Know-how to enable
Extended Producer Responsibility
created by PREVENT Waste Alliance

PREVENT
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EPR Toolbox | Know-how to enable Extended Producer Responsibility for packaging

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MODULE 1

General aspects of EPR schemes for packaging

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Preface, introduction, glossary and key readings

"A circular economy aims to maintain the value of products, materials and resources for as long as possible by returning them into the product cycle at the end of their use, while minimising the generation of waste." [1]

Preface

The global supply of goods has changed drastically over the last 50 years. The number of different products on the market is increasing and individual items are being produced on an ever-increasing scale. Concurrently, innovation in packaging technology has opened up new distribution channels. These have reduced food waste and allowed goods to be stored for extended periods and be transported over long distances. Due to packaging, goods and valuable resources are protected while keeping costs under control. However, pollution caused by packaging disposed of incorrectly is an increasingly serious problem, and one that needs to be addressed urgently by designing products that are easier to recycle, and investing in collection and recycling systems.

These kinds of systems cannot be established without a strong coordinating body, backed up by transparent and stable sources of funding. Making packaging easier to reuse and recycle requires a combination of upstream initiatives and support, which in turn need to be complemented by downstream initiatives to deliver improvements to collection, sorting and recycling systems.

The supply of goods is organised and financed by the private sector. On the other hand, responsibility for waste disposal generally lies with the public sector which, particularly in low- and middle-income countries, is often underregulated and massively underfunded. The issue of who should bear the organisational and financial responsibilities associated with the arising packaging waste and who should be charged with delivering improvements to packaging and recycling infrastructure, is crucial for creating a circular economy.

Experience suggests that the principle of mandatory Extended Producer Responsibility (EPR) can have significant potential to achieve a range of policy objectives. These policy objectives encompass changes both upstream (e.g. design for recycling) and downstream (e.g. increased collection, higher overall rates of recycling and improved technologies for sorting and packaging recycling).

The concept of Extended Producer Responsibility was first devised for Germany's packaging industry in the late 1980s. It is an environmentally-focused approach based on the 'polluter-pays' principle, according to which whoever introduces packaging or packaged goods into a country's market remains responsible for it until the end of the packaging life cycle, including the time period after disposal. Besides packaging, EPR systems often cover electronic devices and batteries, but principally, the system could be applied to any product type.

Since the concept of EPR first emerged, a number of 'EPR systems' have been developed in a wide range of countries. A 2013 study conducted by the OECD stated that over 400 different EPR systems were already in operation.[2] However, not all of these supposedly EPR-based systems actually force producers to assume responsibility for their waste. In many cases, they consist merely of taxes levied on packaging

1 Eurostat (no year). *https://ec.europa.eu/eurostat/web/circular-economy*
2 OECD (2013), What have we learned about extended producer responsibility in the past decade? – A survey of the recent EPR economic literature, Paris

or raw materials, and the revenue raised by the taxes is used to finance general spending. In some countries, EPR legislation is statutory, but it is not enforced.

The owners of many private companies have now recognised that an attitude of 'it was always so' is no longer acceptable, and are keen to help establish EPR systems themselves. This readiness to play an active role will be key to making significant and sustainable progress, and creating a system in which all those involved in the packing value chain assume their share of responsibility.

The EPR Toolbox contains detailed information about EPR, and provides a basic introduction to a number of distinct issues. As individual countries approach EPR from very different starting points, this introduction will have to be complemented by additional studies and discussions in the individual countries concerned. The keys to a successful EPR system are finding ways of bringing the relevant stakeholders together to form a leadership committee, as well as ensuring that the government is willing and able to lead the process.

Extended Producer Responsibility as part of sustainable waste management and a circular economy

All over the world, governments, the private sector, civil society representatives and academics are discussing ways to introduce the concept of the circular economy, with a view to encouraging more efficient use of resources, mitigating the effects of climate change and preventing pollution.

The circular economy is an economic model that promotes a more efficient use of resources by applying the three guiding principles of 'reduce', 'reuse' and 'recycle' to create a circular value chain. In contrast to the traditional model, in which resources are extracted, processed, distributed, consumed and, finally, disposed of, the concept of the circular economy encourages a circular life cycle for resources within the economy. **This helps to maximise the available supply of resources at the same time as minimising the impact on the environment.**

Factsheet 00 Photo 01 (left)

Most non-organic waste is packaging

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Factsheet 00 Photo 02 (right)

Most waste is simply dumped

©cyclos 2019

The circular economy is a promising concept for improving the current treatment of packaging, particularly of plastic packaging in many countries worldwide: Uncollected plastic packaging waste is burned, buried or dumped along streets and canals, which contributes to the pollution of air, soils, water and oceans. Moreover, parts of collected waste leak into the environment during transportation or from dumpsites and landfills.

Estimates suggest that around 2 billion people worldwide lack access to waste collection services, and that the waste generated by some 3 billion people is not treated in an environmentally sound manner.[3] **The need to manage waste properly (including packaging waste), an issue addressed within the concept of the circular economy by ideas like Extended Producer Responsibility (EPR), has therefore become a key issue.**

Countries across Europe, along with other OECD Member States, already have extensive experience in using EPR systems for different types of waste, including packaging. Governments in several low- and middle-income countries have also started to introduce or draft regulations in this area. Besides, a number of companies and business associations have launched voluntary initiatives and committed to reducing the amount of plastic waste leaking into the environment. In some countries, consumer goods industries have formed associations to identify collective action they can take to prevent and manage plastic waste, and are drawing up plans to develop their own EPR-based systems.

The supply chain in a circular economy

The principle of the circular economy requires action at every step of the product value chain and, thus, has important implications for every step. The steps

Factsheet 00
Figure 01

Packaging value chain in a circular economy

3 UNEP, ISWA (2015) Global Waste Management Outlook.

highlighted in green in ▶ Figure 01 are particularly important for transitioning towards sustainable waste management.

In practice, **there are losses at every step of the product value chain. Therefore, it is not possible to achieve a perfect circular economy.** However, if all products and packaging are recyclable, if the system for collecting them as waste works properly, and if demanding technical standards are in place for sorting and recycling waste, then it is possible to achieve an effective circular economy with high rates of recycling.

Organising and financing waste management in a circular economy

Achieving an effective circular economy has important implications for every step of the product value chain. The measures required to do so need to be implemented at a variety of levels and scales, and need to cover more than just waste management. Nevertheless, **sustainable waste management is an essential element in any effective circular economy**. A good waste management system should demonstrate all of the following features, among others:

- Nationwide collection systems,
- Development of recycling infrastructure,
- Recovery at a high-quality level,
- Environmentally compatible disposal,
- Service obligations of the market participants,
- Information, education and awareness among all involved stakeholders.

The two prerequisites for sustainable waste management are reliable organisational structures and stable financing. There are a number of different approaches for meeting these requirements, which can be broadly summarised as follows:

- **The free-market economy-based approach.** This approach can be applied to managing waste where the market for the waste concerned generates enough revenue to cover the costs associated with collection, sorting and marketing it (examples include scrap metals and metal packaging, such as cans).
- **Voluntary initiatives** to finance waste management are usually initiated, implemented and funded by private companies, charitable organisations and/or NGOs. Given the need to make sure schemes are kept on a solid organisational and financial footing, the scope of voluntary initiatives is often limited, for example as a result of limited timeframes or a decision to focus solely on specific waste fractions.
- **Municipal fees** are sometimes used to pay for waste management services. Such charges are essential for financing the management of certain types of waste that cannot be attributed to any specific polluter.
- **Taxes** can have a steering function in several areas but are generally used as a source of funding.
- **Extended Producer Responsibility** (EPR) is an environmental policy approach based on **obliging producers to assume full responsibility for their products**, both during their useful life cycle (e.g. by stipulating compliance with certain health and safety standards) and **during the end-of-life phase** once the products and packaging become waste. EPR systems can be applied to a number of waste streams, but are not suitable for all types of waste.

The suitability of these different approaches depends on the waste stream concerned and the specific circumstances. With this in mind, a sustainable waste management system should encompass multiple approaches in order to cover the full spectrum of waste streams. **EPR is just one** (of several possible) **approaches aimed at creating sustainable organisational and financial structures for waste management**.

Assigning responsibilities among the various stakeholders is a key factor in the success of any EPR system. These responsibilities should be clear and unambiguous. Generally speaking, waste can be assigned to two different categories as follows:

- **Waste for which no single producer is responsible.** Specifically, this category includes residual waste, organic waste (compost), etc.
- **Waste that is introduced to the market by an identifiable party, who should then assume responsibility for its disposal** (for example, waste introduced by domestic producers or importers). This category includes waste like packaging, electronic devices, batteries, cars, etc. EPR can be successfully applied to this kind of waste, and brings major implications for waste disposal procedures.

Extended producer responsibility in a circular economy

As mentioned above, EPR is increasingly recognised as a key concept for 'closing the loop' in the packaging value chain, as it obliges producers to assume responsibility for their products.[4] The notion of producer responsibility is not new, and has already been incorporated into the overarching concept of 'Global Producer Responsibility'. However, EPR is founded on a broader approach:

- Global Producer Responsibility means that producers/importers are responsible for their products as far health and safety and environmental impact are concerned.
- On the other hand, Extended Producer Responsibility means that producers/importers are responsible for their products until the end-of-life stage, after their packaging and products become waste. It therefore extends to the work of collecting, sorting and recycling this waste.

The involvement of a third party, known as the Producer Responsibility Organisation (PRO) or system operator, is usually required in order to coordinate and operate collection, sorting and recycling systems for packaging under EPR. This name reflects the central role this third party fulfils in the system, as illustrated in ▶ Figure 02.

◀ **Factsheet 00**
Figure 02

Transitioning to a sustainable waste management system for packaging

4 EPR systems can be implemented using this general method for a number of different waste streams. However, the way in which each individual system operates in practice will differ. This example is based on an EPR system for packaging (using all possible types of materials).

Glossary

The glossary is based on the definitions of the UNEP/Basel Convention entitled 'Draft practical manuals on Extended Producer Responsibility and on financing systems for environmentally sound management' (2018).[5] Definitions directly quoted from the manuals are marked with a *.

Deposit-Refund System (DRS)	A system in which a surcharge is added to the purchase prices of certain products and containers. If consumers return these containers or products after use, the surcharge is refunded.
Disposal	Refers to any waste management operation not defined as recovery. Any activity that later results in secondary treatment in order to reclaim valuable substances or energy is also classified as disposal.
Energy recovery	A process in which energy (heat, electricity, fuel) is generated from the primary treatment of waste. The most common application of this process is in incineration. Energy recovery is not considered material recycling.
EPR fee	The price paid by a producer to the Producer Responsibility Organisation/system operator in return for carrying out the producers' responsibilities.
EPR system	Any system set up by one or several producers to implement the EPR principle. It can be an individual system (or individual compliance system) where a producer organises its own system, or a collective system (collective compliance system) where several producers decide to collaborate and thus fulfil their responsibility in a collective way through a specific organisation.*
Extended producer responsibility (EPR)	Environmental policy approach in which a producer's responsibility for a product is extended to the waste stage of that product's life cycle. In practice, EPR involves producers taking responsibility for the management of products after becoming waste, including: Collection; pre-treatment, e.g. sorting, dismantling or de-pollution; (preparation for) reuse; recovery (including recycling and energy recovery) or final disposal. EPR systems can allow producers to exercise their responsibility either by providing the financial resources required and/or by taking over the operational aspects of the process from municipalities. They assume the responsibility voluntarily or mandatorily; EPR systems can be implemented individually or collectively.*

5 *http://www.basel.int/Portals/4/download.aspx?d=UNEP-CHW-OEWG.11-INF-7.English.pdf*

Fee	Price paid by a producer to the Producer Responsibility Organisation to deal with its responsibility.*
Feedstock recycling	The process of breaking down plastic polymers into monomers and other basic chemical elements. These monomers can be used as alternatives for virgin material for manufacturing new polymers. This process is particularly useful for plastics that are difficult to recycle because they are of low quality, of low economic value, or of composite construction. However, the process produces hazardous substances and requires high energy-input.
Free riders	Producers and importers that enjoy the benefits of the EPR system without paying the corresponding fees, including those that under-declare waste volumes.
Individual producer responsibility (IPR)	Each individual producer is responsible for the collection and disposal of waste originating from their own products.*
Material recycling	Describes a recycling process in which waste materials are mechanically reprocessed into products, materials or substances with equivalent properties (also referred to as closed-loop recycling) or a product that requires lower levels of these properties.
Manufacturer/Converter	A company that produces packaging by converting raw material.
Landfill	A location where municipal solid waste is disposed of. For a landfill site to qualify as a sanitary, proper environmental precautions must be in place, such as wastewater treatment facilities or sealed landfill. If these conditions are not met, the site is considered an unsanitary landfill.
Obliged companies	Companies that are obliged to pay a fee within an operational EPR system. In most cases, these companies are domestic producers and importers introducing packaged products into the market.
Orphan product	Products that are on the market and for which a producer can no longer be identified.*
Polluter pays principle	According to this principle, the waste producer or owner is the potential polluter and bears (financial) responsibility for any pollution it causes. The ‘polluter pays’ principle is designed to provide the necessary incentives for environmentally friendly conduct and to encourage the required investment in environmentally-friendly waste management.

Producer	The entity whose brand name appears on the product itself or the importer. In the case of packaging, the filler of the packaging is considered the producer*.
Waste prevention (measures)	Measures taken before a substance, a material or a product becomes waste. This includes the reuse of products and measures to extend a product's lifespan. Waste prevention reduces the quantity of waste produced and the amounts of hazardous substances in use, as well as mitigating the adverse impacts of the waste generated on the environment and human health.
Producer Responsibility Organisation (PRO)	Collective entity set up by the obliged companies or through legislation, which becomes responsible for meeting the waste collection and disposal obligations of the individual obliged companies.* The PRO is the most important stakeholder (organisation) in an EPR system and is responsible for setting up, developing and maintaining the system, as well as for the take-back obligations of the obliged companies. In some contexts, the PRO is also used as an abbreviation for Packaging Recycling Organisation. However, this Toolbox does not use it in this sense.
Recovery	Describes any activity in which waste serves a useful purpose, for example by replacing other materials or by leveraging its material properties (examples include preparing material for reuse, recycling as part of material or feedstock recycling, and energy recovery).
Recyclables	Materials that still have useful physical or chemical properties after serving their original purpose and can therefore be re-manufactured. Some also have a significant commercial value (e.g. rigid PE, PET bottles).
Recyclates	Products that have passed through a life cycle and a subsequent recycling process, meaning the product is made from used materials (e.g. plastic granules).
Recycler	A company that recycles pre-processed waste streams (e.g. sorted rigid PE plastics) by washing, flaking, agglomerating and regranulating them. In doing so, the recycler produces an economically marketable product.

Reducing	The practice of using less material and energy in order to minimise the amount of waste generated and to preserve natural resources. It includes measures designed to prevent materials from becoming waste before they are recycled, as well as reusing products (*see below*).
Reuse	The repeated use of a product in the same form for the same or a different purpose. A product being reused does not qualify as waste.
Single use plastic products	Single use plastic products are products that are made wholly or partly from plastic and that are not designed to go through multiple life cycles after their introduction to market, for example, by being returned to a producer to be reused for the same purpose for which they were originally designed.
Solid Waste Management (SWM)	The storage, collection, transportation and disposal of solid waste. Also describes a practice whereby multiple waste management techniques are used to manage and dispose of specific components of solid waste. Such waste management techniques include waste prevention, reduction, reuse, recycling, recovery and disposal.
Source separation	The segregation of specific materials at source for separate collection.
Stakeholder	All actors involved in the life cycle of a product including: Producers, retailers, consumers, local authorities, public and private waste management operators.*
System Operator	Synonym for Producer Responsibility Organisation
Waste hierarchy	A tool for ranking waste management options according to their environmental impact. It gives top priority to preventing waste wherever possible. Where waste is generated, the options considered for handling it are, in order by priority: preparing for re-use; recycling; recovery and, as a last resort, permanent disposal.
Waste management	The term waste management describes typical activities including (a) the collection, transport, treatment and disposal of waste, (b) the control, monitoring and regulation of the production, collection, transport, treatment and disposal of waste and (c) the prevention of waste via in-process modifications, reuse and recycling.

Key readings and other sources

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PROsPA: *https://prospalliance.org/*

Factsheet 01

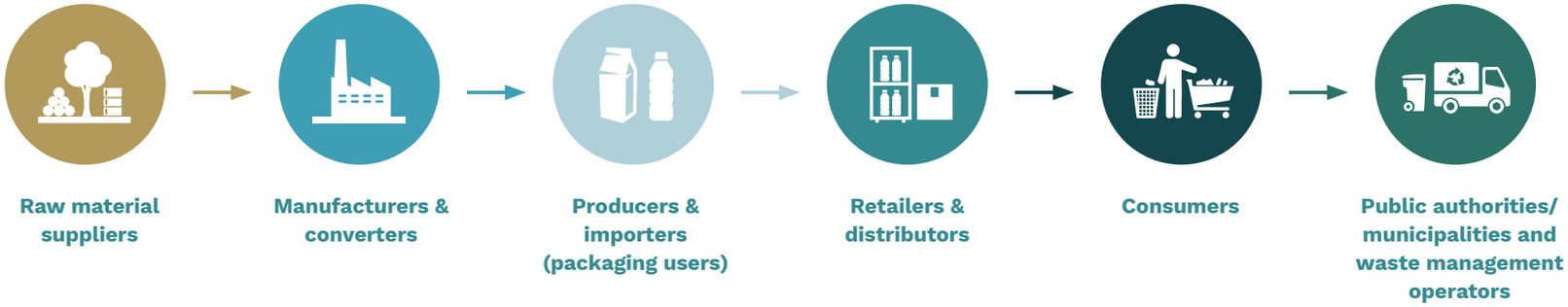
How can roles and responsibilities in packaging value chains be defined?

This factsheet outlines the basic principles of EPR for packaging and describes the possible roles of stakeholders within the packaging value chain. It discusses a number of options for assigning responsibilities as well the steps that need to be taken in order to build a consensus and prepare the ground for the establishment of an EPR system. It also identifies common pitfalls and conflicts within existing EPR schemes and suggests how they can be resolved.

In many countries, the management of municipal solid waste, including packaging waste, is the responsibility of the state, and is usually carried out at municipal/local authority level.[1] The packaging waste is either directly collected by the relevant state authority or by private companies working on the state's behalf. The costs of such systems are borne by the local authorities and/or national government, with citizens contributing financially through their municipal solid waste fees or taxes.

Producers of packaged goods and other stakeholders along the packaging value chain are only held responsible for ensuring their products meet certain health and safety standards.

In such systems, funding often only covers the collection of municipal solid waste, transport and disposal at landfills or open dumpsites. Local authorities frequently lack expertise and resources. Recycling often relies on the informal sector, within which multiple stakeholders collect, sort and recycle materials with a sufficiently high material value, often under inadequate welfare and environmental conditions. Transitioning towards sustainable waste management and a circular economy therefore requires a new approach, one that involves all stakeholders at every stage of the packaging value chain.



Factssheet 01 Figure 01

Stakeholders in the packaging supply chain

1 This document focuses solely on the packaging waste stream (all packaging materials). Other waste streams, such as residual waste, organic waste, WEEE, bulky waste, etc. may be the responsibilities of other entities, such as municipalities, local authorities or producers and importers of the specific goods concerned.

Extended producer responsibility (EPR) is a policy instrument for the sustainable organisation and financing of specific waste streams, such as discarded packaging. It **obliges producers to assume responsibility for their products up to and including the end-of-life stage of their product cycle.** In EPR systems, producers are responsible not only for health and safety issues associated with their products. Moreover, producers are responsible for the management of packaging waste, including collection, sorting and recycling, as well. Thus, EPR systems tie producers into financing and organising management systems for packaging waste, a development with significant implications for the other stakeholders involved in the value chain.

Implementing an EPR system **enhances the interactions between different stakeholders, as well as assigning them new responsibilities.** The precise nature of these responsibilities varies to reflect the institutional landscape in each individual country and exactly how the EPR system operates in practice. As EPR schemes for packaging only cover part of the total volume of municipal solid waste, they need to be integrated into broader waste management and circular economy policies.

Assigning new roles to producers and importers

Obliging producers to assume responsibility for their packaging waste forces them to take on a new role in the value chain. The term **'producer' refers to any company that introduces packaged goods for consumption to a national market. Also, the product will be discarded in the same national market.** It is irrespective of whether the product is produced domestically or imported. This definition helps to maintain a level playing field between companies importing packaged products (importers) and companies that package their products within the country concerned (domestic producers). As these companies are obliged to assume extended responsibility under the EPR system, they are referred to as the **'obliged companies'** within the system. ▶ See Factsheet 03 A suitable legal framework should be drawn up to underpin the EPR system and make it mandatory for obliged companies to ensure compliance, including appropriate monitoring mechanisms and enforcement powers. ▶ See Factsheet 05

The change in the role fulfilled by the obliged companies has a **knock-on effect on the roles and responsibilities of the other stakeholders** right along the packaging value chain. This is why a successful EPR system needs the active participation of all stakeholders.

Stakeholders		Roles & responsibilities in an EPR system
	Raw material suppliers, manufacturers, and converters of packaging material	The first step in the value chain. Provide packaging material for domestic producers and importers – either from virgin raw materials or secondary resources (recyclates). Recyclates are used where applicable according to the grade required for the relevant application – e.g. only food grade recyclates can be used for food packaging. The design of their packaging is a crucial determinant of the reusability and recyclability of the resultant packaging waste. By using recyclates they can 'close the loop' as part of the circular economy.
	Producers, and importers of packaged goods (obliged companies)	Introduce packaged goods to the market by selling packaged imported products or locally produced products to retailers. They are responsible for ensuring that their **packaging waste is properly collected, sorted and recycled**. They may assume this responsibility directly themselves or pay a third party to carry out the responsibility on their behalf (see individual and collective responsibility). Producers and importers can also influence packaging design and demand that a minimum proportion of recycled material is used in the packaging they purchase. This applies to packaging waste from households, but also to waste from equivalent places of origin (e.g. restaurants, local food vendors, hospitals). These stakeholders are responsible for demanding improvements in packaging design and that packaging from manufacturers and converters of packaging materials should be easily recyclable.
	Distributors & retailers of packaged goods	Supermarkets and stores represent the interface between the private sector and end consumers of packaged products. In many EPR systems, retailers are also under an obligation to take back packaging, for example, by providing **separate bins** for glass, paper, plastics and other material fractions. They also need to **educate their customers** about environmentally sound ways of handling packaging waste.

Factsheet 01
Table 01

Overview of stakeholders' roles and responsibilities in the packaging value chain

Stakeholders		Roles & responsibilities in an EPR system
	Consumers	**Consumers must dispose of packaging correctly,** ideally by **separating the waste at source to ensure high-quality recycling.** They need to be aware of strategies for waste reduction and observe strict hygiene standards.
	Waste management operators	Collect and recycle packaging in accordance with the highest possible standards, thus ensuring high-quality recycling. This responsibility also extends to companies operating in the informal sector.
	Local authorities/ municipalities	Provide linkages between consumers and waste management operators through communications and the provision of information, and by supporting collection.
	Government and other public authorities	Responsible for legislation governing the EPR system, and for supervising its operation **(if the system is mandatory).**

Factsheet 01
Table 01

Overview of stakeholders' roles and responsibilities in the packaging value chain

EPR in practice

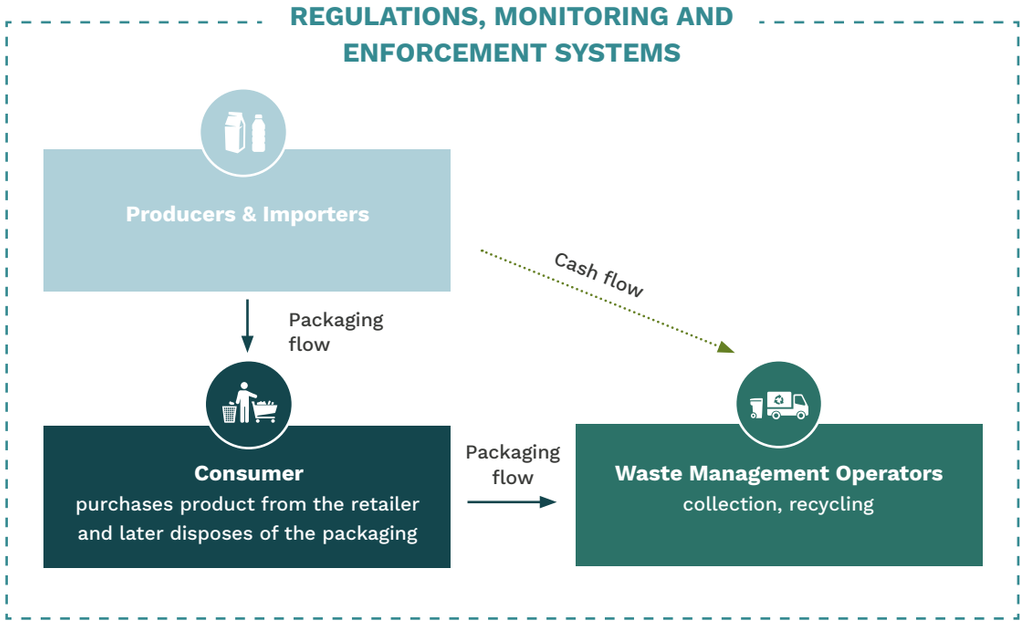
Defining roles and responsibilities is a political process involving multiple stakeholders. The specific roles and responsibilities assigned to each stakeholder always depend on the circumstances at play, including the applicable legal and institutional frameworks. For instance, the framework defines if waste is collected by the municipal authorities or not. Responsibilities also have to be consistent with the structures of the existing or planned EPR system and its various components, since the way systems are set up and operate in practice vary between countries.

Although operational EPR systems vary significantly between countries, all EPR schemes should be designed to strike a balance, simultaneously managing producers' obligations at the same time as ensuring that environmental policies are implemented as appropriate and in line with the 'polluter pays' principle. Accordingly, the basic principles of EPR systems are almost the same in every country:

- Every producer pays a fee when introducing a packaged good into the market. This fee is proportional to the amount of packaging being introduced.
- The fee covers the collection, sorting and recycling of the packaging waste.
- Collection, sorting, and recycling or energy recovery of packaging waste remains the responsibility of the producer(s) concerned. However, the activity required to exercise this responsibility can be delegated to other companies or organisations.

EPR systems can be implemented based on individual responsibility, collective responsibility, or a mixture of the two. The decision as to the most appropriate model for an individual system should be discussed as part of a political, multi-stakeholder dialogue, and the exact details of the model agreed upon should be clear to all stakeholders.

An EPR system based on individual responsibility



Factsheet 01
Figure 02

Individual responsibility

In its simplest form, an EPR system is based on producers taking **individual responsibility** by **directly interacting** with producers and importers and the institution that generated the respective waste. In a system based on individual responsibility, obliged companies either collect waste themselves or pay a waste management operator to collect waste and fulfil take-back obligations. Making the obliged

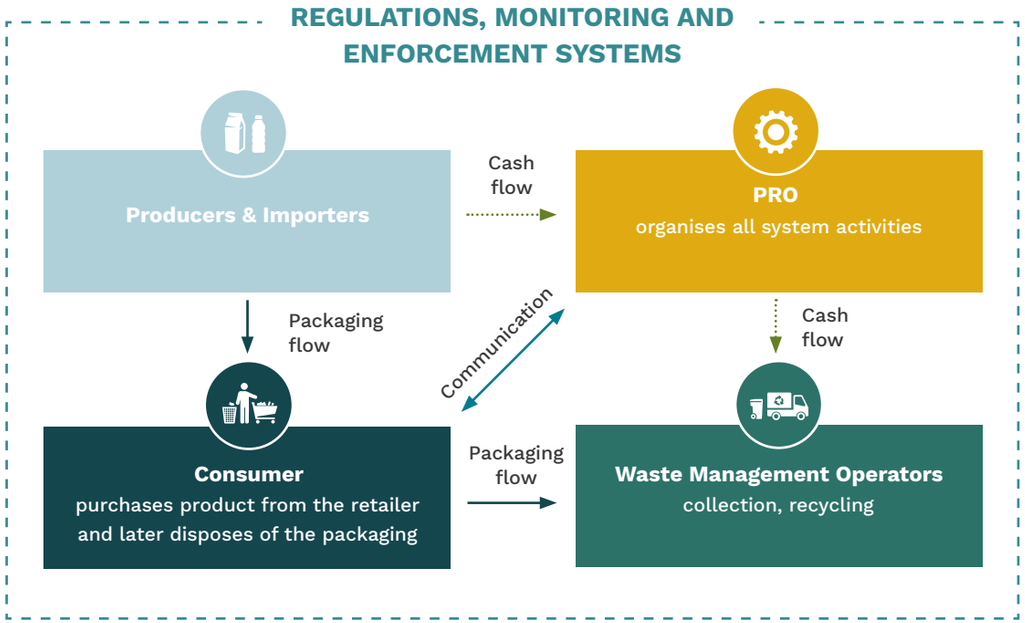
companies take responsibility directly provides an incentive for them to invest in ways of reducing the amount of packaging they use, and to ensure that their packaging is designed for recycling or reuse.

This model requires the obliged companies to be fully aware of exactly how much of their packaging becomes waste, where this transition occurs specifically, and how to access these areas. However, in practice this is not always possible. Moreover, household packaging waste and waste from similar points of origin usually contains many different types of packaging, made by various brands, so returning it all to the consumer goods companies that introduced it to the market in the first place would be very difficult and inefficient from a logistical perspective. To do so, all packaging waste would have to be sorted by brand (i.e. by obliged company) at every individual collection point in the system, so that the obliged companies (or the waste management companies operating on their behalf) could separate their own waste out from the rest and collect it individually.

Therefore, EPR systems based on individual responsibility are much more suitable for industrial packaging (where packaging is often made of mono-materials and producers know where waste is generated) than they are for dealing with household packaging. In most cases, handling household waste requires a different, more practical model based on **collective responsibility**.

An EPR system based on a collective responsibility

As the name implies, a collective responsibility scheme transfers the waste management responsibilities of the producers and importers to a third body within the EPR system, in the form of the **Producer Responsibility Organisation (PRO)** or **system operator**. Under this system, the PRO assumes responsibility for organising all waste management activities within the system. This structure means obliged companies can fulfil their responsibilities by working together to manage the waste generated jointly. **EPR systems based on collective responsibility bring a 'new' stakeholder into the EPR system**, when compared with systems based on individual responsibility.



Factsheet 01 Figure 03

Collective responsibility managed by a PRO

Since the PRO organises packaging waste management activities on behalf of all participants in the system, there is no need to sort the waste by brand. In turn, this leads to a **significant reduction in the cost and logistical challenges associated with managing packaging waste.** This is why, in most countries, household packaging waste is managed using a collective EPR system. ▶ See Factsheet 02

Individual vs collective responsibility

When it comes to allocating roles and responsibilities in an EPR system, the key factor is whether the system is based on individual or collective responsibility. As mentioned above, managing household packaging waste using an individual responsibility system is very challenging, and often not feasible from a practical point of view. Most effective EPR systems for household packaging waste are therefore based on the principle of collective responsibility.

Criteria	Individual responsibility	Collective responsibility
Financial aspects	Producers and importers pay directly for their packaging waste to be collected and treated.	Producers and importers pay their waste collection fees to the PRO, which pays the waste management operators to collect and treat waste.
Organisational aspects & practicalities	Producers and importers need to know the exact distribution of their packaging and be able to access it, wherever it may be. This poses logistical challenges, especially when products are distributed in small quantities, because the logistics infrastructure required to process small volumes is very similar to that required for larger volumes and carries similar costs.	The PRO carries out the system's operational activities on behalf of the producers and importers, resulting in significantly reduced costs and simpler logistics.
Monitoring and enforcement	A state agency needs to monitor, and if necessary, enforce, that every single obliged producer and importer fulfils all of their tasks and responsibilities.	The PRO needs to fulfil all the tasks and responsibilities assigned to it, and its performance is monitored, and if necessary, enforced, by a third party, such as state a body or external auditor.

◀ Factsheet 01
Table 02

Individual vs collective responsibility schemes

Common pitfalls and conflicts and how to resolve them

The most common difficulty in establishing an operational EPR scheme, containing clear roles and responsibilities, is reaching an unambiguous agreement as to which companies are, and are not, obliged under the system. This requires a clear definition of what constitutes an obliged company, as well as cooperation between multiple ministries and/or agencies to identify the companies concerned.

Other pitfalls and conflicts may be related to country-specific conditions, such as geography and the political and socio-economic climate.

Key readings and other sources

PREVENT Waste Alliance (2021).
Video series:
EPR Explained! (01) Introduction, roles and responsibilities

OECD (2016). Extended Producer Responsibility. Updated guidance for efficient waste management.

Basel Convention (2019). Practical Manual on EPR.

IEEP (2019). How to implement extended producer responsibility (EPR). A briefing for governments and businesses.

Kenya Association of Manufacturers (2019). Kenya Plastic Action Plan.

Factsheet 02

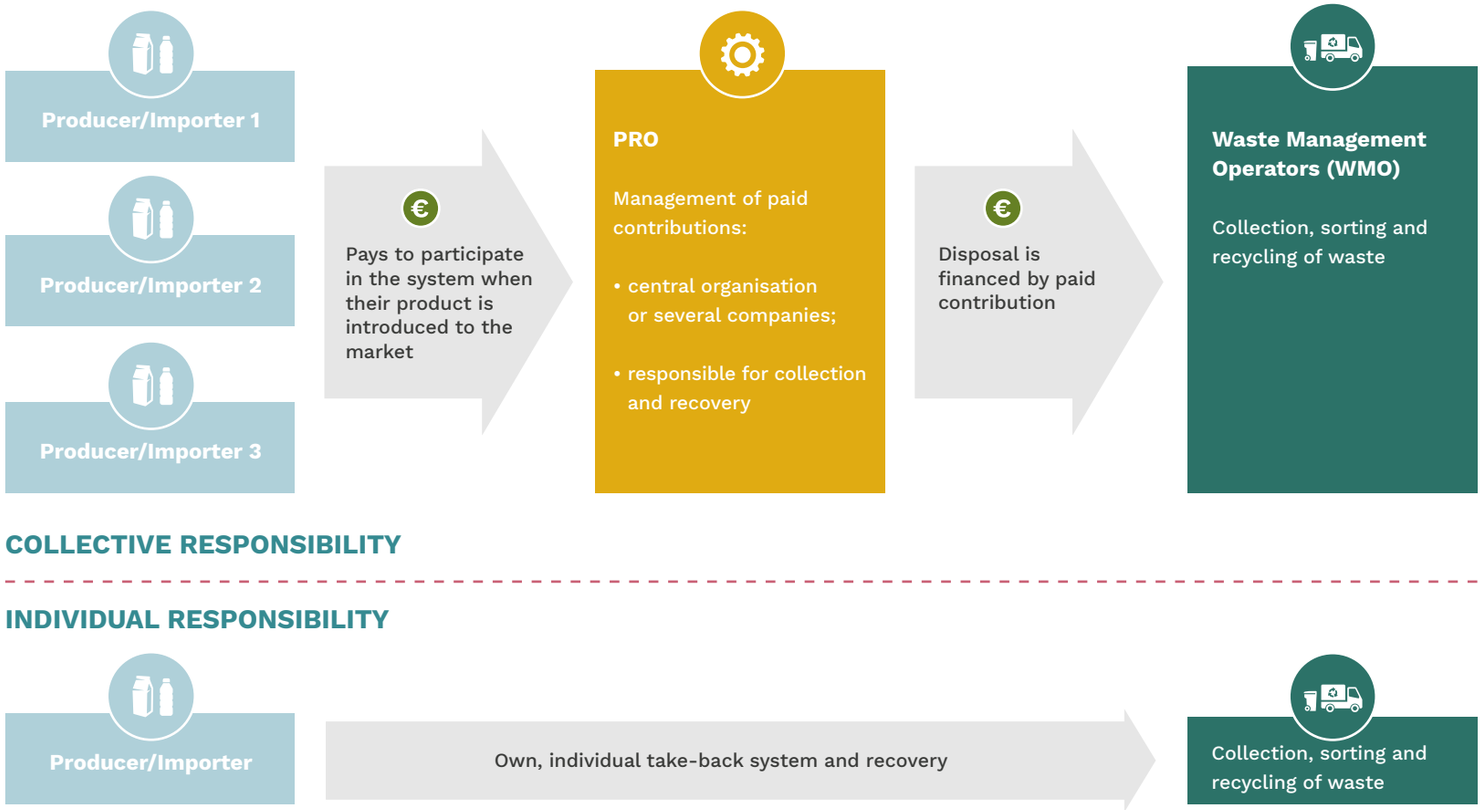
How can a PRO be established?

This factsheet outlines the key elements of the process of setting up and developing a PRO (system operator). It describes the roles and responsibilities of a PRO, who the operating body's members should be and how it should be organised (non -profit vs. for-profit). It also sets out arguments for and against using a single PRO as opposed to setting up several competing PROs.

All over the world, governments are looking to move towards a circular economy to encourage a more efficient use of resources, mitigate the effects of climate change and prevent pollution. At the same time, private-sector stakeholders increasingly recognise the part they can play in fighting plastic pollution. EPR is increasingly acknowledged as a tool for transitioning to a circular economy, and action has been or is being taken to accelerate this transition in an increasing number of countries. One of the key parts of this process is the need to establish and operationalise an effective Producer Responsibility Organisation (PRO).

The Role of the PRO

In an EPR, companies have to take either individual or collective responsibility for their waste. Since it is more challenging to monitor and enforce systems based on individual responsibility, collective responsibility models are more common.
▶ See Factsheet 01 A collective responsibility system requires a central organisation within the EPR to coordinate activity within the system. This organisation is known as the **PRO or the system operator**, and takes over the responsibilities of the obliged companies in the collective system. This allows obliged companies to take joint responsibility for their products and the packaging waste that they create.
▶ See Figure 01

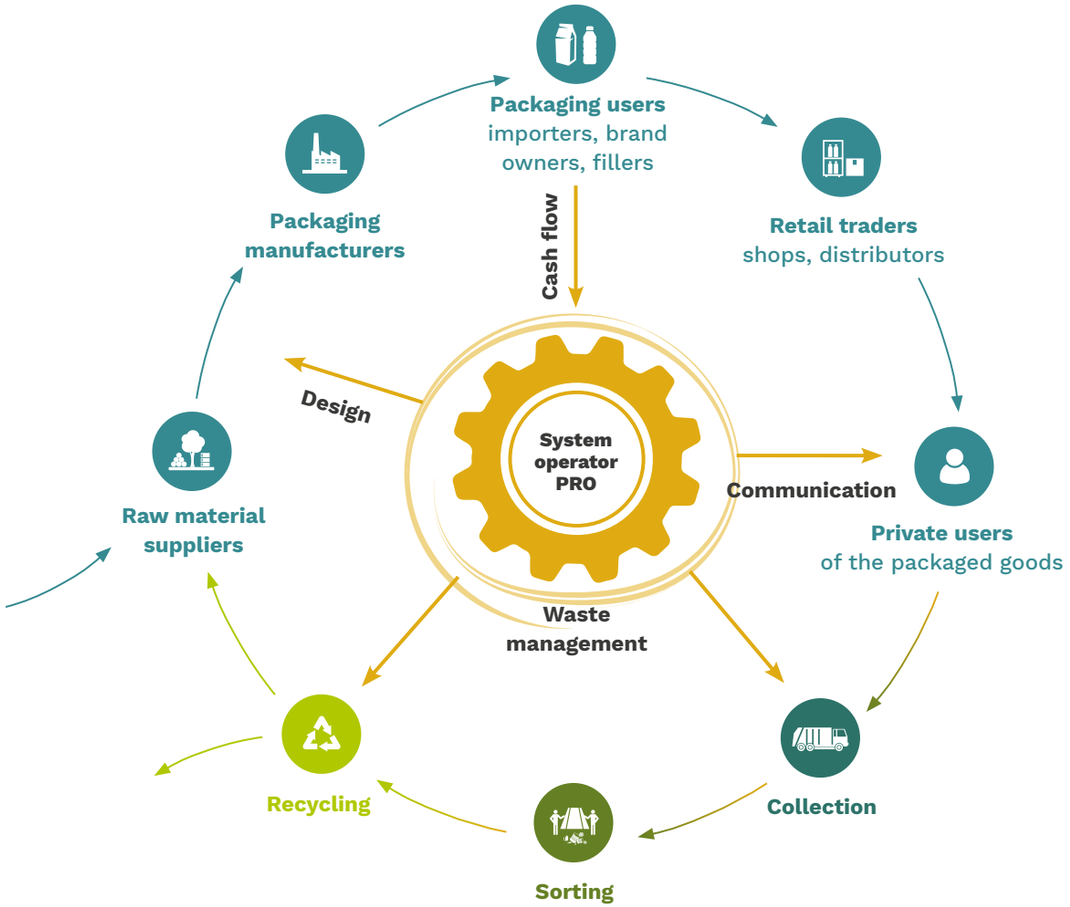


Factsheet 02
Figure 01

Comparison of collective and individual EPR systems

According to this structure, the PRO becomes the central body for organising all activities associated with the EPR system. Specifically, this means the PRO is:

- The most important stakeholder for operating the system (which it does as an organisation with it).
- Responsible for setting up, developing and maintaining a circular economy system.
- Responsible for fulfilling the take-back obligations of the obliged companies.
- Responsible for communication, providing information and research and development.



Factsheet 02
Figure 02

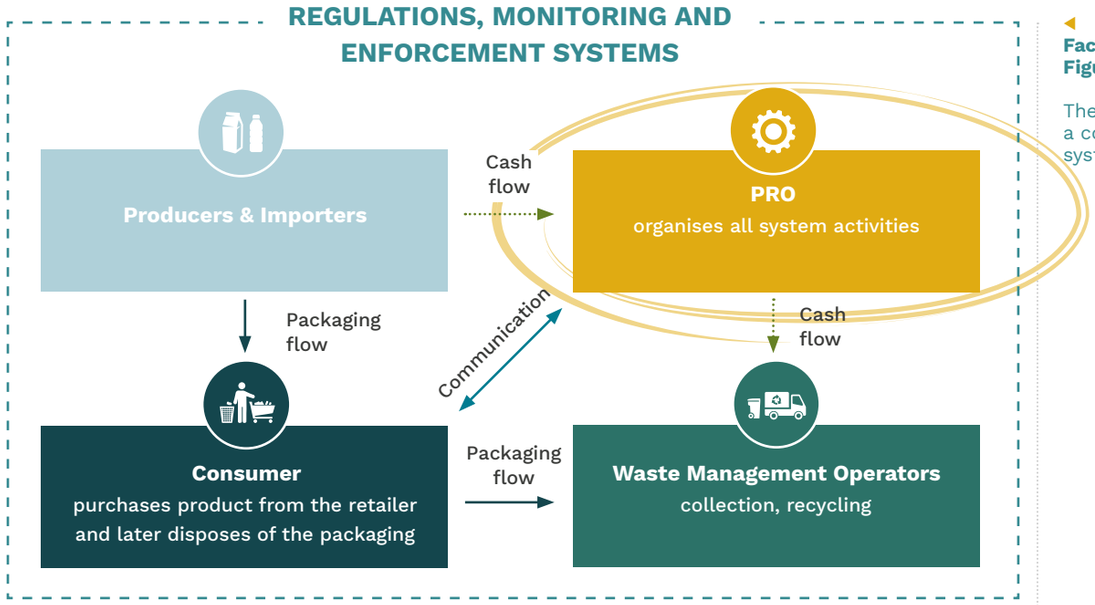
The PRO organises all activity within the system

The PRO has to fulfil all its responsibilities, which means it has to be supervised. This role is usually performed by the local Ministry of the Environment or by a third party appointed by the Ministry. However, in order to ensure fair competition, it is also important that companies paying fees into the system are represented on the monitoring committees.

EPR systems, and, by extension, the PRO, can be organised on a voluntary or a mandatory basis. However, voluntary EPR systems are by definition limited in scope, as there is no legal framework in place to ensure compliance and secure reliable sources of funding. Generally speaking, only a small number of companies participate in such voluntary systems, which in turn limits the size and number of the projects they can implement. Voluntary systems can also distort competition because they do not ensure a level playing field.

For all these reasons, setting up a comprehensive collection system on a voluntary basis is not usually feasible, as the costs would be borne entirely by a small number of companies. Participation in voluntary schemes is often tied to companies' Corporate Social Responsibility budgets, or dependent on specific business cases that only apply to high-value materials. Long-term coverage of operational costs is not guaranteed and there is no official monitoring system.

A mandatory system enables a level playing field between all the companies obliged to participate and secures reliable sources of funding. It also allows an integrated collection system to be set up for all packaging materials – including those that have little to no market value. A PRO is crucial to the success of such systems.



Factsheet 02 Figure 03

The PRO within a collective EPR system

Tasks of the PRO

The PRO's overall task is substantially the same in all EPR systems, regardless of the specific conditions to which it is subject. The **PRO's tasks** generally include:

- **Registering all obliged companies** (*in cooperation with the supervisory authorities*). To maintain the level playing field and stop free-riding, all obliged companies need to be registered. 'Obliged companies' for registration purposes are defined as the companies that introduce packaged goods into the market for sale and consumption in the country concerned, meaning that their waste packaging also needs to be managed in that country. ▶ See Factsheet 04

- **Collecting and managing all funding** received from the obliged companies, and ensuring that the fees charged are fair and do not harm the competitiveness of any participating company. ▶ See Factsheet 03
- **Managing tenders and contracts** for all activities conducted as part of the EPR system (e.g. the collection, sorting, and recycling of packaging waste).
- **Documenting** the collection, sorting and recycling of packaging waste.
- **Informing and educating** all waste producers and consumers about the importance of an environmentally sound waste management system, including on issues like separate collections. ▶ See Factsheet 09
- **Monitoring** all the services that have been assigned to service providers, and specifically all services relating to the fulfilment of collection and recycling responsibilities by waste management companies.
- **Funding all activities** using funds provided by the obliged companies. ▶ See Factsheet 03
- **Providing documentary evidence and verification to the supervisory authorities.** The PRO has to prove that it has fulfilled all its responsibilities in full, and has used the fees paid by the obliged companies in accordance with the agreements made.

Aside from these activities, which are related to fulfilling the PRO's responsibilities in an EPR system, there are also a number of additional, more general tasks the PRO must carry out. These include managing the members of the EPR system, interacting with relevant authorities, billing and invoicing, operating IT systems and ensuring they meet the needs of the members, business planning, book-keeping, cash flow management, setting targets, monitoring performance, carrying out audits and complying with reporting requirements. The precise way in which the PRO is organised will depend on the structure of the PRO (e.g. whether it is set up as an association, a foundation, a joint stock company, etc.) and the context applicable in the country concerned.

Options for setting up a PRO

The way the PRO fulfils its various tasks can be influenced by the way it is set up. As far as the structure is concerned, the major differences usually have to do with:

- Whether the PRO is state-led or industry-led (▶ see Table 01).
- Whether the PRO is non-profit or for-profit (▶ see Table 02).
- Whether the PRO is a single PRO or if there are multiple PROs within the same EPR system.
- Whether the PRO covers all packaging or specific packaging types only (▶ see Table 03).

Experience gained in a number of European countries has demonstrated that there is no one structure that will guarantee success. Rather, the success of a PRO depends on an effective and efficient organisational structure, sufficient funding, effective administration, and monitoring and enforcement of the EPR system.

Industry-led PROs vs state-led PROs

In line with the basic principles of the EPR, the PRO is usually established by private industry. Nevertheless, it is possible to make the PRO part of a public authority.

- **Industry-led PROs:** Industry-led PROs are established by companies, associations or other organisations from the private sector. These PROs are supervised by public authorities to ensure they fulfil their roles and responsibilities. However, the day-to-day operation of the EPR system is not directly connected to any public authority. Most PROs are industry-led and organised by producers, while other PROs are organised by private investors or waste management companies.
- **State-led PROs:** State-led PROs are run by a public authority, for example where the PRO becomes a department within a government ministry. Examples of such state-led PROs include the Eco-Lef system in Tunisia and Taiwan's Waste Recycling Management Fund.

Criteria	Industry-led PRO	State-led PRO
Financial aspects	EPR fees are not connected to public funds and reflect the costs incurred by the PRO in carrying out its duties. Funding must be transparent and traceable (both internally and externally for monitoring purposes).	Systems must be in place to ensure that PRO funds are only used for the EPR system, and not diverted for other purposes or the general budget (i.e. that the funds are not treated like taxes).
Organisational aspects & practicalities	Significant effort required in relation to interactions with private stakeholders and public authorities. Companies have to take the lead in establishing the PRO.	There must be sufficient capability, expertise and resources within the public administration in order to set up the required structures and collect funds from obliged companies. There is no scope for industry initiatives run by highly-motivated private companies wishing to contribute.
Free rider issue	It is in the PRO's interest to avoid free-riding and maintain a level playing field.	Prone to corruption (particularly in countries with high rates of corruption).
Monitoring	Monitored by an outside party, such as a public agency.	Difficult. No independent, external party to supervise and enforce any sanctions.

Factsheet 02 Table 01

Industry-led vs. state-led PROs

Single non-profit PROs vs competing for-profit PROs

The key distinction between **industry-led PROs** is whether the PRO is set up as a for-profit or a non-profit organisation.

- **Non-profit PROs:** Non-profit PROs are owned by the obliged producers and by industry representatives (examples include those in Belgium, Norway and Spain). The obliged industry creates a joint non-profit entity that collects the necessary funds.
- **PROs as for-profit corporations:** In some cases, the law requires direct competition between several PROs rather than allowing a single PRO to exercise a monopoly. This is the model used in in Germany and Austria, for example, where competition rulings have forced the system to evolve from a single PRO to one in which multiple PROs competing with each other.

The number of PROs in an EPR system (whether there is a single PRO with a monopoly or several PROs in competition) tends to be determined by whether the PRO is non-profit or for-profit. Practical experience has shown that **non-profit PROs operate most fairly when there is only one PRO** (operational monopoly). On the other hand, **PROs set-up as for-profit corporations operate most fairly when they compete** with other PROs.

Criteria	Non-profit PRO	For-profit PRO
Financial aspects	The fees collected reflect the costs incurred in implementing and operating the system. They are regularly reviewed based on spending and revenues collected.	Competition leads to high price pressure. This means that while PROs can make profits, they can also make losses and, in some cases, become insolvent.
Organisational aspects & practicalities	The PRO has no economic interest of its own, allowing higher levels of transparency.	Less transparency as a lot of information is not disclosed. Each PRO is responsible for organising itself.
Free rider issue	As there is only one PRO, it is easier to identify free riders when obliged companies pay EPR fees to the PRO.	More difficult to make sure that every obliged company pays its EPR fees to the PRO. A separate register is needed. Competing PROs have a vested interest in acquiring companies as participants in their systems, whereas monopolies can survive by increasing prices.
Monitoring	The effort associated with monitoring is lower than for a for-profit PRO.	A high level of monitoring is necessary as there are multiple, competing PROs and a lower level of transparency.

Factsheet 02
Table 02

Non-profit PROs vs for-profit PROs

PROs for all packaging materials vs PROs for specific packaging materials

The last decision that has to be made is whether the PRO will be responsible for packaging materials of all types, or whether it should only cover selected material fractions.

- **PROs for all packaging:** Here the PRO is responsible for setting up and operationalising the system for all kinds of packaging materials (plastics, paperboard and card materials, metals, glass, and all composites and beverage cartons). In the Netherlands, for example, it is a legal requirement that the PRO must cover all types of packaging and materials.
- **PROs for specific packaging:** If it is possible to separate specific, clearly identifiable packaging streams (e.g. glass, paper and cards, industrial and transport packaging) and collect them separately, a PRO can be set up solely for these specific packaging streams. For instance, in Spain there are two PROs – Ecovidrio for glass, and EcoEmbes for other packaging materials. In Belgium, Valipac is the PRO for industrial and transport packaging, while FostPlus is the PRO for household packaging.

Criteria	PRO for all packaging	PRO for specific packaging
Financial aspects	Less dependent on external events due to the variety of materials. Internal cross-subsidies can compensate for fluctuations in the prices of individual materials.	Highly dependent on external developments affecting the price of the material.
Organisational aspects & practicalities	Obliged companies can register for all packaging materials with one PRO.	Obliged companies that handle multiple packaging materials need to register with more than one PRO, increasing their administrative burden. The fees for the different materials need to be balanced out to avoid any unwanted shifts in the materials used for packaging.
Free rider issue	There is no difference between the two models.	
Monitoring and enforcement	Less specific and in-depth monitoring at company level.	Monitoring is more difficult, but supervisors can exercise a deeper level of control.

Factsheet 02 Table 03

PROs for all packaging materials vs PROs for specific types of packaging

Structure and members of the PRO

Initiating an EPR scheme, and especially a PRO, is a complex process in which multiple stakeholders need to be included. This process is highly dependent on the individual circumstances surrounding the scheme. Any existing legal requirements and voluntary initiatives should generally be taken into account when setting up an EPR and/or PRO.

In principle, a PRO can be structured differently depending on the specific circumstances, legal framework and general political context in the country concerned. For example, a PRO can be constituted as an association, a foundation, a limited liability company or a corporation. The choice of structure then determines who the PROs members should be.

The members of a PRO often fall into three distinct categories:

1. **Executive board members** are responsible for managing operational activity, spending and monitoring. The management structure may consist of one or more people, and its members can be elected by the members or externally appointed. If the PRO is organised as an association, management responsibilities are usually split between an elected management board and a group of professional managers (sometimes known as a secretariat).
2. **Partners or members** (*see below*).
3. **Advisers/advisory board** advise the PRO on its work. Therefore, it is very important that they are kept informed of recent developments, innovations, news, and any other relevant details.

Generally speaking, all relevant stakeholders involved in the supply chain should participate in the PRO. However, the precise composition of the PRO and exactly how individual members contribute to it are highly dependent on the specific context in which it operates. PRO members usually fall into one of **four different categories**:

- **Obliged companies:** Producers and importers that introduce their packaged goods and products into the specific market concerned, for which they pay fees to the EPR.
- **Other companies in the supply chain** (prior to the consumption of the goods): These are companies forming part of the packaging supply chain (raw material suppliers, plastic packaging and product converters, designers, manufacturers, retailers and traders). Being involved in the PRO means they are kept informed of the developments relevant to the EPR scheme (where they affect their businesses) and can actively participate in these developments. As they are not obliged companies, they do not pay EPR fees.
- **Other partners in the supply chain** (after the consumption stage): These partners are often involved in waste management, collection and recovery, especially recycling. Being involved in the PRO ensures that waste management operators are kept informed of developments that may affect their operations, such as changes to packaging designs. Often it is not possible to make these companies members of the PRO, because doing so can create conflicts of interest.
- **Additional affiliate members:** Affiliate members may include NGOs, universities as well as municipal and other authorities. Depending on the structure of the PRO, affiliate members may also sit on the advisory board.

Steps for developing a PRO in a mandatory EPR system

Experience from a number of countries shows that developing a PRO is a multi-step approach that takes time and requires a long-term outlook. With this in mind, we recommend that a group should begin the process by working on a voluntary basis to establish a legal framework. The main phases of the process of setting up a PRO are as follows:

- **Phase I – Preparation:** This phase is divided into actions taken by the private sector (I a) and by public sector authorities (I b).
  - **I a – Establishing a preparatory organisation on a voluntary basis:** At the beginning of the process, a voluntary PRO should be set up as a forerunner for a mandatory PRO/system operator, to be set up when the relevant legal framework comes into force. Although voluntary systems are limited in their scope and effectiveness, they can be very useful for establishing the organisational and regulatory foundation and monitoring mechanisms that will go on to underpin the mandatory PRO. This preparatory organisation still has to meet the targets it sets for itself (e.g. to recycle a certain amount of plastic per year), and it will also carry out a number of essential projects and initiatives that will allow it to gain experience and find out the best way of applying certain measures in the country concerned (e.g. how best to organise collection and recycling, how to create registers and monitoring mechanisms, and how to set fees).
  - **I b – Establishing a legal basis for a mandatory EPR system:** A mandatory EPR system requires a suitable legal framework in order to function. Drafting this framework requires various agreements and discussions between state authorities and the private sector. The forerunner organisation should represent the obliged private-sector companies in discussions with the relevant state authorities.
- **Phase II – Roll out of the mandatory EPR system:** Once the legal framework for the EPR comes into force, the voluntary PRO can be turned into a formal, mandatory PRO and be put under a legal obligation to carry out its responsibilities and achieve the targets set for it. The exact form the roll out takes depends on the structure of the EPR, as well as the political, socio-economic and geographical context.
- **Phase III – Improving and optimising mechanisms once the mandatory EPR system is in force:** After a legal framework has been established, and once a mandatory EPR system is in place, steps should be taken to ensure that the EPR system and the PRO are continuously improving, and that they evolve to reflect the latest developments in the design and use of packaging, as well as any changes in legal requirements.
- **Phase IV – Evaluation and development:** The EPR system needs to be continuously adapted on the basis of evaluation and experience gained, as well to reflect changes in the external operating environment (technology, financial flows, prices, etc.). The PRO's regulations should be kept under review and updated as necessary.

Key readings and other sources

PREVENT Waste Alliance (2021).
Video series:
EPR Explained! (02) Producer Responsibility Organisation

An overview of different PROs for packaging, covering more than 30 countries, can be found at

EXPRA (*http://www.expra.eu/*) as well as
PROsPA (*https://prospalliance.org/*).

Korea Resource Circulation Service Agency.
http://www.kora.or.kr/eng/coreBusiness/eprImplementation.do

Factsheet 03

How can financial flows be managed and fees and payments be set?

This factsheet outlines how the PRO should be managed from a financial standpoint in order to ensure accountability and transparency and to prevent corruption. It considers, amongst other things, how to set the fees 'producers' should pay to a PRO and the payments made by a PRO to collectors and recyclers.

Financial flows from the obliged companies can significantly improve the business cases for collecting, sorting and recycling packaging waste. These flows are one way of implementing the 'polluter pays principle' and following the **guiding philosophy behind EPR of internalising packaging waste management costs within the price of the product**. Internalising the costs is therefore a complementary option to covering waste management costs through waste management fees or funding from state budgets.

Financing the management of packaging waste

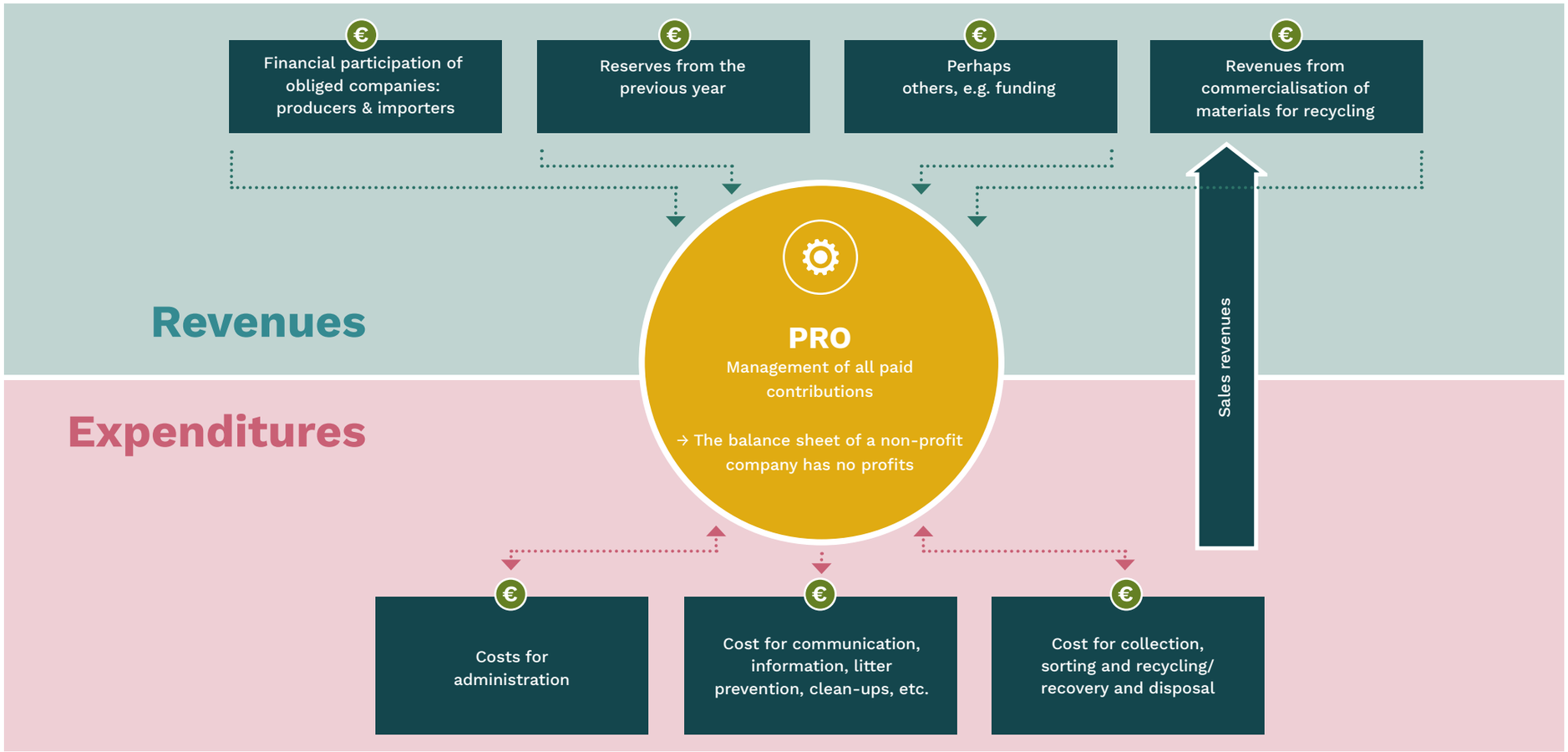
A system in which all discarded packaging is collected, sorted and either recycled or treated in an environmentally sound way, cannot operate without sufficient funding. The market value of packaging waste is not enough to cover the costs associated with these services. A purely market-based approach relying on commercialising waste can only cover a small portion of the service costs, particularly when we consider that some waste types have little or no market value and that adequate social and environmental provisions must also be made. Depending on the costs of collecting and sorting in relation to the market prices of the raw materials, it is possible that only approx. 20% of the system costs can be covered from the sale of valuable materials.

In an EPR system, every obliged company (producer/importer) pays a fee when introducing packaged goods into the market. The costs of subsequent collection, sorting and recycling should be funded via the EPR scheme, along with expenditure associated with the provision of information and communications, administration and other costs.

In a mandatory EPR system, the PRO acts as the system operator and the most important stakeholder organisation. It is responsible for setting up, developing and maintaining all services, including the management of all fees and payments. The fees are used to fund the collection and further treatment of the packaging waste, and to cover all the PRO's funding flows. Sound financial management and a certain degree of transparency and accountability (i.e. the absence of corruption) are crucial for the effective management of discarded packaging.

Most countries with effective EPR schemes start with a single PRO, set up as a non-profit organisation. A non-profit PRO is not supposed to make any profits; any potential surpluses generated within a financial year have to be included in the budget for the following financial year.

However, both for-profit and non-profit PROs can use surpluses to generate accruals for future waste obligations, or reduce their prices so they can use up their reserves. Some countries put a cap on the size of the reserves a PRO can generate.



Factsheet 03
Figure 01

Revenue and expenditure (for a non-profit PRO)

In a few countries, such as Germany and Austria, there are several competing PROs. ▶ See Country Report Germany In these countries, the PROs are obliged to collect, sort and recycle waste, as well as to provide information and handle communications and administrative work. However, they are allowed to generate surpluses. PROs can be structured as private limited companies or corporations, for instance. With a for-profit PRO, surpluses are not carried over into the budget for the following year, and are reported as profits instead.

System-relevant packaging and obliged companies

Any requirement for certain packaging types to be included in the EPR system (system-relevant packaging) must be clearly defined in the legal framework. In most countries, the EPR system covers only household packaging and packaging from equivalent places of origin. Therefore, only companies introducing these types of packaging to the market qualify as obliged companies under the EPR, and are subject to the relevant fees (▶ see Figure 02).

Factsheet 03
Figure 02

Example of packaging which must be included in the EPR system

The category of packaging known as **service packaging** represents a special case. Service packaging is defined as any packaging that is not filled with goods until the point at which it is passed to the consumer. Typical examples are bread roll bags, butcher's paper, potato chips boxes, takeaway coffee cups or bags for fruit and vegetables. Specifically in this case, the company marketing and selling the packaging materials – not the coffee – are required to participate in the EPR system and must pay the EPR fees. Companies using and distributing service packaging, such as bakeries or snack bars, in contrast, do not have to pay EPR fees for this service packaging material. However, these companies should obtain evidence from their upstream distributor (the seller of the packaging material) that he or she paid into the EPR system. Proofe could be ensured by an invoice, a delivery note or via a contractual agreement.[1]

Ensuring a level playing field is very important for the acceptance of the EPR system. Therefore, **all requirements and responsibilities have to apply equally to all obliged companies**. With that in mind, it is crucial that both the definition of an obliged company and the point in the system at which the obliged companies are identified are clear and unambiguous, as they determine who pays EPR fees and how big these fees are.

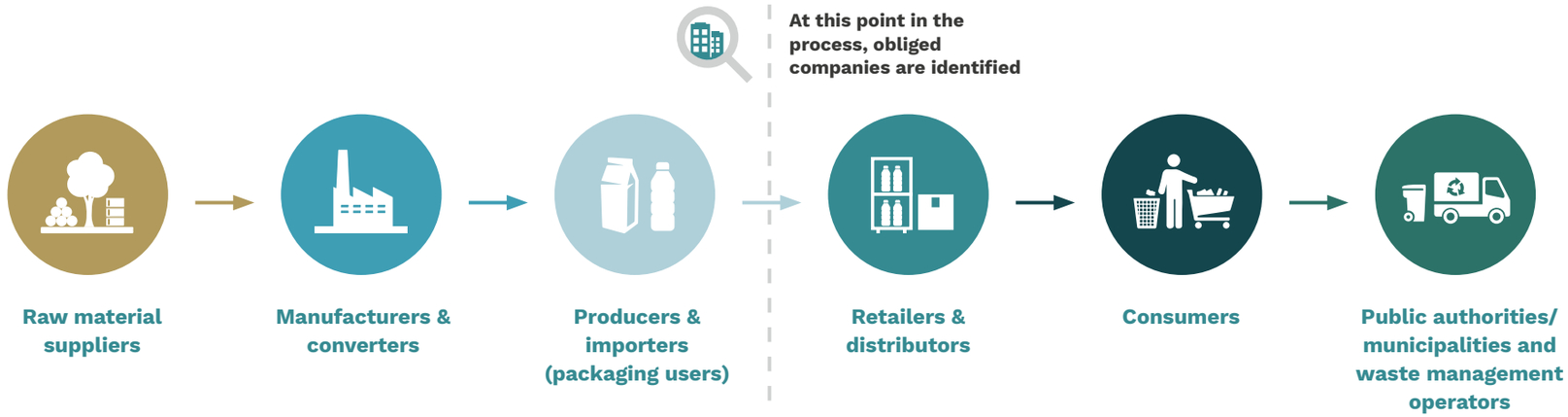
Since EPR fees should not be paid twice for the same packaging within the supply chain, it is important to find a point in the chain where the obliged company can be clearly identified.

The **point at which a company becomes obliged under the EPR is defined as the point at which the companies introduce packaged goods into the market** in the country covered by the EPR's legal framework. These goods are then consumed and eventually disposed of in that country. The obliged companies within this system are the packaging users, fillers and brand owners (referred to collectively as 'producers') and the importers importing the packaged goods for sale and consumption in the country concerned. Both producers and importers are obliged to fund the EPR system.

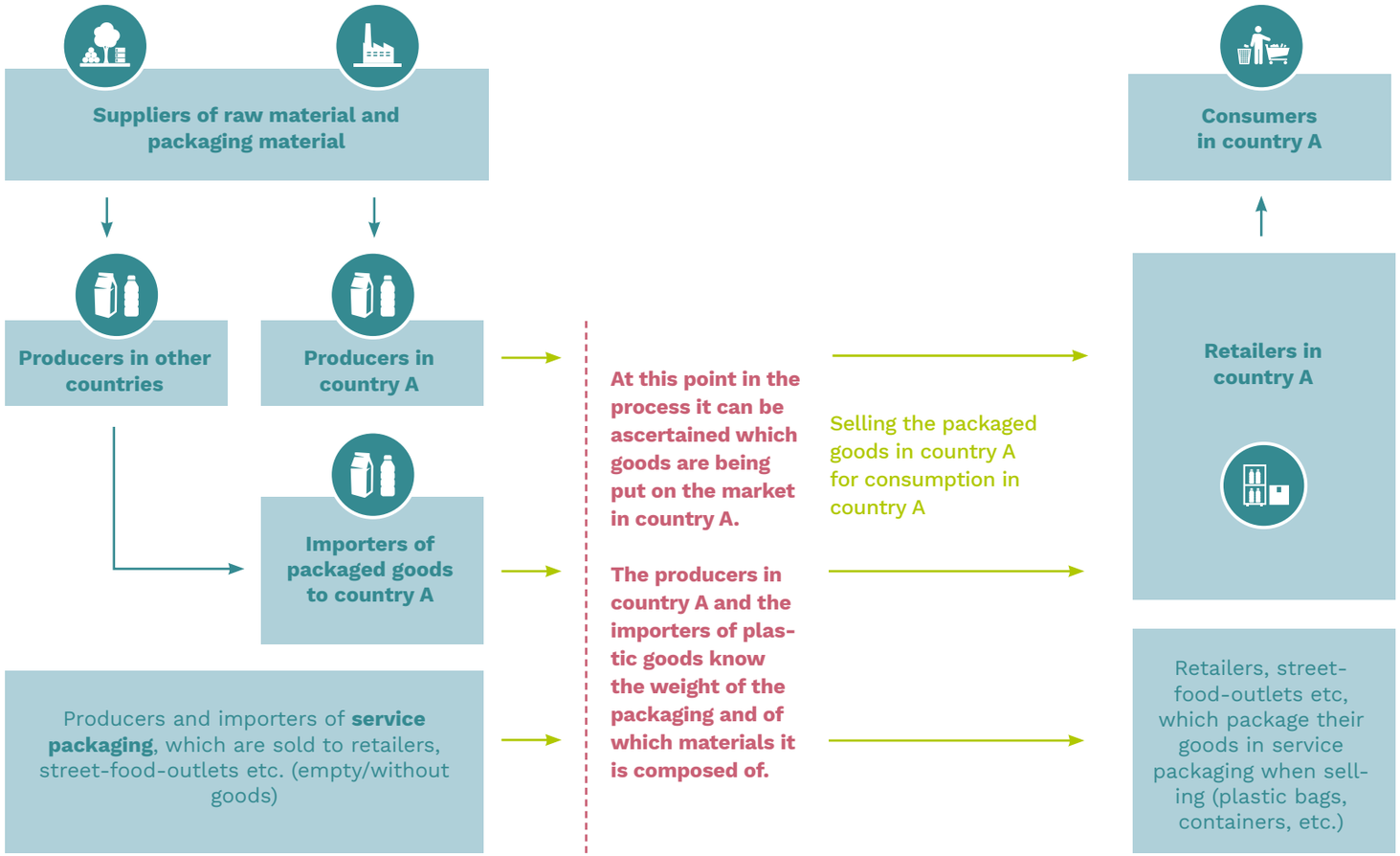
1 *https://www.verpackungsregister.org/fileadmin/user_upload/How-to-Guide_en_13072018_final.pdf*

Factsheet 03
Figure 03

Simplified supply chain and the point at which obliged companies become liable for EPR fees



As a rule, the **obliged producer or the obliged importer** is the first company to distribute the goods in the country concerned, and is therefore obliged to pay EPR fees. One exception to this rule is **service packaging** (e.g. plastic bags, food containers), which is only used when the goods it carries are sold. For this type of packaging, the company selling the empty service packaging to retailers, street food outlets, and other places where the packaging will be filled is obliged to participate in the EPR system. Due to the high number of fast food and street food stalls, for instance, it would not be feasible to include them as obliged companies in an EPR system.



Factsheet 03
Figure 04

A simplified supply chain showing the point at which obliged companies are identified

Factors influencing EPR fees

The fees to be raised by the PRO differ between countries. Every PRO has its own way of setting its fees. If there is only one PRO, operating as a non-profit organisation and with a de facto monopoly, the fees it raises have to be enough to cover all its costs, but it is not allowed to make a profit. In most cases, the EPR fees for packaging materials are published and accessible to the public.

The total amount that obliged companies pay to the PRO in EPR fees **depends on the quantity/weight and material fraction of the packaging** they introduce to the market in the country concerned. In almost all countries, the fees vary according to the type of packaging material used. A number of countries also have further modifications, such as:

- **Bonuses/malus for recyclability:** Packaging that is easy to recycle carries a reduced EPR fee for the obliged company (i.e. a bonus). By the same token, packaging that cannot be recycled can be penalised i.e. it carries an increased EPR fee. However, there are currently no uniform criteria as to what is and is not easily recyclable, and each country sets its own criteria and standards, meaning that standards in France are different from those in Italy, the Netherlands or Germany, for instance. This kind of bonus/malus system is easier to implement if there is only one PRO; many competing PROs complicate this process.
- **Bonuses for specific labelling or information:** A bonus is sometimes awarded if the packaging carries certain labelling, such as instructions for proper disposal or a specific marking (this system is applied in France, for instance).
- **Fee per unit**: Under a fee per unit system, a licence fee has to paid for each unit of packaging. This fee might range from, perhaps, EUR 0.01 to EUR 0.06. Countries operating this system include Spain and Belgium.

The fees paid to the PRO (system operator) need to cover all the costs it incurs in carrying out its duties as defined in the legal framework. Depending on the exact provisions of the framework, some costs (such as a share of collection costs) might be borne by other stakeholders such as municipalities/local authorities.

The following factors influence the amount the PRO will need to raise to cover its costs:

- The type of collection system ▶ See Factsheet 06
- The amount of waste/packaging
- The composition of the waste
- Organisational structures
- Any financial contributions made by municipalities/local authorities
- Recovery and disposal infrastructure
- Any mandatory recycling quotas
- Any contributions to litter removal
- Free riders and orphan products
- Audit costs
- Research and development spending

As EPR systems for packaging have been in place in many European countries over a number of years, we can draw on a range of experience as far as the EPR fees charged for different materials are concerned. The costs payable by the obliged companies for one tonne of plastics range from about €200 per tonne (in Italy, for sortable and recyclable household packaging waste) to around €650 per tonne (for all plastic packaging in the Netherlands), while costs for paper and cardboard usually do not exceed €100 per tonne.

Packaging type	Belgium	France	Netherlands	Spain
Paper packaging	€59.40	€165.30	€22.00	€76.00
Glass	€40.30	€13.50	€56.00	€24.51[1)]
Beverage cartons	€574.00	€246.10	€380.00	€355.00
Plastic bottles	€246.10[1)]	€288.80[1]	DRS: €20.00 or €0.25 per bottle, otherwise €600.00 or €340.00[1) 2) 3)]	€433.00[2)]
Recyclable plastics	€357.80[2)]	€309.20 – €485.70[2)]	€340.00[2)]	€377.00[3)]
Other plastics	€711.20[3) 4)]		€600.00[3)]	€739.00[4)]

Belgium
1) Colorless, blue or green PET bottles, 2) HDPE-bottles and HDPE-closures, 3) All other packaging elements made exclusively of plastic such as: PET trays, other PET-bottles, HDPE trays, hard plastics (PP, PS), flexible plastics (films, bags), with the exemption of those listed under 4), 4) Styrofoam (EPS), expanded polystyrene (XPS) trays and compostable plastics. The tariff is EUR 0.8535/kg; (source: Fost Plus (2020). *https://www.fostplus.be/en/enterprises/your-declaration/rates*)

France
Contribution by weight + units + bonus/penalty. This table lists the nominal prices of each material. The total price actually paid can be affected by penalties and bonuses. 1) Bottles made of clear PET, 2) bottles made of colored PET, PE or PP are €309.20/t, Rigid packaging made of PE, PP or PET: €333/t, Flexible PE-packaging: €360.80/t, PS rigid packaging: €388.50/t, Complex packaging or other resins excluding PVC: €416.30/t; Packaging containing PVC: €485.7/t.; (source: Citeo (2019). *https://bo.citeo.com/sites/default/files/2019-10/20191008_Citeo_2020%20Rate_The%20rate%20list.pdf*)

The Netherlands
1) If bottles are part of a deposit refund system, the fee is €20/t. If bottles legally fall under the scope of deposit (>750 ml with soft drinks or water), but producers/importers do not comply with the DRS, a fee of €0.25 per bottle applies. For all other bottles, the regular fee applies, unless companies have successfully applied for fee differentiation. In that case, the lower fee applies. 2) This reduced fee only applies if the producer has successfully applied for fee differentiation and Afvalfonds Verpakkingen has granted it. This means that the packaging is both recyclable and generates a positive market value. There are many other types of packaging that are fully recyclable, but that do not have this positive market value and therefore have the regular fee. 3) This is the standard fee for plastics, including biode-gradable plastics. If the company is unable or unwilling to specify the material composition of the packaging, a general rate may be applied (€770/t); (source: Afvalfonds (2020). *https://afvalfondsverpakkin-gen.nl/en/packaging-waste-management-contribution*)

Spain
1) €24.51/t reflects the weight; a unit factor (as of 2020, €0.00348/ud) is charged in addition, 2) PET, 3) HDPE only (rigid body and UNE bags), 4) also applies to other materials that do not belong to any specific group; (source: Ecoembes (2020). *https://www.ecoembes.com/en/companies/member-companies/green-dot-fees*)

Factsheet 03
Table 01

Fees per tonne in 2020

If the fees paid are spread across all the individual items affected, the additional cost per item is insignificant and unlikely to be noticed by individual consumers. Based on an EPR fee of €300 per tonne, **the EPR fee for a single 25g plastic bottle is EUR 0.0075**.

Setting fees to be paid by the obliged companies

There is no 'one-size-fits-all' approach for setting the EPR fees that the obliged companies need to pay. The EPR instrument(s) that is/are most appropriate for the prevailing market conditions should be selected.[2] In most cases, the fees paid are proportional to the quantity of each material fraction introduced to the market. As costs associated with the collection, sorting and recycling of plastic packaging are higher than those associated with paper and card, the EPR fee per tonne for plastic is usually higher than for paper and card. **As long as each company has to pay the same prices as all the others for each type of packaging they introduce to the market, the EPR system maintains a level playing field that applies equally to domestic companies and importers based outside the country concerned.**

EPR systems are primarily intended to close any gaps in funding for waste management by commercialising the waste material; this is necessary because the expenses associated with collecting and sorting the waste exceed the revenues generated. EPR fees can also have a steering function, as fees can be modulated to incentivise certain behaviours. For instance, if a given type of packaging is not recyclable, it is usually priced with a significantly higher EPR fee than easily recyclable packaging.

In EPR schemes with a non-profit PRO, EPR fees are usually published and clearly broken down (usually on the PRO's website). However, if multiple PROs are operating in competition with each other, fees are not generally disclosed, and the obliged companies are free to select a PRO of their choice as part of a tendering process.

2 Basel Convention: "Draft practical manuals on Extended Producer Responsibility and on financing systems for environmentally sound management"; 16 July 2018

Financial flows from the PRO to the waste management companies

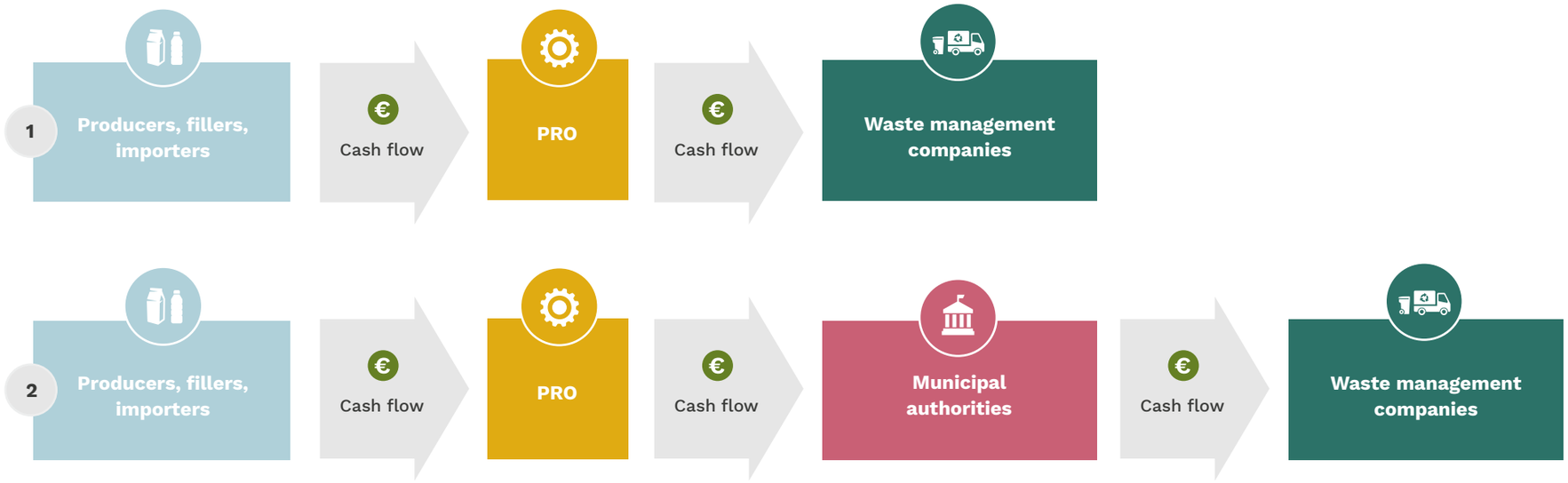
The EPR fees are used to finance operational activity, as illustrated in ▶ Figure 05. There are two distinct models for EPR financial flows:

1. The PRO directly contracts companies to collect, sort and recycle the packaging (this is the system used in e.g. Germany and Austria).
2. The local/provincial authorities contract companies to collect, sort and recycle the packaging, or carry out one or more of these tasks themselves. In return, the PRO pays a fee to the local/provincial authorities (this system is used in the Netherlands, Japan and South Korea, for example).

There are a number of other variations that incorporate elements from both models to reflect circumstances in specific countries. Examples include:

- Municipalities/local authorities being held responsible for collection only, and being paid accordingly by the PRO. The PRO then contracts companies for sorting and recycling the waste (this system is used in France, Belgium and Spain, for example).
- The PRO may set up its own project-specific sorting centres or may conclude contracts with recycling companies.

The informal waste management sector can also be integrated into this process at a variety of different points.



◀ **Factsheet 03**
Figure 05

Models for financial flows from PROs to waste management companies

Paying for waste management (who gets paid for what)

The waste management companies are paid for the services they carry out in accordance with their agreements with the PRO or the municipalities/local authorities. Contracts are usually concluded following a tender procedure. The payments made to these companies also include revenues that are expected to be generated from selling the collected packaging to recyclers. Other waste management actors might also include waste banks, community-based organisations or formalised informal sector associations, such as cooperatives of waste pickers, provided they can fulfil certain reporting, accountability and financial management criteria.

Transparency and monitoring

As with other contract-based interactions, monitoring mechanisms are imperative for checking whether all the services required under an EPR system are actually being provided. Specifically, monitoring systems should oblige the waste management companies involved to verify their activities. For this to work in practice, all companies, facilities and plants involved in the system must be registered, and each plant must keep records of inputs and outputs. ▶ See Factsheet 04

As far as monitoring the PRO's (system operator's) finances is concerned, it is very important to ensure that records of all revenues and expenses are published, along with annual reports and audits done by external auditors.

Key readings and other sources

PREVENT Waste Alliance (2021).
Video series:
EPR Explained! (03) Finance

Fost Plus (2020). *https://www.fostplus.be/en/enterprises/your-declaration/rates*

Citeo (2019). *https://bo.citeo.com/sites/default/files/2019-10/20191008_Citeo_2020%20Rate_The%20rate%20list.pdf*

Afvalfonds (2020). *https://afvalfondsverpakkingen.nl/en/packaging-waste-management-contribution*

Ecoembes (2020). *https://www.ecoembes.com/en/companies/member-companies/green-dot-fees*

Stiftung Zentrale Stelle Verpackungsregister (2019). How-To Guide to the Packaging Act for Manufacturers.

Factsheet 04

How can a register of obliged companies be established?

This factsheet sets out the role of a register for producers and how it should be organised. It covers aspects including how to collect, store and process data, such as information provided by companies on the amount of packaging they introduce to the market. The factsheet outlines who manages such data, what level of public transparency is required and how to avoid free-riding by companies not participating in the scheme.

The OECD's guidance on EPR (2016) describes the purpose of a register as follows:
"Registers provide PROs with the means to compile information needed to set fees and to identify free riders. Accreditation provides governments with a means to ensure that PROs meet specified performance criteria and to monitor their activities....Since 2001, registers of producers and accreditation of PROs have become important means of promoting compliance with EPR obligations."[1]

The Basel Convention's practical manual on EPR (2019) states that:
"Enforcement [bodies] should ensure a public register of producers is available and maintained in order to identify all producers including internet sellers and free-riders. All producers should be identified and required to take up their responsibility individually or through a PRO."[2]

Purposes and types of registers

In a mandatory EPR scheme, being able to identify and monitor the obliged companies and the Producer Responsibility Organisation (PRO) is crucial. **▶ See Factsheet 01 and 03** It reduces the risk of free-riding and ensures that the cost of funding the system is shared by a sufficiently high number of companies. This factsheet focuses on the **register for producers and importers** as the most important register for an EPR scheme. It is an essential tool for clearly identifying the obliged companies (i.e. producers and importers) and ensuring they are compliant with their obligations under the EPR scheme.

Where it is possible to organise the EPR system in multiple different ways, the register is also very important for registering and authorising the entities responsible for operating the system. This is particularly the case where companies are allowed to choose between the various options available. Such options may include:

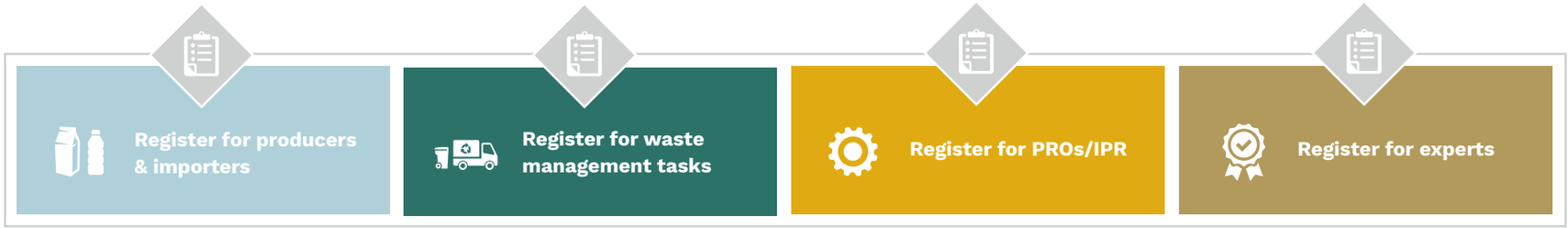
- Participating in a collective PRO
- Organising an IPR (Individual Producer Responsibility) system
- Choosing between several competing PROs

A **register of PROs** helps to ensure transparency where there is more than one way of fulfilling requirements under the EPR system (where multiple PROs are in competition and/or other bespoke solutions are available). Similarly, a **register of the auditors/experts** monitoring PROs or certifying facilities, for instance, helps to ensure that these experts can also be held accountable.

1 OECD: "Extended Producer Responsibility: Updated Guidance for Efficient Waste Management", 2016
2 UNEP/CHW.14/5/Add1: "Development of guidelines for environmentally sound management" 20 February 2019, Revised draft practical manual on Extended Producer Responsibility. Adopted by COP-14 in May 2019.

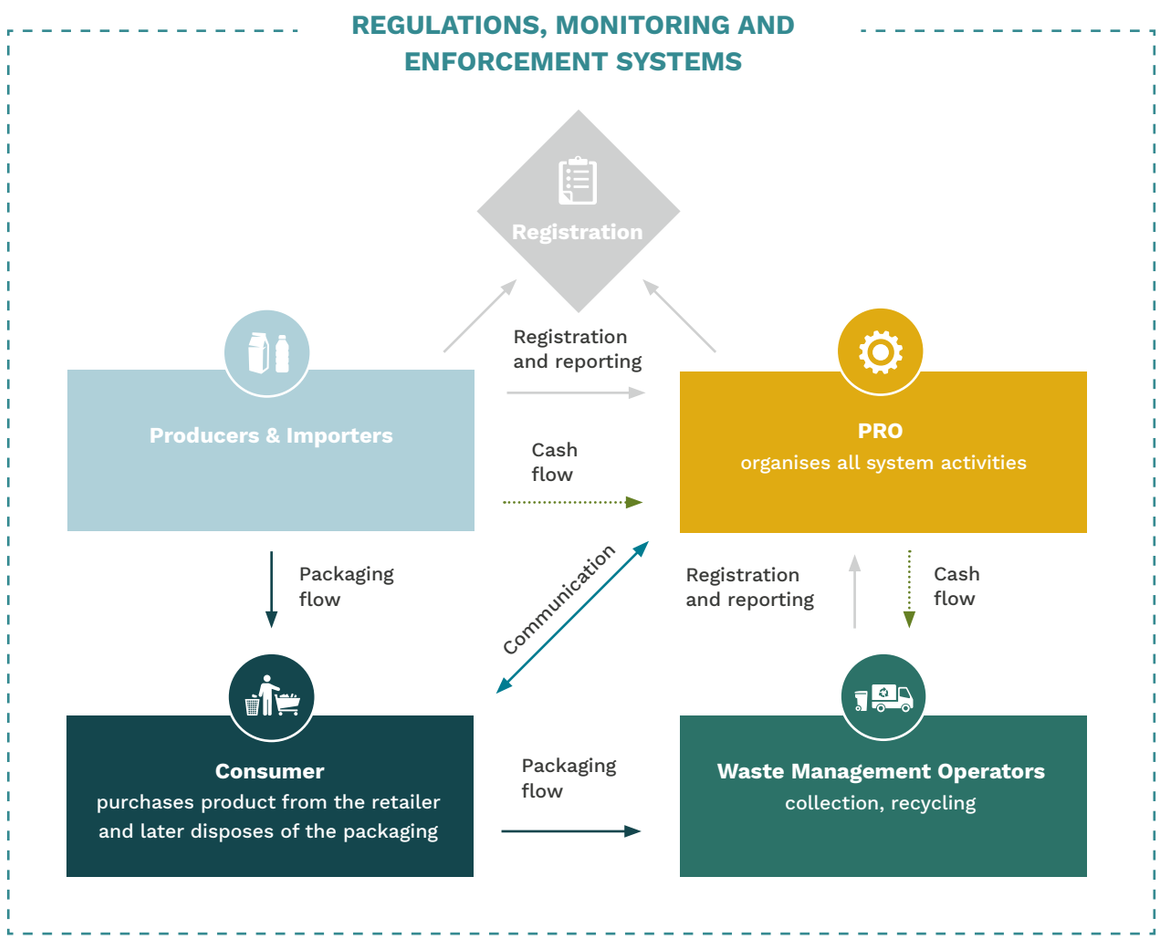
In addition, a separate **register of approved waste management facilities** (primarily covering collectors, sorting plants and recycling plants) helps to monitor and maintain standards of treatment and recycling for packaging waste. Such a register can also help to identify the waste management companies within the EPR, show which entities hold accreditation for specific tasks, monitor certification and inspect waste management activities. Waste management tasks carried out under an EPR system must be completed in accordance with certain regulations, including compliance with environmental and workplace health and safety standards. A register of approved facilities can also create transparency and provide a more solid basis on which to select suitable/recognised recycling technologies. An agreed standard for certification can be helpful in this regard for a clear categorisation. As a minimum, the register should contain information about the company being registered (name, address), the activity it is responsible for carrying out and the technologies it uses to do so (i.e. the type of processing or recovery activity in which the company is involved).

The operator of the register should be granted the right to check this data and the right to remove companies from the register in case of violation. Imposing an obligation to register can also be an important step towards formalising the activities of companies or individuals working in the informal sector and integrating them into the EPR system. Different registers can be run by different bodies. In this factsheet we will focus on the register for producers & importers.



Factsheet 04
Figure 01

Different types of registers



Main objectives and responsibilities of the register for producers and importers

1. Identifying producers and importers
2. Reporting data
3. Monitoring compliance and, depending on its competences, enforcement

Organising the register

A **register for producers and importers can be run by a government agency or by an organisation of the obliged companies**.
A privately-organised register can be part of the PRO or a separate organisation set up by obliged companies. Where there is competition between PROs, it is essential that the register is managed by a separate organisation that is not affiliated to any PRO. If there is only one PRO, on the other hand, the PRO can administer registers itself, in which case it should be obliged to report information to relevant authorities as appropriate.

The following table compares key features of registers run by government agencies and registers run by obliged companies.

Factsheet 04 Figure 02

Registration for producers and importers

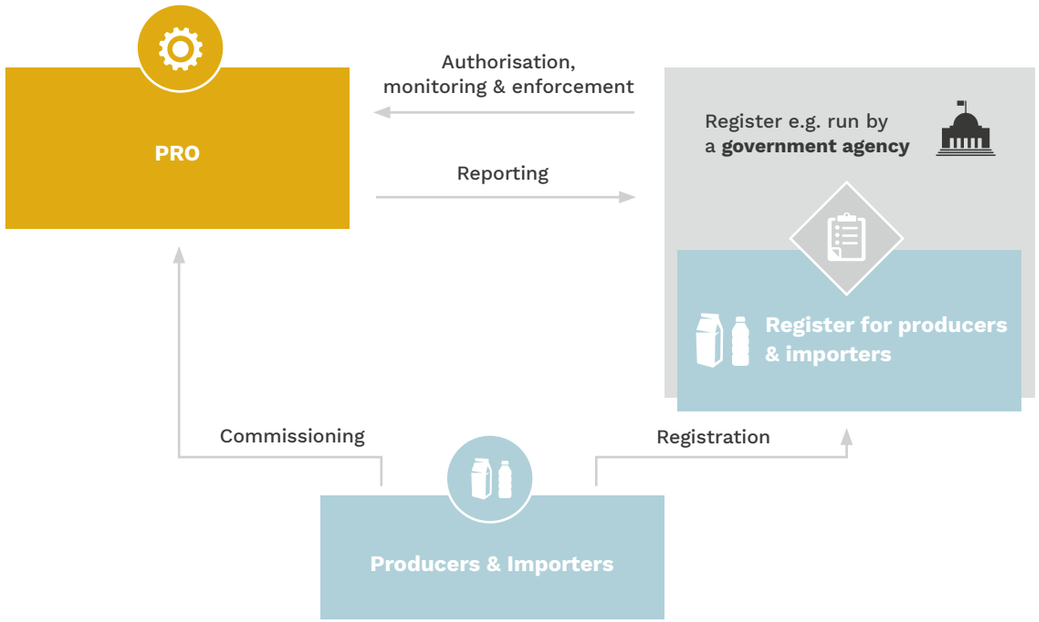
Criteria	Government agency	Obliged companies[3]
Financial aspects	The register can be financed by registration fees paid by the producers and importers, or from general public funds. Government structures are often less flexible than private bodies. It is therefore possible that if the budget has to be adjusted, this may result in work being delayed. Reliable financing needs to be secured.	The register is set up and financed by the obliged companies. The financial risk lies entirely with the producers and importers, meaning that it is very much in the common interest for all obliged companies to contribute funding.
Organisational aspects	An effective register must have a sufficient number of appropriately qualified staff. To make sure the register is relevant to the practical work being carried out, producers and importers and other relevant stakeholders should be involved in setting the rules for EPR. An authority not directly in competition with the stakeholders in the system can be tasked with ensuring the confidentiality of the data on the register.	The register contains confidential data belonging to competing companies, which must be handled accordingly. With this in mind, administrative activities regarding the register should not be carried out by the producers and importers themselves.
Monitoring	The government agency must remain neutral at all times to reduce the risk of conflicts of interest. The agency may itself be supervised by the relevant government ministry (e.g. environment ministry).	A privately-organised register must be effectively monitored by a supervisory authority, which should have the right to carry out inspections, the right to demand information and the right to participate in the register's rule-making processes. The precise nature of the supervisory authority's involvement should be set out in binding regulations. In particular, it must be made clear whether the register will have enforcement responsibilities (i.e. the authority to impose fines or sanctions) or whether this responsiblilty will be assumed by government authorities.

Factsheet 04
Table 01

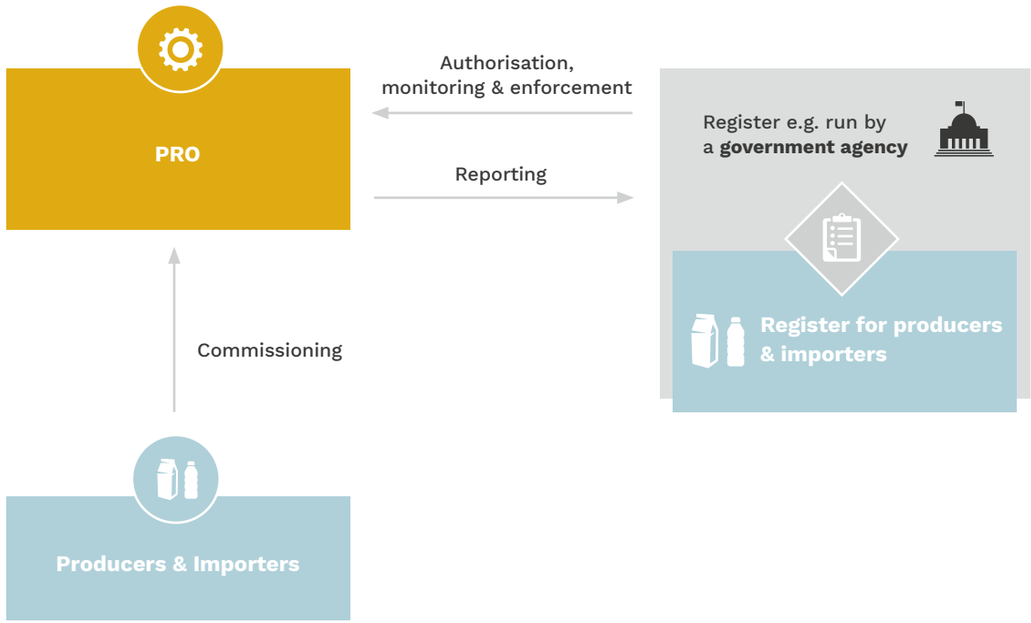
Registers run by government agencies vs registers run by obliged companies

3 Where there is a single PRO for all the obliged companies, the PRO can run the register itself. This structure is covered in the 'obliged companies' column. In such cases the PRO must be effectively supervised by an appropriate authority.

As a general principle, all the tasks, powers, committees and supervisory bodies associated with the register should be clearly described in the relevant legal framework. The illustration below shows a register run by a government agency, and to which the producers and importers report directly.



The next diagram shows another relatively common structure. Here the producers' and importers' data is reported directly to the PRO, and the PRO reports it in turn to the government agency.



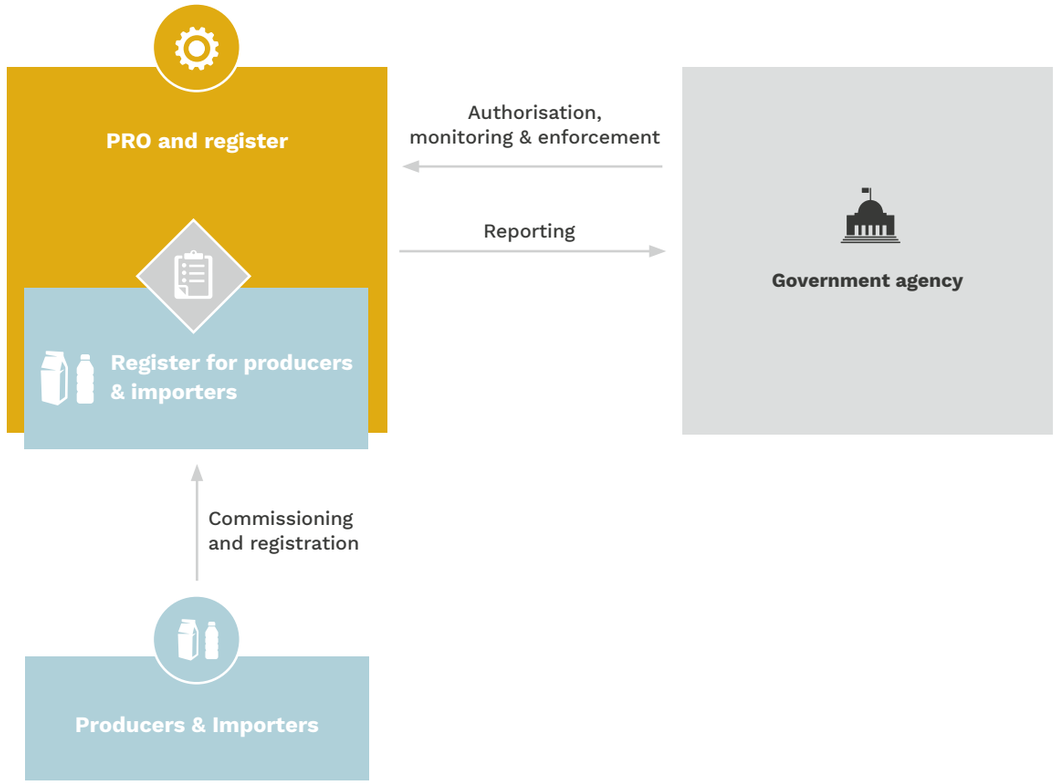
Factsheet 04 Figure 03 (left)

A register managed by a government agency, producers/ importers registering directly

Factsheet 04 Figure 04 (right)

A register managed by a government agency, with producers' and importers' data being reported to the government via the PRO

▶ Figure 05 shows the PRO managing the register. The government agency is still responsible for monitoring the system, but is not responsible for managing it.



Collecting, storing and processing data belonging to the obliged companies
A database is required in order to process and assess data belonging to the companies introducing packaged products into the market, and to determine the exact quantity of material concerned. Obliged companies should generally be able to submit reports online. The most efficient way of registering companies and reporting data is to do so online. However, if small enterprises are also subject to registration requirements, they should not be assumed to have access to the technical equipment needed to use an online system. It may therefore be necessary to allow paper-based registration in certain exceptional circumstances.

The database and the system for transferring data must be set up such that they guarantee the **confidentiality of the data**. Only highly aggregated data is and should be published on the register, such as the data used to calculate collection and recycling quotas.

Registering companies – basic registration requirements
All obliged companies, as defined by the applicable regulations, must be registered. As a minimum, the following data should be required for registration purposes:

- The company's tax ID, or another unique national identity number belonging to the company.
- The company's name and address.
- The company's staff members responsible for the registration, including contact details.
- The brands or categories of the products the company introduces to the market (e.g. groceries, electronics).

Companies should be issued with a registration number upon initial registration.

◀ **Factsheet 04**
Figure 05

A register managed by the PRO

Data reporting the quantities of packaging introduced to the market.
If a company can fulfil its duties under the EPR in a number of different ways, their reports to the register will have to include some additional information. For example, if a company can choose whether to use an individual or a collective take-back system, its choice must be recorded in the register. In addition to the basic reporting requirements, various levels of supplementary reporting requirements may be imposed depending on any additional information that may be required in some countries as a result of the size of the obliged company and/or the amount of packaging it introduces to the market. Basic details must be provided as a bare minimum for all companies, and the thresholds, beyond which additional data must be reported, should be clearly defined in the regulations for the EPR system.

As a minimum, the **data to be reported by obliged companies** might include details such as the weight of the packaging introduced to the market (this information is also required in order to calculate quotas) and the proportion of each defined group of materials in each tonne of waste. The number of units each company produces can also be part of the data. Reports might be filed annually or on a monthly basis. It is also recommended that the reported data will be audited regularly, either by state authorities or approved external auditors.

- If general or random audits are carried out by approved auditors, a suitable set of rules and regulations must be in place, and sufficient numbers of auditors must be available.
- Inspections by relevant state authorities require a clear mandate for the body carrying out the audit, as well as the availability of suitably qualified personnel.

Companies required to register
The legal framework must include a clear definition of what constitutes an obliged company. If the obligation to register is made to apply irrespective of the quantities of packaging the company produces or of turnover, a large number of very small companies could be obliged to report data to the register, in which case it should be borne in mind that they may not have access to the technical equipment used by bigger companies. Therefore, it may be preferable to draw-up a definition of a micro company, and not to impose any additional obligations on these companies beyond the requirement to register in the first place. Simplified reporting procedures can also be used to minimise the burden on small businesses when reporting data.

It is optional to make the registration number mandatory. Due to this exact number, however, which will be listed in every company document (e.g. invoices), the company will be identifiable. Also, this specific number will make sure companies can only list and sell registered products.

Ensuring the register is transparent, availability of data and confidentiality
A register should be designed in such a way that no confidential market information is published. What exact information can be made publicly available should be clarified in the regulations governing the register. Given that not all data can be published, a register should have two sections: one for **data that can and should be publicly available** and one for **confidential data**. The section containing general information about the registered companies should be publicly available. This section should include the name of the company, its address and, if necessary, details of how they fulfil their obligations under the EPR system (or, for waste management activities, what type of disposal activities they carry out).

The control by competitors is an important tool for minimising free-riding. Checks should focus on whether they are registered, and may also cover the EPR form - e.g. a PRO or an individual producer responsibility. The confidential section of the register should include any information about the amount of packaging each company is introducing to the market.

Steps to establish a register for obliged companies

- **Phase I: Preparation**
  - **Phase I a - Clarify governance:** Who should set up and operate the register? Who will the supervisory authority be? Set up a working group to prepare next steps (including participants from government and business). Calculate the costs associated with operating the register (equipment, personnel, ongoing expenses). Clarify how data will be reported (e.g. online, by fax, open interface system) and how communication will take place.
  - **Phase I b - Establishing a legal framework:** The regulations should set out which parties are responsible for which tasks, who will run the register, what powers they will have, and how the register will be funded. It should also state who is responsible for reporting the required data (whether the companies have to do it themselves or can do so via a third party tasked to do so on their behalf, how to deal with companies based outside of the country in which the register operates, internet sales, etc.).

▶ See Factsheet 05

- **Phase II - Rolling out the register**
  - The structure of the database and the front end must be sufficiently developed. Any issues surrounding data protection and data security must be clarified.
  - To make sure there is enough time to test the reporting and data processing systems, the register should be operational well before the deadlines by which companies have to start meeting their responsibilities. It must also be decided exactly which data should be made publicly available.
  - Obliged companies participating in the register must be aware of the register and any obligations associated with it. It is therefore very important to carry out the necessary public relations work to ensure they are fully informed.
- **Phase III – Evaluation and development**

Key readings and other sources

PREVENT Waste Alliance (2021).
Video series:
EPR Explained! (04) Register of obliged companies

Register of Central Agency “Verpackungsregister” (Germany).
https://oeffentliche-register.verpackungsregister.org/Producer

Register of Fost Plus (Belgium).
https://www.ivcie.be/wp-content/uploads/2019/03/Erkenning-F-2018-EN.pdf

ZAReg (Austria).
https://secure.umweltbundesamt.at/eras/registerabfrageVerpackungVHVSearch.do

Factsheet 05

How can a regulatory framework be designed?

This factsheet outlines the requirement for a legal framework at a national level (legislation, by-laws, decrees, ordinances etc. depending on the legal context in the country concerned) and the basic content that it should include. It describes the key policy instruments that form part of an EPR system, such as collection and recycling targets, obligations for private sector companies and ensuring there is sufficient flexibility to form PROs, as well as for monitoring and evaluation.

Particularly in low- and middle-income countries, waste management is often poorly organised and tremendously underfunded. Municipalities and local authorities often lack the organisational and financial resources needed to improve the overall operating environment and create a circular economy, complete with collection services that provide acceptable conditions for their staff, waste segregation at source and treatment options for different waste types, including packaging. In this context, EPR is a key concept to 'closing the loop' in the packaging value chain by obliging producers to assume responsibility for their products. As an approach to governance, EPR requires a high degree of interaction between stakeholders along the packaging value chain. National governments play a crucial role in preparing the legal framework for EPR packaging systems. Getting this framework right allows producers to make an effective contribution to managing packaging waste and ensures there is a level playing field among obliged companies. Ideally, the process of drafting this framework should take place in consultation with stakeholders along the packaging value chain, thus facilitating implementation later on.

Voluntary initiatives vs mandatory systems

In many countries, a variety of industry-led initiatives, individual projects and structures (particularly those led by manufacturers, producers and importers) are already being implemented. **Voluntary initiatives** are a great way of gathering experience of specific issues, but voluntary initiatives by companies are usually linked to their individual Corporate Social Responsibility budgets and/or limited to projects dealing with specific types of materials that have a certain minimum market value. Ensuring that all types of packaging is collected, sorted and recycled on a large-scale requires better organisation and bigger financial flows in order to create solid business cases right along the value chain.

As a system for collecting and recycling household packaging always requires significant additional funding, voluntary initiatives cannot fulfil these tasks. There is a need for a clear legislative and legal framework that takes account of both extended producer responsibility and the 'polluter pays' principle, of which both are important in ensuring a level playing field. The principle behind EPR is discussed at length in the practical manual on EPR adopted by the 14th Conference of Parties of the Basel Convention (2019).[1]

Mandatory EPR systems require a specific legal basis. As far as packaging is concerned, this means that the system's objectives and all measures designed to achieve them must be set out in a **complete, specific** and **unambiguous** manner as part of a legal framework. The legal basis for the EPR system could be set out in a legal framework specifically for packaging, or could be added to the general environmental law, or to another law. This framework could take the form of an act of parliament, by-law, decree, ordinance or other suitable legislation depending on

1 Basel Convention (2019) Revised draft practical manual on extended producer responsibility (UNEP/CHW.14/5/Add.1)

the country concerned. The framework should also include details of any penalties/ fines that may be imposed should obliged companies fail to fulfil their duties under the framework. Such penalties should be in line with the way environmental regulations are enforced in the country concerned.

The following table compares some important aspects of mandatory EPR systems (with effective implementation and supervision) and voluntary initiatives.

Criteria	Mandatory EPR systems	Voluntary initiatives
Financial aspects and sustainability	Since the definition of an obliged company is clearly set out, there is a reliable legal basis for running costs to be covered over the long term. This is a very important consideration for investors. The EPR system involves financial contributions from all companies that sell packaged products (potentially numbering several thousand, or even more). The companies usually incorporate any additional costs into the price of the product concerned.	Since there is no obligation, each company decides for itself whether and how much it wants to invest in a project on a voluntary basis. Hence there is no guarantee that running costs will be covered. The financial contribution of each company tends to be small when compared to the contributions companies have to pay in a mandatory EPR scheme.
Competition	Since all companies introducing packaging into the market are obliged to pay for the EPR system, the system does not distort competition. The rules apply equally to all the obliged companies, and a level playing field is maintained.	Only a few companies participate in voluntary measures, and they might incur competitive disadvantages as a result.
National systems	Provided there is a solid legal framework, EPR systems can be set up covering whole countries (or other clearly defined economic regions/ blocs).	It is not possible to establish a comprehensive, nationwide collection system covering all packaging waste on a voluntary basis.

→

Factsheet 05
Table 01

Mandatory EPR systems vs voluntary initiatives

Criteria	Mandatory EPR systems	Voluntary initiatives
Monitoring	Compliance with legal requirements can be closely monitored, provided that the state authorities have sufficient resources to do so.	Aside from voluntary disclosures and declarations, there are no official monitoring systems to check whether the voluntary initiatives fulfil their targets. There is no reliable planning capability.
Results	It is possible to develop a sustainable waste management system featuring: • A comprehensive collection system. • Recycling infrastructure. • A high-quality, profitable recycling industry • Environmental-friendly disposal. • Market participants who are obliged to meet waste disposal requirements. • Education/provision of information/communications.	The results are very limited. A voluntary initiative cannot be considered a reliable part of any sustainable waste management system as no claims can be made against it. This means that projects are often shut down once they run out of funding.

Factsheet 05
Table 01

Mandatory EPR systems vs voluntary initiatives

Key policy elements of a legal framework for an EPR System

In order for the EPR system to meet the objective set for it, the scope of the underlying regulatory framework must be set out clearly and in great detail.

Examples from countries that have already implemented EPR legislation show that there is no universally applicable ideal template for legal frameworks for EPR packaging systems. The regulatory basis underlying every EPR is different, and takes account of national frameworks and national strategies in the country concerned.

Despite these differences, it can be said that most existing legislation usually covers the following points:

a. Objectives
b. Terms and definitions
c. Mandatory PRO/system operator
d. Obliged producers and importers
e. Types of packaging covered by the EPR
f. Scope of financing and financial calculations
g. The collection system and collection targets
h. Sorting, recycling and recovery targets
i. Involvement of municipalities/local authorities
j. Involvement of the informal sector
k. Communications, provision of information and education measures
l. The responsibilities and remits of relevant authorities and monitoring mechanisms
m. Roles and responsibilities of any other stakeholders involved
n. Incentives
o. Penalties

a. Objectives

The description of objectives in the regulatory basis is important because the regulatory basis for the EPR will be applied in light of these objectives, and the overall success of the scheme judged on whether these objectives are achieved. The objectives should be measurable and achievable, and it must be clear who will be held accountable for delivering them.

General objectives are formulated in the context of the policy strategy of the country in which the EPR is set up. Potential objectives for an EPR might include reducing packaging waste, promoting a circular economy and collection systems, promoting recycling and sustainable use of resources, cutting greenhouse gas emissions, promoting recyclability and facilitating reliable sources of financing.

Specific objectives are specific targets assigned to individual stakeholders. These might include, for example, targets for collection, recycling rates and the share of recycled material used in packaging instead of primary raw material. These targets are binding and must be verifiable. Therefore, the targets also have to be considered in the regulations. ▶ See Factsheet 12 and 13

b. Terms and definitions

One of the most important features of a regulatory framework is the use of clear definitions that are not open to interpretation. As a bare minimum, the following terms should be clearly defined:

- **Packaging** (sales packaging, lightweight packaging, service packaging, transport packaging, industrial packaging, reusable packaging, system-relevant packaging)
- **Equivalent places of origin** (explicitly non-households, generating similar waste fractions as households; these might include hospitals, hotels, restaurants and offices)
- **Obliged companies** (companies obliged to participate in the system, such as producers, importers and others as appropriate)
- **System operator** (details of how the PRO will operate and what that means for the rest of the system)
- **Terms referred to as part of the waste hierarchy** (prevention, preparing for reuse, recycling, recovery, energy recovery, disposal)

- **Extended producer responsibility** (what the term means in general terms in the context of a waste management system, and for each relevant stakeholder)
- **Register** (what registers are defined within the regulatory basis and what information they will include)

Certain country-specific circumstances may require further definitions to be included in the framework (e.g. depending on the way single-use plastics regulations are implemented in the country concerned).

c. Mandatory system operator (PRO)

The three pillars described below must be defined in the regulatory basis for the EPR:

Structure & members	Responsibilities of the PRO	Rights of the PRO
• Whether it is a monopoly (only one PRO) or there will be competition. • Who the members of the PRO will be (whether all stakeholders in the supply chain can become members of the PRO, or whether only certain companies will be admitted). • Supervisory bodies	• The mandatory tasks the PRO must carry out (e.g. building up a collective system encompassing collection, sorting and recycling of packaging waste, registration, collecting payment for these tasks from the obliged companies). • Documentation and verification obligations. • How the informal sector will be integrated into the system. • Cooperation with the municipalities/local authorities. • Research and development. • Measures to be taken against littering and fly-tipping.	• Rights to appoint inspection bodies. • Rights to commission external experts. • Access rights. • Rights to impose fines.

◀ Factsheet 05 Table 02

Pillars of a regulatory basis

▶ See Factsheet 02

d. Obliged producers and importers

In an EPR system, **the legal framework should set out exactly who has to pay into the system and at which points within the system the obliged parties will be identified.** The wording of the framework might read something like "Obliged Companies are defined as companies that introduce packaging into the domestic market of country X, which is later used and disposed of in the territory of country X." Hence, domestic producers and importers both fall under the definition of obliged companies. On the basis of this definition, the point at which the quantities of packaging are measured for the purposes of the EPR system would be the point at which the obliged company first introduces the packaging materials concerned to the market in the relevant country. This company has to be registered with the PRO and provide the PRO with all required information about its packaging. The (annual) financial contribution the obliged company will have to make to the EPR system can then be calculated on the basis of this information.

A clear and unambiguous definition of obliged companies and the system-relevant packaging to be included in the system is essential to ensure that:

- An EPR fee is paid for every item of packing that is used, and thus becomes a waste product in the country concerned.
- Obliged companies are not made to pay twice for the same packaging at two different points in the supply chain.
- Effective checks can be carried out as to which companies are obliged to pay into the EPR system, how much they should be paying, and whether they have made the payments required of them.

▶ See Factsheet 03

e. Types of packaging covered

The legal framework must set out which types of packaging produced by the obliged companies are covered by the scheme (i.e. whether the scheme covers all types of materials, such as plastics, paper, metals and glass, or only applies to specific categories of packaging such as household, commercial or industrial packaging waste).

The framework can also be used to include specifically defined types of packaging in the EPR scheme, such as specific single-use plastic items. Any specific inclusions must be explicitly listed in the relevant legal documents.

f. Scope of financing and financial calculations

The precise **share of the service costs to be paid by the obliged companies** must be clearly stated. For instance, will costs be covered entirely by the EPR system, or will municipalities/local authorities be expected to contribute to collection, processing and recycling costs?

The obliged companies should be expected to make a significant contribution to the overall cost of the system. At the same time, all obliged companies must be treated equally and should not be made to pay more than their fair share of the costs.

The legal framework can also set out whether the fees to be paid by the obliged companies should be modulated depending on how easily their packaging can be recycled (i.e. whether the fee for recyclable packaging waste should be lower than that for non-recyclable packaging). If a system of modulated fees is to be used, the criteria used to decide the fee payable should also be clearly stated. In some modulated-fee systems, the PRO decides how the fees are modulated. If the PRO takes on this responsibility, the legal framework can be worded more flexibly, but it should still stipulate in general terms that recyclability must be considered when setting EPR fees.

g. Collection system and collection targets

The framework should address the following aspects of the collection system:

- **Material fractions:** The legal framework should state whether all material fractions are to be collected right from the start of the EPR system, or whether the EPR will initially only cover certain material fractions, such as those for which there is already an established recycling market.

- **Proportion of households covered by the system:** Once a legal framework has been adopted, the collection system cannot be set up immediately for every household and equivalent places of origin in the country; it has to be built step-by-step. There are various options for such a step-by-step approach. The legal framework should set out targets by when a comprehensive system covering 100% of households should be in place across the whole geographical area of the EPR scheme. If it is not possible to cover 100% of households in the scheme area initially, it may be advisable to aim for 50% coverage within the first 3 years, rising to 100% after 5 years. Another strategy is to limit the EPR system to collection services in specific provinces/municipalities in the beginning. The amounts of packaging collected in these areas could then be compared against the total quantity of packaged products introduced to the national market by the obliged companies, and for which they are charged fees. If the EPR is introduced step-by-step, stakeholders can gain experience through pilot projects, which can then be fed into the future development of the system. ▶ See Country Report Chile

- **Type of collection system:** The type of the collection system to be used (e.g. kerbside collection from households or bring systems in public places) can be determined by the PRO in agreement with municipalities/local authorities, or defined in the regulatory basis for the EPR system. The framework should also consider how to integrate informal waste collectors. ▶ See Factsheet 06 and 08

h. Sorting, recycling and recovery targets

One important goal of an EPR system is gradually to establish structures for collecting and recycling or recovering packaging waste. With this in mind, the legal framework needs to state how performance against objectives will be measured over time to find out whether targets are met.

The regulatory basis should suggest some general requirements for the technical procedures involved in recycling, such as the recovery rate, the minimum quantities to be collected, and how relevant calculations will be made. For example, it should stipulate whether all packaging has to be recycled using material recycling processes and/or when chemical or energy recovery techniques may be used. The legal framework should also set certain recycling targets for the different material fractions, stated in terms of amounts of materials that need to be recycled or recovered per year. Recycling rates might be based on (i) the amounts licensed by the PRO; (ii) the amounts introduced to the market in the country concerned; or (iii) the amounts collected through the system. Targets cannot work unless compliance can be reliably measured, so accurate data is crucial. ▶ See Factsheet 07, 11, 12 and 13

i. Involvement of municipalities/local authorities

A close partnership between municipalities/local authorities and the PRO is an important condition for the overall success of any EPR system, as well as for ensuring it is both economically and environmentally sustainable. The role municipalities/local authorities should play should be clearly defined within the framework, which should set out their precise operational responsibilities and how they will de-conflict with the system operator (PRO).

Communication and providing information are particularly important. All households and equivalent places of origin must be given specific information about the collection system, and kept regularly informed of any developments. The municipality/local authority can act as a bridge to individual citizens and other places where waste is generated, as well as being responsible for the disposal of waste from all waste streams not covered by the EPR. Therefore, the municipalities/local authorities should work together with the system operator to decide exactly what information will be provided to citizens, who will be responsible for answering any questions, who the primary point(s) of contact should be, and how communications activity will be funded. The specific content of any framework or related agreements will depend on the circumstances and legal framework in the country concerned.

j. Involvement of the informal sector

Any informal recycling activities should be integrated into the EPR system. The workers performing these activities should not lose their incomes, and should be transferred into the formal EPR system. The regulatory basis for the scheme can make integration a legal requirement, or it may stipulate that the PRO should draw up a plan as to how informal activities will be integrated into the system. The regulatory basis should outline how the informal sector can be involved in the EPR system and the responsibilities of the PRO in this regard. ▶ See Factsheet 08

k. Communication, provision of information and education

An EPR system can only function properly if citizens/consumers participate in it. Therefore, they should be kept informed of strategies aimed at reducing waste and encouraging environmentally sound practices for returning and treating packaging. To ensure that the PRO does enough to educate the population and raise awareness of relevant issues, the legal framework might stipulate that the PRO should make a contribution to funding awareness-raising campaigns and similar initiatives. ▶ See Factsheet 09

Stakeholders from trade, commerce and industry should also be provided with information about the EPR system, the associated infrastructure and the requirement to collect individual packaging fractions separately. The EPR scheme should be based on strong, collaborative relationships between all stakeholders, and the PRO should ideally provide a platform to help forge connections between different stakeholders (such as between recyclers and packaging producers).

l. Regulations, remits of public authorities and monitoring mechanisms

An EPR system for packaging runs alongside other waste management activities carried out by municipalities/local authorities. The special way in which an EPR system is funded and organised makes it different from the collection systems for all other solid waste flows. It is therefore very important that it has separate rules and mechanisms for inspection and monitoring. Monitoring may be required at a number of different levels. For example, the municipalities/local authorities may need to check whether the PRO is complying with its obligation to set the specifications for relevant infrastructure and to provide notification as appropriate. Legislators may also wish to monitor progress towards recycling targets across the country as a whole, as well as to make sure that individual companies are complying with the system. Moreover, the legislative authority should create an effective and efficient legal framework for the implementation of the EPR scheme. Public authorities have a key role to play in the enforcement and supervision of the EPR system. The competent public authorities, along with their roles and responsibilities, must be explicitly listed in the legal framework, and they must be provided with sufficient resources to fulfil the roles assigned to them.

Further regulations not directly related to the EPR system

The following topics may also be addressed in the legal framework for handling packaging waste, although they are not directly related to the implementation and operation of an EPR scheme. However, these issues may also be covered by other legal frameworks:

- Littering prevention, beach clean-ups and similar services
- Handling of non system-relevant packaging
- Requirements for setting up a (potential) deposit-refund scheme
- Targets for use of recyclates
- Labelling obligations for packaging (e.g. types of plastic)

Key readings and other sources

PREVENT Waste Alliance (2021).
Video series:
EPR Explained! (05) Framework conditions

An overview of different legal frameworks for EPR systems for packaging covering more than 30 countries can be found on

EXPRA's website
http://www.expra.eu/en/members as well as

PROsPA
https://prospalliance.org/members/

MODULE 2

Collection and sorting of packaging waste

Factsheet 06

How can the collection of packaging waste be organised?

This factsheet outlines key aspects of the connection between EPR systems and packaging waste collection at municipal level. It describes how responsibility for collecting packaging waste is assigned, as well as the roles of public and private entities and community-based organisations in the collection process. It also shows how to link financing flows associated with the EPR scheme to funding packaging waste collection systems, and describes the systems required for effective collection. A good collection system will also create new jobs.

Waste collection is a key aspect of the sustainable management and recycling of packaging waste. Not only does it provide secondary resources and close the loop of the circular economy, it also helps to prevent packaging waste from polluting soil and waterways.

Ideally, waste collection should be organised on the basis of segregation at source. Once individual packaging material fractions have been collected, some additional sorting is usually required, because it is not always possible to sort all recyclable materials from other types of waste at source. For a collection system to function properly, decisions need to be made on a number of key issues, which are discussed in this factsheet.

Organisation

As part of an EPR system, the responsibility for collecting packaging waste may be assumed either by the municipality/local authority or by a PRO, depending on the provisions of the applicable regulatory framework.

If a municipal/local authority takes responsibility for collection, this means that the municipality organises collections and provides related operational services itself, or delegates these responsibilities to a private company operating on its behalf. The advantage of this system is that the same people are responsible for collecting both packaging and other types of waste (such as organic waste, bulky waste or waste electrical and electronic equipment). On the other hand, this system means that the PRO, which is ultimately responsible for reaching certain recycling targets, cannot exert a direct influence on the quantity and the quality of packaging waste collected. Such influence is provided in case the PRO takes responsibility for collection and can design contractual guidelines accordingly (see below).

The system for financing the municipal service must also be clearly regulated. Generally speaking, this funding is either provided by fees paid to the municipality or local authority, or by the system operator (PRO) refunding the costs associated with collection to the municipality concerned.

When packaging is collected separately, the amount of packaging mixed in with residual waste decreases. This means that the intervals between residual waste collections can be increased, or the volumes of containers for residual waste can be reduced. This in turn allows the local authority to save money on collection costs and any associated services. Citizens must be kept informed of developments and any changes to collection frequencies at all times.

If responsibility for collections is assigned to a system operator (PRO), the PRO is expected to commission and pay for the services associated with the collection of packaging waste. This system relies on a strong working relationship between the PRO and the municipality or local authority, which acts as the primary point of contact for citizens. The PRO assigns collection responsibilities to a collector, which might take the form of a local authority-run company, a private waste management company, a waste bank or a community-based organisation. The PRO can influence collection services by entering into contractual arrangements with the collectors.

The most appropriate operating model for any individual EPR scheme will depend on the circumstances at hand. In countries where municipal or local authorities wield considerable influence, there is often political pressure to ensure that they are heavily involved in the system. On the other hand, in some countries, municipalities are not equipped to carry out waste management activities themselves, or may not want to assume any additional tasks or responsibilities. When preparing a legal framework, it is very important that the municipalities are consulted to ensure that suitable solutions are found.

In many countries, incorporating people working in the informal economy into the EPR system will be an important issue, as informal waste collectors often work to collect and monetise valuable recyclable fractions. ▶ See Factsheet 08
However, it is crucial that waste with little or no market value is collected alongside valuable waste to prevent it from leaking into the environment. With this in mind, the underlying framework for the EPR system must emphasise the importance of collecting all types of waste. **Simply applying the principle of 'cash for trash' is not a recipe for rolling out reliable, separate collection of all types of packaging in the area covered by the system.**

Financing

The fees paid by the obliged companies usually need to cover all the costs associated with the services carried out under the EPR system, which should themselves be defined by law before it begins to operate. The costs covered by the obliged companies generally also include costs incurred by contracted waste collection companies when collecting waste. In some EPR systems (such as in France), the municipality/local authority makes a contribution towards collection costs. For systems like these, the PRO needs to agree to the division of costs with the local authority concerned.

If packaging or packaging materials covered under the EPR are collected together with other waste for which the municipality/local authority is responsible, for example, if paper is collected alongside other waste from the printing industry, the costs of collection must be split accordingly. The contributions to be made in such cases can be calculated on the basis of the quantity of waste involved or on the basis of an analysis of costs incurred and any profits made. ▶ See Factsheet 03

Collection system

Since segregation and collection systems need to be tailored to local conditions, they vary between countries. Even in countries with established EPR systems, there are often significant differences in the way different materials are collected. **Packaging waste may be collected using a kerbside or a bring system.**

- **Kerbside systems** are systems in which **packaging is collected directly from private households**. They tend to be best suited to rural areas and areas where there is enough space in the existing built-up environment for the relevant collection containers to be installed, or for bags containing recyclable fractions to be stored.
- In **bring systems**, waste is taken to central collection points and collected from there. Examples of bring systems **include waste collection stations, recycling centres or waste banks**.

The choice of system depends on how residual waste is collected. If a **bring system incorporating local collection points is used**, it is sometimes possible to expand the system by adding additional containers for different types of packaging.

Factsheet 06 Photo 01 (left)

A collection point in a bring system, Maspalomas/ Gran Canaria (Spain)

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Factsheet 06 Photo 02 (top right)

Containers for a kerbside collection system in Beijing, China

©cyclos 2019

Factsheet 06 Photo 03 (bottom right)

A bring system in Sri Lanka

©cyclos 2019

Material fractions

As far as the way specific material fractions are collected is concerned, there are two main options. Either **(i) the system can start by collecting a small number of fractions and gradually expand to cover more; or (ii) it can be set up to collect all packaging fractions right from the start.** In countries where systems have been expanded gradually to cover more and more fractions, the first fractions to be collected have usually included packaging with a positive market value and an existing recycling market. The most obvious examples of these fractions are PET, PE, PP, tin cans and paper packaging. The advantage of focusing on these fractions to begin with, is that everything that is collected can actually be recycled, and does not end up in landfill, which would reduce the popularity of the system amongst the population. Once the system is established for these more valuable fractions, collection can be gradually expanded to low-value and non-valuable packaging, which can be prepared for co-processing in cement plants, for example.

However, it is **also possible to collect all the different packaging fractions from the outset, regardless of their value.** This approach allows the population to get accustomed to a comprehensive collection system and means that sorting methods can be geared towards the entire spectrum of packaging from the very beginning. However, finding ways of storing materials for which there is no existing recycling market in the country concerned (such as composites or mixed plastics) can be a challenge.

Factsheet 06
Figure 01

Different packaging fractions

Transport and transfer

Collections must be carried out using **suitable vehicles**. The vehicles need to be suitable for use in the local area where they will be operating, and must not compress the recyclable fractions too much. They should also be easy for the on-site staff to operate and repair. People working in the informal sector should also be involved in the collection process. ▶ See Factsheet 08

Since there are often long distances between the collection points and the sorting plant, in some areas, it may be a good idea to transport the waste collected to an intermediate collection point, a so-called transfer station, from which it can then be picked up and taken to the sorting plant.

Services

As collection, transport and sorting costs are usually covered by the PRO, arrangements will need to be made for the following services associated with waste collection:

- Setting up infrastructure for collecting packaging waste.
- Documenting collection.
- Ensuring containers are emptied regularly.
- Cleaning the collection points.
- Maintaining and looking after the containers.
- Integrating collections with sorting infrastructure.

Factsheet 06 Photo 04

Collection vehicles from a pilot project in Beijing, China

©cyclos 2019

Factsheet 06 Photo 05

Collecting lightweight packaging in Germany

©Der Grüne Punkt, Köln 2019

Having an established EPR system and the recycling infrastructure that goes with it also provides major economic benefits. For instance, the Danish Ministry for Environment and Food estimates that shifting to a more circular approach to handling plastic waste by setting up an EPR system and increasing recycling creates three to four jobs for every 1,000 tonnes of plastic waste recycled rather than incinerated, as well as generating additional revenue of DKR 6m (or approximate US$ 900,000). Once it has been collected, packaging usually needs to be sorted into marketable fractions. ▶ See Factsheet 07

Key readings and other sources

PREVENT Waste Alliance (2021).
Video series:
EPR Explained! (06) Collection of packaging waste

Factsheet 07

How can sorting procedures for packaging waste be organised?

This factsheet outlines the key elements of sorting processes and explains how they work. It also discusses ways in which the system operator (PRO) can carry out its responsibilities with regard to sorting packaging waste.

Both collection and sorting of packaging waste are integral parts of EPR systems. Packaging waste can be collected as a single material (for example if collection covers PET bottles or metal cans only) or as a mixed fraction (e.g. mixed lightweight packaging[1]). ▶ See Factsheet 06 In both cases, further sorting is usually required in order to separate out marketable fractions.

The EPR system is responsible for organising sorting so that specific mono-material packaging fractions can be separated from collected waste and then recycled. This is a key task of the system operator (PRO); it is down to the system operator to organise and finance the sorting activity required after the packaging is collected. The necessary arrangements may be made on the basis of tender processes specifically for sorting waste, or using combined tenders covering both collection and sorting.

Manual and automated sorting

As shown in ▶ Photo 01, sorting large quantities of lightweight packaging requires significant sorting capacity.

Factsheet 07 Photo 01

Collecting mixed light-weight packaging in Germany

©cyclos 2019

Factsheet 07 Photo 02

Seperate collection of PET bottles, from a project in Beijing, China

©cyclos 2019

1 The term ‘lightweight packaging’ refers to packaging made of plastics, metals or composites (such as beverage cartons).

Sorting collected packaging waste is an essential requirement for mono-material collections (for instance collections of PET bottles only). Before the packaging can be delivered to recycling plants, any residues, contamination and/or impurities must be removed, and the packaging must be sorted by colour to improve the market value.

Packaging collected in mono-material collections has to be re-sorted prior to recycling to filter out any material that is contaminated or has been wrongly assigned to the collection, as these materials would make the waste less suitable for recycling and reduce its commercial value. Packaging collected as mixed lightweight packaging needs to be sorted into marketable fractions and pressed into transportable bales. ▶ **Photo 03** provides an overview of the most important fractions obtained by sorting plastic packaging, which are then delivered to plants for recycling or energy recovery.

Sorting using manual processes

In low- and middle-income countries, sorting is often a manual process. The mixed fractions are separated and the recyclable fractions are then sorted by hand, rather than using mechanised sorting systems. The advantages of sorting waste by hand are that it requires a small investment, it is easy for workers to do (particularly if they have conveyer belts to help them), and is a reliable method, as the basic technical equipment required is less prone to breakdowns than more advanced systems. As it is a labour-intensive process, manual sorting also creates jobs.

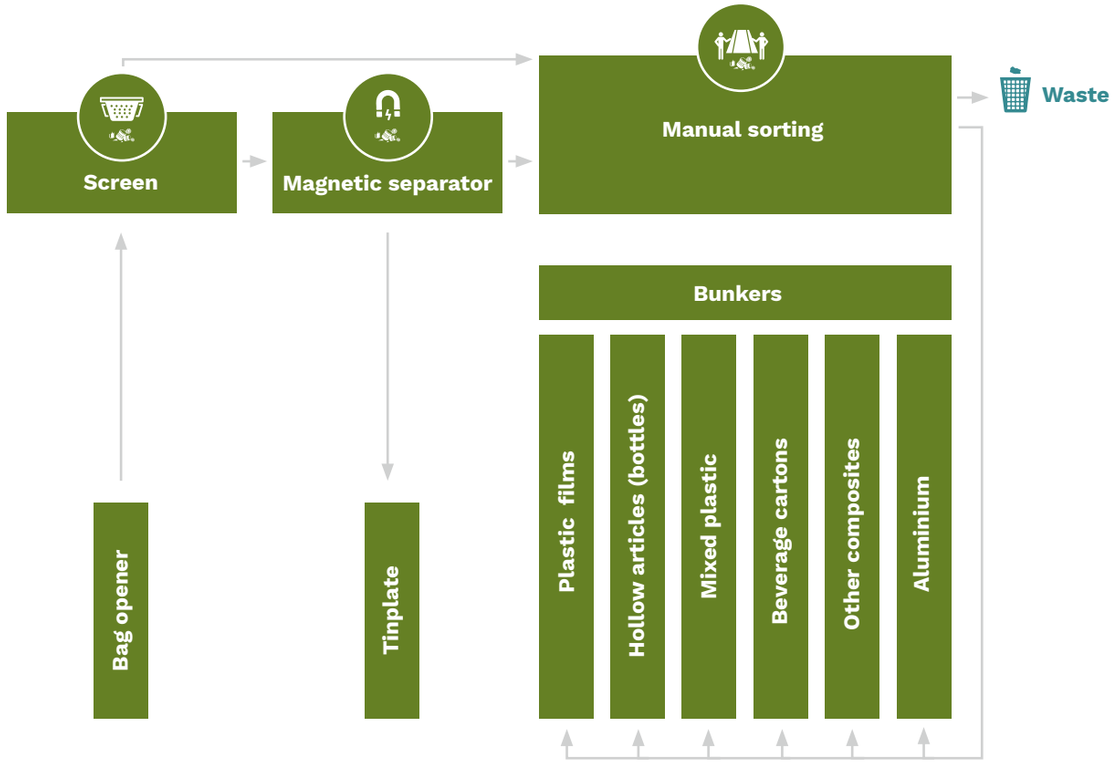
On the other hand, the amount of waste that can be sorted using a manual system is comparatively limited, as is the quality of the recyclable waste. Sorting waste into various plastic fractions by hand requires considerable expertise and is a time-consuming process. Moreover, as the system relies on the abilities of individual workers, more errors tend to be made than with an automated system. Identifying different fractions is difficult; for example, manual sorting systems struggle to sort metals beyond the two basic categories of ferrous and non-ferrous.

Factsheet 07
Photo 03

Various sorted plastic fractions (from mixed lightweight packaging collection)

©cyclos 2018

To compensate for these disadvantages, manual sorting is often supported by various technical equipment, generally including tools for separating and classifying material flows (e.g. bag openers or screens) and equipment for separating ferrous metals (magnetic separators). This makes it much easier to remove fine residues and ferrous metals before the material is sorted manually. Systems can be gradually expanded to cover more fractions and can be adapted to take account of developments in local markets.



Factsheet 07 Figure 01 (left)

Outline of a simple sorting process for light-weight packaging in which most sorting is done manually

Factsheet 07 Photo 04 (top right)

Sorting mixed lightweight packaging manually in Beijing, China

©cyclos 2019

Factsheet 07 Photo 05 (bottom right)

Sorting PET bottles in Accra, Ghana

©cyclos 2019

Waste pickers working in the informal sector can be easily integrated into the sorting process, especially for labour-intensive manual systems. ▶ See Factsheet 08 Such manual systems are therefore best suited to EPR systems in low- and middle-income countries, where they can be used effectively to sort collected packaging waste at smaller, decentralised facilities where most sorting is done by hand.

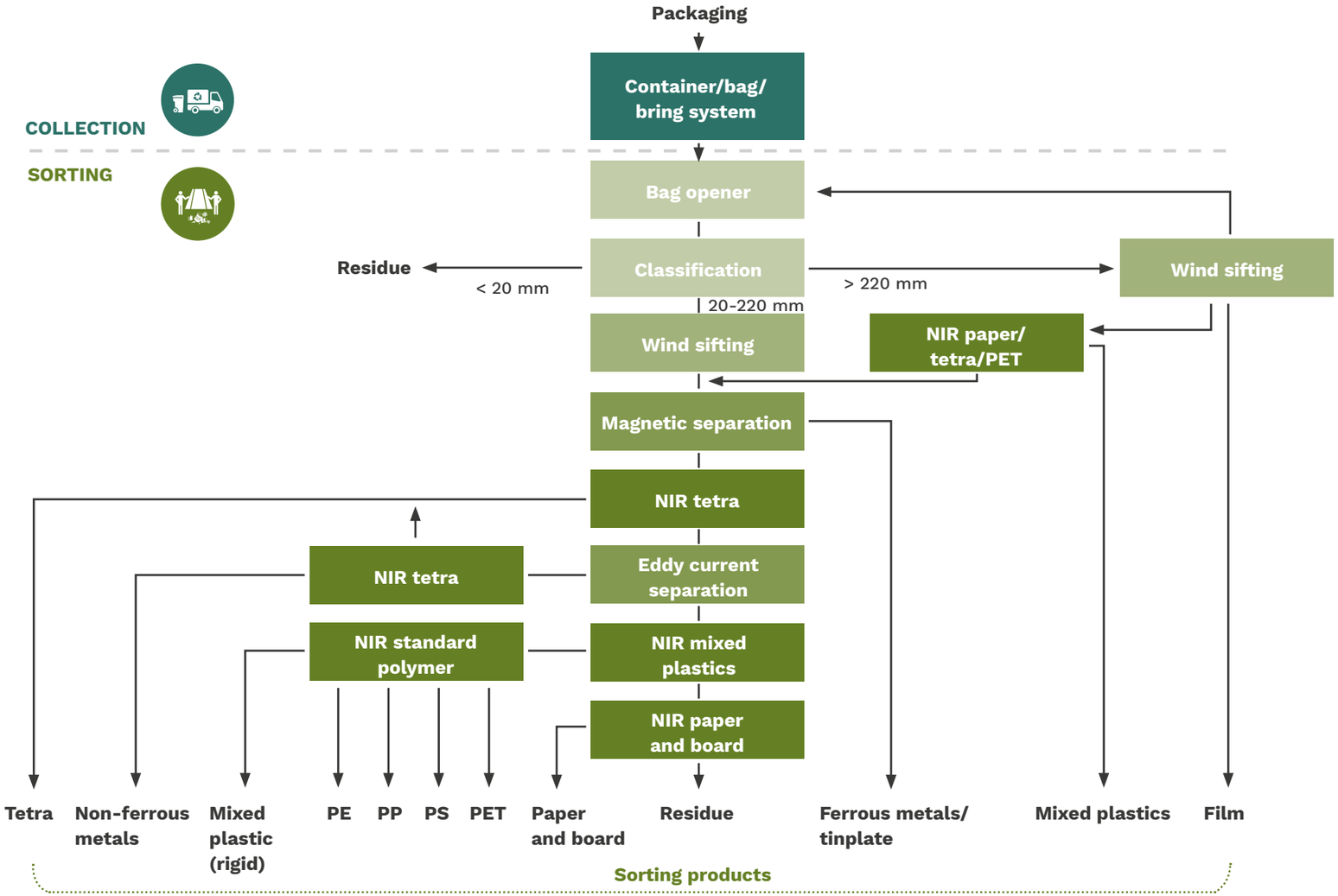
In areas where very large quantities of packaging are collected separately through the EPR system every day, small sorting plants operating mostly by hand may not have the capacity to sort the required quantities of waste. This is a particular problem in megacities. In this situation, it is a good idea to set up larger-scale, predominantly automated, sorting systems.

Automated sorting

Most modern sorting plants are almost completely automated and use a multitude of separation tools. These automated systems replace manual sorting and produce highly-differentiated material flows, which can then be marketed directly to recycling companies.

A good automatic sorting system for lightweight packaging should include the following:

- A bag opening mechanism for separating mixed packaging (if it is collected in bags).
- A classification system. This system screens the material collected and assigns it to between 3 and 5 different categories according to the size and coarseness of individual particles. This allows the system to filter out fine particles and organic material, and to remove large pieces of material that might cause disruption during sorting. The rest of the material will be of more or less average size (the exact size depends on the size of the packaging) and easy to sort.
- A wind-sifting system for separating film and paper.
- A magnetic separation system for recovering ferrous metals/tinplate.
- Eddy current separation for separating out non-ferrous metals.
- Sensor-based optical sorting.



Factsheet 07 Figure 02

Flow chart of a modern, state-of-the-art light-weight packaging/material sorting process

Source: Institut cyclos-HTP, own representation

State-of-the-art facilities in Europe often have more than 20 of these sorting machines, set up to identify, sort and separate different types of plastic (PE, PP, PET, PS) and liquid packaging board (LPB)[2]. In addition to pure NIR[3] separators, a specific process can also be used to carry out multiple different detection tests (e.g. NIR, colour measurement, form recognition and eddy current separation[4]) from a single machine (known as a multi-sensor separator). This is very useful for separating bottles from trays, for instance.

Larger, more modern sorting plants process huge quantities of waste, of around 200,000 tonnes per year. Setting up plants like these in low- and middle-income countries can be difficult, due to the nature of the equipment required and the associated investment costs, which can amount to around €15m.

Factsheet 07 Photo 06

A sorting plant for lightweight packaging in Rotterdam, the Netherlands

2 Liquid Packaging Board is not an end product as such, but is intended to be used for production of beverage cartons. It cannot be used for card-based products other than beverage cartons.
3 Near-infrared (NIR) reflectance spectroscopy. NIR is the most important detection method in for sorting light packaging/materials, and is used to differentiate between plastics and other materials containing hydrocarbons. The detector is positioned over an accelerator belt, just ahead of a belt transfer point, and measures radiation from a conventional halogen light source, reflected from the near-surface layers of an object. These measurements are fed back to a computer, which compares the spectrum emitted from the object to reference spectra. If the object is positively identified as belonging to a certain fraction, a jet of compressed air is fired at the object to push it off the belt and into the area reserved for its particular frac
4 Eddy current separation is used to separate metallic from non-ferromagnetic components. The system is set up in such a way that any liquid cartons with aluminium coatings that have not already been separated out by an upstream NIR beverage carton sorting system are discharged into the product flow. This flow then has to be purified in an NIR separation stage. The principle behind eddy current separation is based on the induction of electrical currents in electrically-conductive materials using a high-frequency alternating magnetic field.

Sorting residual waste

In many countries, the first stage of the sorting process is to sort recyclables from residual waste. This part of the sorting process removes the need for separate recyclables collections. However, sorting this way also comes with several disadvantages:

- Huge quantities of waste have to be brought to the sorting plant to find a very small proportion of packaging.
- The collected waste contains a considerable proportion of organic waste. This organic waste contaminates the sorted recyclables and thus reduces their economic and recycling value. In some cases, it may make them impossible to recycle.
- The huge amount of organic waste causes odour pollution and leads to poor working conditions.
- The technical equipment in the sorting plant quickly becomes contaminated by the large amounts of organic waste. Cleaning the plant to deal with this problem can be very expensive.

Factsheet 07 Photo 07

Residual waste being sorted in a pilot plant in Amman, Jordan

©cyclos 2019

Factsheet 07 Photo 08

Contaminated PET bottles separated from residual waste

©cyclos 2019

Key readings and other sources

PREVENT Waste Alliance (2021).
Video series:
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Factsheet 08

How can the informal sector be involved and recognised for a Just Transition?

This factsheet describes how informal workers and enterprises can be integrated into waste collection, sorting and recycling systems for packaging as part of the Extended Producer Responsibility (EPR) concept and related municipal waste management. The recommendations include strategies how to integrate workers under vulnerable working conditions in formal waste management markets.

It explores, among others, the following questions: Which forms of organisation (e.g. cooperatives) are suitable and which role can they play for the integration of informal workers? How can working conditions and income of informal waste pickers be improved and sustainable business models be set up? How can access to healthcare and social services be improved? This is analysed through a "Just Transition" perspective recently stressed by waste picker organisations, seeking to ensure that "nobody is left behind." Two case studies are briefly mentioned at the end of this factsheet, complemented by other key readings and sources.

In low- and middle-income countries, separate collection, sorting and recycling of specific types of packaging waste is often carried out by the informal economy, sometimes in parallel to the official waste management system. The activities of the informal sector are driven by a combination of the market value of certain recyclable materials and the socio-economic conditions affecting some sections of the population. Nearly every city in the world has developed some form of informal waste management system over time. These range from improving waste segregation at households through educational activities, separate collection, sale and, to a more limited extent, the processing of recyclable materials. For the purposes of this factsheet, the term 'informal worker' refers to workers with no legal employment contracts, work/operating permits, access to health care or entitlements to social security, as well as those working in conditions that do not comply with health and safety and/or environmental standards.

The need of a Just Transition

The definition of "Just Transition"[1] used in the context of the plastic pollution topic was developed by representatives of waste pickers' movements from around the world and draws on the International Labour Organization (ILO) definition frequently referred to in the context of climate action, and the definition proposed by the International Trade Union Congress in their submissions to the Secretariat.

Just Transition is defined as ending plastic pollution in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind. It is based on making visible those already working at all stages of the plastic value chain, waste pickers and other workers under informal and cooperative settings and recognising their fundamental human dignity, and their historic contribution. It involves maximising the social and economic opportunities of ending plastic pollution while minimising and carefully managing any challenges – including through effective social dialogue among all groups impacted, and respect for fundamental human rights. A plan for a just transition must build and improve upon systems that waste pickers have already established while guaranteeing better and decent work, social protection, more training opportunities, appropriate technology transfer, support for infrastructure and organising of workers, and greater job security for workers at all stages of the plastic value chain, waste-pickers and other

1 International Alliance of Waste Pickers (2023). Recommendations for potential core obligations options for the plastics treaty: *https://globalrec.org/wp-content/uploads/2023/05/230522_recommendations-for-core-obligations-plastic-treaty_IAWP_globalrec.org_.pdf*

workers in informal and cooperative settings, and all workers affected by plastic pollution. Its specific outworking will depend on local context and local consultation. The just transition framework should emphasise supporting waste pickers and other workers who are most vulnerable to occupational disruption from waste management investments and climate change.

A description of the informal sector

The waste management sector is labour-intensive, and the initial investment required to set up a business is low. Barriers to entry are perceived to be low, which is one reason why the industry is particularly attractive to people working informally to boost their incomes. In some parts of the world, all waste management work is done on an informal basis, and such informal systems are **very often the backbone of collection, separation, recycling and trade in low- and middle-income countries.**

It is difficult to describe the informal sector in general terms, as circumstances vary markedly between countries and are strongly influenced by specific local factors, such as seasonal fluctuations in the industry. In some parts of the world, informal workers are better organised and more efficient than in others (e.g., through the creation of cooperatives). Better organisation and efficiency tend to result in better incomes for workers who, in general and regardless of their level of income volatility, remain in a state of high vulnerability. Contamination of waste due to a lack of separation at source drives down the market value of waste collected, and end-consumer markets for the goods are often underdeveloped, too. Moreover, many governments and societies barely recognise the informal sector and the important contribution it makes to public and environmental health, leading to low social status, risk of being displaced or harassed and a lack of support for efforts to improve living and working conditions.

Informal stakeholders operate at every step in the waste management chain, though they are most heavily involved in collection. Drawing clear boundaries as to where informal activity comes to an end and formal work begins is generally extremely difficult (▶ see Figure 1).[2]

Many informal stakeholders in waste management systems collect recyclables from households or workplaces as waste pickers on the streets, at transfer stations and at dumpsites.

Factsheet 08 Figure 01

Informal work within waste management systems

2 Kenya Plastic Action Plan (2019)

They usually collect recyclable materials and sell them to middlemen – small businesses which store recyclables before selling them on to recycling companies. However, informal businesses operate at every stage of the recycling process, in some cases through direct commercial links between waste pickers and formal recycling companies.

Depending on the roles people fulfil along informal packaging waste value chains, **their working lives are often characterised by a lack of regular income, rudimentary equipment, and harsh working conditions, little or no recognition of their work and a generally vulnerable position in the labour market.**

As the nature of the informal sector varies between countries, it is difficult to define general categories of workers within the informal waste management sector, but most systems incorporate at least some of the following groups:[3]

- **Recyclables collectors** are self-employed workers who use bags, small pushcarts, pull carts or small motorised vehicles to collect recyclable materials bought from households, generators of bulk waste or other establishments. They sell the material they collect to junk shops as a primary source of income and/or directly to formal recycling facilities. Recyclable collectors who are professional and semi-professional are usually well-equipped (e.g., with a motorcycle and trailer for collecting waste), highly knowledgeable about the industry and the waste cycle and often take genuine pride in their work. They can act as informal middlemen who buy and sell packaging waste, and/or process it using certain recycling processes (▶ see also Figure 1). Collectors can also play an important role in terms of education and behaviour change, thanks to their presence in the field and a close engagement with residents.
- **Material pickers** pick up recyclable waste material on the streets or at open dumps, rather than collecting it directly from the source. Picking waste material is very labour-intensive and dangerous, particularly on open dumps. In many countries it is forbidden to go into landfills to collect recyclables.
- As part of the two categories mentioned above, we can also identify other groups of informal workers, for example:
  - **Casual or precarious informal workers** are often elderly people or people experiencing temporary hardship, for example as a result of unemployment. They usually have simple equipment such as old prams or wheelbarrows.
  - **Women waste pickers** are treated as a specific category of informal workers because their work is particularly precarious, and they are often equipped with nothing more than a pram, if they have any tools at all. They often fend for themselves, as they can't count on support from other family members and have little prospect of developing any sort of career.

3 Triangulated from
- GA Circular (2020). Full Circle. Accelerating the Circular Economy for Post-Consumer PET Bottles in Southeast Asia
- Ocean Conservancy (2019). Plastics Policy Playbook
- GIZ (2015). Valuing Informal Integration. Inclusive Recycling in North Africa and Middle East.

Collection of packaging by the informal sector

Before the informal sector can be integrated into an EPR system, a thorough analysis is required to determine exactly which waste fractions are already being collected. Generally speaking, informal waste collectors tend to collect **any packaging and/or material with a positive market value, i.e. material that can generate income when sold.** Collection by the informal sector also varies depending on the proximity of recycling facilities or other potential customers to whom the waste can be sold (e.g., waste banks, aggregators, or brokers). If a specific price is paid for a given type of packaging (▶ see Table 1), it is safe to assume that informal collectors will collect a considerable part of it. The following table shows an example of which types of packaging and materials are collected in the informal sector. This greatly varies from location to location.

Packaging type and material	Collected in the informal sector	Comments
PET bottles	Often	Usually have a positive market value, easy to collect, recycling/recovery systems often already established.
Packaging containing ferrous metals (like cans)	Often	Positive market value, with most waste being generated in industrial settings. Local recycling facilities are usually in place.
Non-ferrous metal packaging (like cans)	Often	Positive market value, with most waste being generated in industrial settings. Can usually be recycled or marketed locally.
Paper	Often	Paper waste is collected primarily from industrial/commercial sources. Can usually be recycled or marketed locally.
HDPE (rigid plastics, such as bottles)	Sometimes	Sometimes carries a positive net market value depending on local recycling facilities.

◀ **Factsheet 08 Table 01**

Some examples of how various types of house-hold waste are collected in the informal sector

Packaging type and material	Collected in the informal sector	Comments
PP/PS (rigid plastics, such as cups)	Sometimes	Sometimes carries a positive net market value depending on local recycling facilities.
LDPE (film)	Sometimes	There is sometimes a positive market value for mono-materials, though this market value is generally for industrial waste only and depends on local recycling facilities.
Glass	Sometimes	Market value is strongly dependent on local recycling facilities and is usually more stable than other commodities. Collection is labour-intensive because glass is a dense material and heavy to carry.
Liquid packaging board (TetraPak and similar)	Rarely	No positive market value as it is generally difficult to market and recycle locally. Collection can be incentivised if the producer pays for it to be collected (thus creating an artificial market).
PS	Not collected	Accounts for only a small proportion of household packaging waste, making collection labour-intensive and non-profitable.
Other PET packaging (e.g. trays)	Not collected	No positive market value, no established recycling process.
PVC	Not collected	Accounts for only a small proportion of household packaging waste, making collection labour-intensive and non-profitable. There are facilities in place for the collection and recycling of some non-packaging items, such as PVC pipes.
Composites (flexible and rigid) and other plastics	Not collected	No market value. Collection is labour-intensive (especially for flexible packaging) because it is light, meaning that very large quantities have to be collected to make collection viable.

Factsheet 08 Table 01

Some examples of how various types of household waste are collected in the informal sector

The need for sustainable waste management

In high-income countries, the proportion of waste collected for recycling is rising in line with increasing GDP. However, studies indicate that this is not the case in many low- and middle-income countries. For PET bottles, for instance, data show that countries with lower GDPs generally have higher collected-for-recycling rates than countries with higher GDPs. One of the main reasons for this inverse correlation is reliance on the informal sector. As countries and cities develop, the average cost of living increases, and collecting and selling PET bottles in the informal sector ceases to be economically viable which forces workers to move on to other trades and jobs. This in turn leads to a reduced number of workers in the informal waste management sector, which pushes down the collected-for-recycling rate. Unless this cycle is addressed, it can pose a real problem for the transition to sustainable waste management.[4]

Improving waste management and recycling is a crucial step for the development of low- and middle-income countries, and the expertise of stakeholders in the informal waste management sector will be key to achieving this aim, so it is very important that they are socially and economically integrated into the waste management industry. However, informal operators should only carry out waste management activities when the following conditions are met:

- Materials are easy to access and safe for sorting and storage.
- Transport and, if necessary, storage, are easy to arrange.
- There is a market for the materials they collect.
- There are buyers in their local areas.
- Collecting the materials can be expected to generate revenue.

Collecting waste in the informal, as opposed to the formal, economy, brings a high level of risk and uncertainty for those involved in collection, and severely limits the scope to establish a sustainable waste management system. In informal systems, items with no market value are not collected or discarded inappropriately and continue to litter the environment; systems that concentrate on collecting marketable materials are not effective for disposing other types of waste. Therefore, a key requirement for a comprehensive waste collection system is to **shift the focus from collecting materials with a positive market value to providing a service to the population,** regardless of how much the waste is worth in financial terms.

EPR is one of the key tools for this shift to a service-orientated mindset. It needs to be accompanied by efforts to recognise and integrate workers in the informal sector into a formal, supervised waste management system, possibly including moves to formalise their work. To make sure the system is properly funded for the long-term, it is also important to measure and be aware of the management costs for all waste materials, including items that have no positive market value.

4 GA Circular (2020). Full Circle. Accelerating the Circular Economy for Post-Consumer PET Bottles in Southeast Asia

Integrating the informal sector into an EPR system

When an EPR system works effectively, it encourages solid, long-term organisational structures and reliable funding. This in turn brings major benefits for workers and businesses working alongside it in the informal sector. Any good EPR system must be able to do the following:

- Ensure nationwide collection of all packaging.
- Develop infrastructure for sorting and recycling packaging.
- Ensure material recycling and high-quality recovery.
- Dispose of any non-recoverable packaging in an environmentally sound manner.
- Document and monitor waste management activity.
- Fulfil the obligations assigned to it by market participants.
- Provide training, advice, and information.
- Ensure materials can be easily identified.
- Ensure high standards of safety and welfare for workers in the EPR system.
- Make sure the management of financial flows is transparent and those responsible for doing so are held accountable.

Before the informal sector can be integrated into an EPR system, a thorough analysis is required to:

- Find the best term to refer to informal workers that makes them feel comfortable and proud,
- Identify organised communities with leaders who can represent them in decision-making processes (they can be mostly independent and hence not easy to identify),
- Know whether they are already supported by NGOs which can collaborate as intermediaries to facilitate any communication and preparation process regarding EPR integration,
- Identify existing studies or surveys carried out by environmental agencies, NGOs or other stakeholders trying to identify and characterise workers in the informal waste sector,
- Identify existing or ongoing work to establish policies for the inclusion of the informal waste workers,
- Identify existing initiatives to register informal waste workers,
- Identify existing initiatives led by packaging producers to integrate informal workers in packaging waste collection and sorting processes,
- Do what is necessary to get a formal agreement between all stakeholders in the packaging value chain that recognises informal workers as key players for the EPR implementation process. For example, when establishing a governance mechanism for the PRO (system operator), consider the option of including informal sector representatives in the decision-making process or in strategic meetings led by the PRO administration with other stakeholders.

Looking at formalisation as one way of integration, the formalisation of informal economies can take different approaches, such as registration, taxation, organisation and representation, legal frameworks, social protection, business incentives or support, and more[5]. For the waste picker community, the following benefits would be included as outlined in table 2 below.

Legal recognition	Improve salary conditions and benefits	Improve representation	Access to training and personal protective equipment
Legal recognition and positive public image and or public acceptance by waste pickers who contribute to the upkeep and cleanliness of the cities they work in.	Increased earnings of workers via stable monthly income.	Increase their voice and representation.	Improve their skills through training.
Identification cards to protect them, so that they can be identified as workers in order to benefit from the payment scheme.	Improve work conditions e.g., uniforms, specially designed carts and buckets for collection of municipal solid waste and sorting spaces, etc.	Bargaining mechanisms to negotiate with buyers of the material they collect and with municipal officials.	Access to appropriate equipment and protective gear such as carts and gloves.
	Access to welfare e.g., day-care for children, education scholarships, pension schemes.	Organisational and bargaining power will help self and social recognition of their workers as a prerequisite toward building a collective voice and self-representation in order to engage in negotiations with employers, suppliers, buyers and/or middlemen.	

Factsheet 08 Table 02

Waste pickers formalisation approaches[6]

5 Morais et al. (2022) Global review of human waste picking and its contribution to poverty alleviation and circular economy
6 According to Morais et al. (2022), based on Dias 2016, International Labour Organisation and WIEGO 2017, WIEGO 2020

Due to the lack of an existing exemplary inclusive EPR model, WIEGO[7] highlighted the following enabling factors that are based on the experience of waste pickers and a few systems attempting integration.

Legislative Action for mainstreaming of the informal economy:

- Recognise all actors in the informal recycling economy in regulatory and legislative frameworks around waste management and resource recovery as applicable in individual countries.
- EPR systems need to account for waste pickers and other informal waste workers in EPR systems so that EPR functions well without exacerbating exclusion and poverty.
- EPR system design must be multi-stakeholder, and needs ongoing, direct communication with informal waste workers in the recycling value chain – waste pickers, waste pickers' organisations, scrap dealers, aggregators, and recyclers.
- The regulatory framework must also allow for a just transition to the formal economy, without discrimination, irrespective of the worker or entrepreneur status – such as the provision of occupational identity cards, ease of registration including reduced fee involved in registration, allowing participation in tenders and bids, upholding existing service contracts and ensuring that EPR systems do not exclude informal workers.
- Strong markets for materials or mechanisms to compensate fluctuations in market prices are key to both promoting a circular economy as well as ensuring an inclusive recycling, reuse and repair sector that generates and sustains local livelihoods.

Facilitative Action to create an enabling environment:

- Access to capacity development and training.
- Access to social security.
- Access to infrastructure, land, and equipment.
- Access to finance.
- Access to legal support and administration.
- Access to technology.

Governance Action for ensuring adequate waste management, employment targets and standards, and social and labour protections:

- Protect access to waste for the informal waste workers.
- Prevent greenwashing by disclosing environmental and social performance indicators that allow a critical and holistic evaluation of the EPR system.
- Support entrepreneurship and social business.
- Support fair pricing of material that is negotiated between all stakeholders.
- Provide grievance redressal mechanisms.
- Prevent corrupt/exclusionary practices.
- Prevent monopoly power of companies providing or contracting formal waste management services, including producers, as the lack of conditions for a free competition puts at risk the integration of informal workers into an EPR system and a just transition.
- Enforce the Polluter Pays Principle.
- Promote equal partnerships.
- Manage data traceability of performance indicators (amounts collected, jobs created, etc.) from PROs, by ensuring data is in the public domain.

7 WIEGO (2022). Technical Brief on Extended Producer Responsibility (EPR) and Waste Pickers.

Integrating informal workers through waste picker cooperatives or as employees

'Typical' waste pickers work in the streets, on dumpsites and at landfill sites. Their focus is gathering valuable materials according to the principle of 'cash for trash': anything that cannot be sold for a profit is left to pollute the environment. However, an EPR system must ensure that all packaging is collected, including packaging with no market value or waste that is too light or difficult to collect to be economically viable, e.g., plastic bags, sachets, composite packaging.

Labour-intensive collection and sorting represent a great opportunity to integrate informal waste pickers into an EPR. The system operator (PRO) can help by offering attractive, formalised, terms and conditions, thus encouraging collectors who have been working informally to join a waste pickers' cooperative or apply for jobs. Agreements between cooperatives and PROs or employment contracts can be made directly between the waste picker and the PRO, or between waste pickers cooperative or the employee and a company tasked with providing sorting and collection services to the PRO.

To formalise the current position of workers in the informal sector and integrate them into an EPR system, setting up cooperatives can help to formalise their activities[8]. **Cooperatives, in particular, have proven especially effective in integrating informal workers across a number of countries.** Under this model, formally registered collectives and cooperatives of independent informal workers enter into formal agreements to manage waste on behalf of the local authorities on a contracted basis. Allowing waste pickers in cooperatives to participate in such activities enables them to influence decision-making and to operate from a position of strength in numbers. Organising informal workers as part of a formal system requires a high level of trust between all those involved.

Factsheet 08 Photo 01

Sorting PET bottles in Accra, Ghana

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Factsheet 08 Photo 02

Production overview of an organized cooperative of informal waste pickers in Brazil (Cooperative Crescer - Sao Paulo)

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Formalisation is often linked to restricting workers to set working hours. This can cause problems for some informal workers, especially women. It is therefore important that moves to integrate informal workers leave room for flexible solutions. The four key steps in the formalisation process are:

- Building trust and making sure workers are aware of how the system works and what will be expected of them.
- Providing professional training and legal advice.
- Providing access to waste management infrastructure and equipment.
- Signing formal agreements (cooperatives) or employment contracts.

8 Morais (2022). Global review of human waste-picking and its contribution to poverty alleviation and a circular economy.

The table below demonstrates the potential benefits and disadvantages that come with integrating informal workers into the formal economy:

Informal sector	Formal agreements with cooperatives or employment
Irregular income	Earning regular income
Lack of appropriate waste management infrastructure and equipment	Access to suitable infrastructure and equipment
Insecure living standards	Better living standards
High risk of ill health	Lower risk of ill health
Vulnerable to unfair business practices	Fair, regulated business practices
Lack of access to social security systems	Access to social security systems
Very high degree of flexibility and independence	Less flexibility and independence

Factsheet 08
Table 03

Informal work vs. formal economy

Integrating informal workers as business partners of independent/self-employed entrepreneurs

Professional and semi-professional waste management companies in the informal sector are generally very well informed about the market, recycling, recovery options, the key stakeholders within the recycling chain and the various processes associated with waste management. The skills of these informal companies can be invaluable when it comes to setting up a successful EPR system, and the system operator (PRO) should consider contracts with some of these companies. Alternatively, if the aim is to integrate these informal actors into the system via a formal contract, the PRO and any co-contractors may agree to make companies in the informal sector formal members of the EPR scheme.

Where informal companies own their own facilities, it must be ascertained exactly what services they provide and what standards they comply with (or will be expected to comply with in the future). If these companies operate their own collection vehicles, it should be established whether they are roadworthy and how much waste they can transport. If, on the other hand, the companies have been operating purely as trading companies (perhaps with their own storage facilities), discussions should be held to clarify how they can contribute to the EPR system.

Independent/self-employed entrepreneurs may be able to play a role in areas including collection services, the provision of storage capacity, and sorting, marketing and/or recycling waste.

To include companies operating informally in an EPR system, their status has to be formalised. The first step in this process is to incentivise the company to register with the system operator (PRO) and provide clear identifying information, including its address, a specific location, a nominated point of contact, an e-mail address and a detailed description of the services it provides. Other key steps include:

- Building trust, as well as providing information on the system and the types of services required.
- Providing professional supervision and legal advice.
- Concluding service agreements with business partners.

Factsheet 08
Photo 03

Waste delivery in Accra, Ghana

©cyclos 2019

The table below illustrates the effects of involving participants (both individuals and companies) from the informal sector in recycling systems as formal business partners:

Informal business	Formal business partners
Uncertain commercial basis for operations	Fixed service agreements
Uncertain marketing conditions	Reliable acceptance of recyclables
Uncertain situation for employees/workers	Better conditions for employees/workers
High operational risks	Reduced risks
Vulnerable to unfair business practices	Supervised business practices
Not paying tax (though they may be paying informal landlords or stakeholders in order to operate)	Paying tax
No obligations to report to public authorities	Required to report to public authorities (which they may find very time-consuming and cumbersome)
No obligation to provide access to healthcare and welfare benefits for workers/ employees	Expected to provide access to healthcare and welfare benefits to individual workers/employees

Factsheet 08 Table 04

Informal business vs. formal business partners.

Enterprises in the informal sector can be integrated into EPR systems as formal partners by a number of different routes. For example, they can be set up as NGO-supported micro enterprises, as franchises of formal waste management companies, as cooperatives[9], as community-based organisations, or as associations, among others, depending on the local jurisdiction.

Other lessons learned from integrating informal enterprises and formalising working conditions

Past experience with integrating informal enterprises into formal structures has highlighted a number of useful lessons.[10] However, it is also important to take into account context-specific challenges that may arise when implementing and scaling up projects.

- Public authorities (both at national and local level) are crucial in supporting the integration of informal workers by providing social security and implementing waste-related legislation (including legislation not connected to EPR).
- Children often work as waste pickers to contribute to the family income or to support themselves independently, sacrificing their education, health and physical development. When addressing the issue of child labour, it is important to acknowledge the economic issues to which it is intimately connected, and to address the contextual and structural factors that influence children to work or prevent them from accessing education.
- Inclusion and empowerment of women should be prioritised. Women are still frequently excluded from formal labour as it is often still perceived as a male domain[11].
- An effort should be made to raise public awareness of the work done by informal waste management workers and why it is important.

Integrating informal stakeholders into the legal framework of an EPR System

Informal recycling activities should be integrated into the EPR system to ensure the people involved in them are working as part of the EPR system and to remove any risk to their incomes. Their work should be carried out on the basis of the legal framework applicable to the mandatory EPR system concerned. In particular, the legal basis should outline how the informal sector can be involved in the EPR system, and what responsibilities the PRO shall assume in this regard. Below follow two examples on how some countries already incorporated the inclusion of informal workers in their practices on EPR for packaging.

Chile case study

In Chile, a legal framework for a mandatory EPR system has already been drawn up. The decree covering packaging was enacted in June 2020 where it is stipulated that producers must begin compliance with a gradual scheme of recycling targets starting from October 2023 through PROs to which they must necessarily adhere. Article 41 of this decree states that:

> *The waste pickers who are registered in the national register (RETC or PRTR) will be able to participate in waste management in order to achieve the objectives established in the Decree. For these purposes, they must be certified within the framework of the National System of Certification of Labour Competencies established in Law No. 20 267.*
>
> *The Producer Responsibility Organisation must make the bidding rules under which they will conclude contracts for the collection and recovery services available to the waste pickers free of charge.*

9 Ocean Conservancy (2019). Plastics Policy Playbook
10 After Manning, C. (2020). Private sector partnerships with waste pickers
11 UNEP (2015). Global Waste Management Outlook.

> *In addition, the PRO's Inclusion Plan (Article 41) must indicate the mechanisms and instruments of training, financing and formalisation, aimed at enabling the full integration of waste pickers, indicating the scope and magnitude of the efforts to be made in these three aspects.[...].*[12]

South Africa Case Study[13]

In South Africa, the absence of formal systems for separation at source of recyclables, an informal sector comprised of waste pickers has emerged that contributes significantly to their collection of recyclables. These informal sector livelihoods are marginal, with many waste pickers being homeless or living in informal settlements, and in many cases on or adjacent to landfills[14]. The National Waste Management Strategy 2020[15] promotes waste separation at source linked to EPR programmes including waste pickers. It calls for innovation and a variety of different models and tools to be developed for engaging the informal sector (waste pickers) that accomplish waste separation at source.

The promulgation of EPR regulations in November 2020[16] provided the legal framework for waste picker integration into the post-consumer collection value chain and for EPR schemes to pay a living wage (not below the minimum wage) to waste collectors, reclaimers, and pickers. Progress to date includes the development of the Guidelines for Waste Picker Integration[17], the associated supporting website hosting a variety of useful resources and training materials (www.wastepickerintegration.org) as well as the development of the South Africa Waste Picker Registration System (SAWPRS).

Registration on the SAWPRS will facilitate waste pickers' inclusion in government and industry programmes and provide pickers with access to the service fee which industry must pay to them in terms of the EPR regulations[18]. It is important to note that although payments of waste pickers were to be commenced in November 2022, significant work must still be conducted by Producer Responsibility Organisations (PROs) to ensure that all registered waste pickers are paid the service fee, and that the current level of service fee is extremely low (approx. 0,15 RAN/kg or 0,007 USD/kg).

12 Chilean packaging EPR decree (Spanish). (*Link*).
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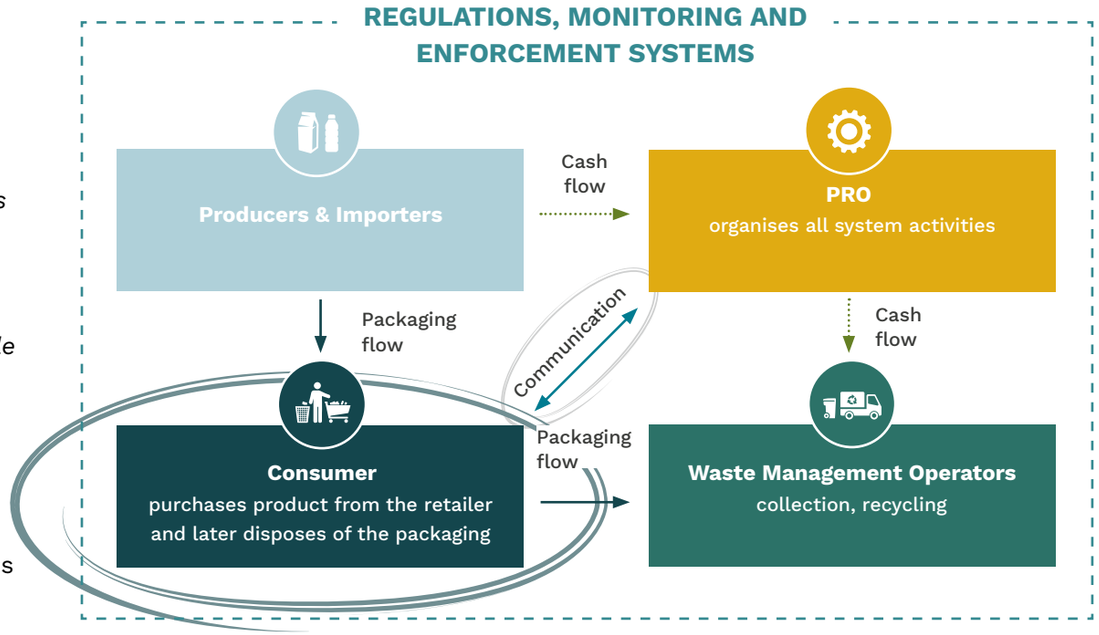
Factsheet 09

How can citizens be incentivised to separate packaging waste at source?

This factsheet addresses the need to obtain the support and co-operation of citizens when it comes to segregating waste. It covers issues such as the information that should be provided, raising awareness, and the incentive mechanisms that can be used to encourage citizens to separate packaging waste, as well as discussing the best collection methods, the role of deposit refund systems and how to run sustainable public campaigns to raise awareness.

Transitioning to a sustainable system for managing packaging waste depends on participation of the population. This is particularly true of segregating waste, which is key to increasing recycling. It is therefore essential to ensure citizens are fully informed about how and why they should separate their waste, especially in countries with no prior experience of waste segregation at consumer level.

Depending on the way the individual EPR scheme is set up, and on the institutional framework in the country concerned, **providing information to the population can be the responsibility of the PRO and/or of municipal authorities or other public bodies**. To help institutionalise this responsibility, it is a good idea to enshrine it in the regulatory framework for the scheme and to assign a budget for it, funded by the PRO through the EPR fees.



Factsheet 09 Figure 01

Consumers in an EPR scheme

In addition to running awareness campaigns, citizens can also be incentivised to separate their waste on an organisational, financial, cognitive and/or emotional level. It is important to create a culture of collective civic responsibility in which consumers feel obliged to carry out their civic duties without expecting any reward for doing so.

There are a number of tools/strategies for encouraging people to sort their waste, such as:

- Making the collection system convenient and easy to use.
- Good communications (providing information and being transparent, making sure the measures people are being asked to take are credible).
- Educating the various different target groups about the scheme.
- Monitoring (during collection).
- Reducing the amount and associated fee for residual waste management through segregating packaging from residual waste (for example, making collections of sorted packaging waste free of charge on the basis that the costs are covered through the EPR fees).
- Penalties (for littering or not segregating waste properly.
- Financial or non-cash incentives.

Waste collection systems for household packaging waste

The exact nature of the waste collection system will have an effect on how people use it. Kerbside collection systems and systems based on central collection points each have their own advantages and disadvantages, as do 'hybrid' systems featuring elements of both. The table below sets out how these systems can affect consumers' behaviour:

Criteria	Kerbside	Central collection*
Distance for consumers and available space in flats and in front of buildings	Short distance (+) Requires enough space in front of flats and buildings to install waste bins, which must be accessible to waste collection vehicles (-)	Distances are longer. Some people may need to use private transport to reach the collection points (-/+) Requires less space, as collection points are installed in a smaller number of specially selected locations on streets and in public spaces (+) If the collection points are located along the main traffic/commuter routes, it becomes easier to integrate waste disposal into daily routines. (+)
Disposal of packaging at household level	Separation at source directly into the waste bins, which are then collected (+)	Waste has to be stored in the house between visits to collection points, which takes up space (-)
Monitoring	Easier to identify people not segregating their waste properly (+)	Waste is disposed of anonymously, which can have a negative effect on behaviour (-)
Costs	A more expensive option, as having bins outside houses means more containers and more collection points for the collection vehicles (-)	Less expensive. Centralised collection points mean fewer stops for collection vehicles (+)

* Includes waste banks as a specific form of centralised collection system.

▶ See Factsheet 06

◀ Factsheet 09
Table 01

Kerbside collection systems vs central collection systems

When it comes to incentivising consumers to sort their waste, the following factors are key:

- **Bins and containers must be easy to access.** Citizens will be reluctant to bring their waste to a central collection point if it is difficult to get to.

- **Waste separation should be simple, with clear labelling.** Especially when operating in countries with no experience of waste segregation, clear labelling is crucial to avoid segregation errors and potential contamination of recyclable waste.

- **Separated waste must not be mixed with residual waste after collection.** Nothing reduces citizens' motivation to sort their waste more than seeing recyclable waste being disposed of together with residual waste after collection, rather than being recycled. This is a particular risk when the system fails to identify enough recovery and recycling options, or struggles to market recycled waste.

- **There must be enough containers for residual waste.** Providing bins for recycling is important, but ensuring there are enough bins for residual waste is just as crucial. Otherwise there is a high risk that citizens will dispose of non-recyclables in the recycling bins – thus contaminating the recyclable waste – or will simply dump waste in the surrounding area.

Another way of incentivising consumers to separate packaging waste is **using deposit refund systems (DRS).** ▶ **See Factsheet 10** In a DRS, a set deposit is added to the purchase price of a packaged good (e.g. a drink in a PET bottle). Once the product has been consumed, the consumer can claim the deposit (or a voucher for the same amount) by returning the empty packaging. This payment acts as an incentive to bring the packaging back to take-back stations, instead of disposing of it as waste.

Deposit refunds are not the only way of incentivising consumers to return empty packaging. Rewards can be anything that motivates the buyers to return the empty packaging. A wide range of examples can be found in countries all over the world. For instance, in Turkey, consumers can use their empty PET drinks bottles to buy tickets for public transport, while in various parts of Indonesia, the Philippines and Sri Lanka, children can exchange recyclables for school equipment. Such incentives tend to be most effective among households with relatively low incomes. There is also one clear disadvantage of such systems, which is that they can encourage citizens to think they should be paid for recycling their waste instead of paying waste management fees themselves.

◀ **Factsheet 09 Figure 02**

The French 'Triman' is printed on packaging to remind consumers to sort their waste

©Citeo

Consumer awareness: communication and education

Sustainable waste management also depends on **changing consumers' attitudes towards waste**, and particularly on creating a sense of civic collective responsibility for it. Making sure people are informed about both the benefits of proper waste management and the adverse effects of failure to manage it effectively is key to promoting this change. Increasing awareness of the effect waste can have on health and the environment is also crucial in preventing mismanagement of waste. For a waste management system to thrive, every level of society, from local communities to schools and universities, businesses, different organisations and governments, has to buy into it, and work together to build a culture that will help it to become established.

Consumer awareness starts at an individual level. There are number of different ways of raising awareness, which should ideally be used in combination with each other. Examples include:

- Guidelines and signage
- Printed media
- Digital media
- New technology, such as apps on smartphones
- Environmental education programmes in schools
- Events and campaigns
- Environmentally-friendly labelling schemes
- Marketing
- Product fees on packaging

Factsheet 09 Photo 01

Waste separation in schools in Zarqa, Jordan

©cyclos 2019

Awareness-raising schemes should be also promoted by people and institutions outside of the government with the potential to impact consumer behaviour, including, for example, religious authorities or local village leaders/chiefs.

School and nursery education for long-term impact

One of the most powerful tools for education and raising awareness is **environmental education programmes in schools**, as children pick up habits faster than adults. Children can also play an active part in raising awareness of waste-related issues by transferring their knowledge to their parents, close family, and community. What children are taught as youngsters stays with them for life, and they will pass that knowledge on to future generations.

Schools can become a main driver of change. The first step is to **develop programmes for teaching children about waste**, how it should be managed, the negative consequences of not handling it properly, and best practices to deal with waste. Integrating issues around waste management into a range of different subjects, such as science, citizenship classes, etc., helps pupils to link mismanagement of waste with the effects it has on health and the environment. Educating children about waste management can also raise awareness of the fact that waste is ubiquitous in society and that, if properly managed, it can become a valuable resource, helping us to make new products and bringing various economic and social benefits. It can also provide new jobs and rewarding careers in the environmental and waste management sectors.

In addition to teaching children about waste management in school, workshops, events, and other awareness-raising campaigns are also essential for educating them about waste management. **Engaging children in activities that combine theoretical and practical knowledge** enhances their critical thinking and analytical and problem-solving skills, which in turn help them to make informed decisions on waste issues.

Key readings and other sources

PREVENT Waste Alliance (2021).
Video series:
EPR Explained! (09) Citizens

Factsheet 10

How can deposit refund systems be set up?

This factsheet outlines the basic principles of deposit refund systems as one potential element of an EPR scheme, and describes various forms of deposit refund systems.

A deposit refund system (DRS) is a specific form of collecting packaging as part of an EPR scheme. In a DRS, consumers pay a deposit when they buy certain packaged goods, for instance, beverage containers, and have to return the packaging after use in order to claim the deposit back. The deposit gives consumers a financial incentive to bring these items to take-back stations instead of simply disposing of them as waste.

A DRS is a separate type of EPR system that can usually be implemented alongside another EPR system for packaging or on its own. This is because the packaging covered by the DRS is not included in the general EPR system for packaging, meaning that the DRS operates on the basis of its own regulations, definitions, agreed responsibilities, infrastructure, monitoring and inspection mechanisms. Organising a DRS is therefore every bit as demanding as setting up an EPR system for packaging.

Key principles of deposit refund systems

In theory, deposit refund systems can be used for various types of packaging. However, in practice, **they are not suitable for the full range of packaging currently available, as they can only be applied to easily identifiable items, such as drinks bottles or rigid bottles used for household cleaning products.** The biggest limiting factor for a DRS is the space available to retailers, especially if attempting to collect more than one packaging fraction while complying with relevant hygiene standards.

In a DRS, consumers are incentivised to return items subject to a deposit to the retailer or another take-back station in order to claim back the deposit, rather than just disposing of the item as waste. Deposit refund systems are thus **systems based on consumer participation**, which can significantly reduce the amount of waste littering public spaces. Moreover, as this take-back system for used items is limited to specific goods, a DRS can collect **large quantities of high-quality, pre-separated material fractions**, allowing for high-quality recycling.

A number of decisions have to made before a DR system can be established. It is particularly important to clarify the following points in advance:

- Which items made of which materials should be collected as part of the DRS, and how big should the individual items be?
- Where should the items covered by the scheme be collected?
- How should products to be covered by the DRS be labelled and identified?
- What organisational and administrative arrangements need to be made?
- How should the DRS be financed?
- How big should the deposit be to provide a sufficient incentive to consumers?

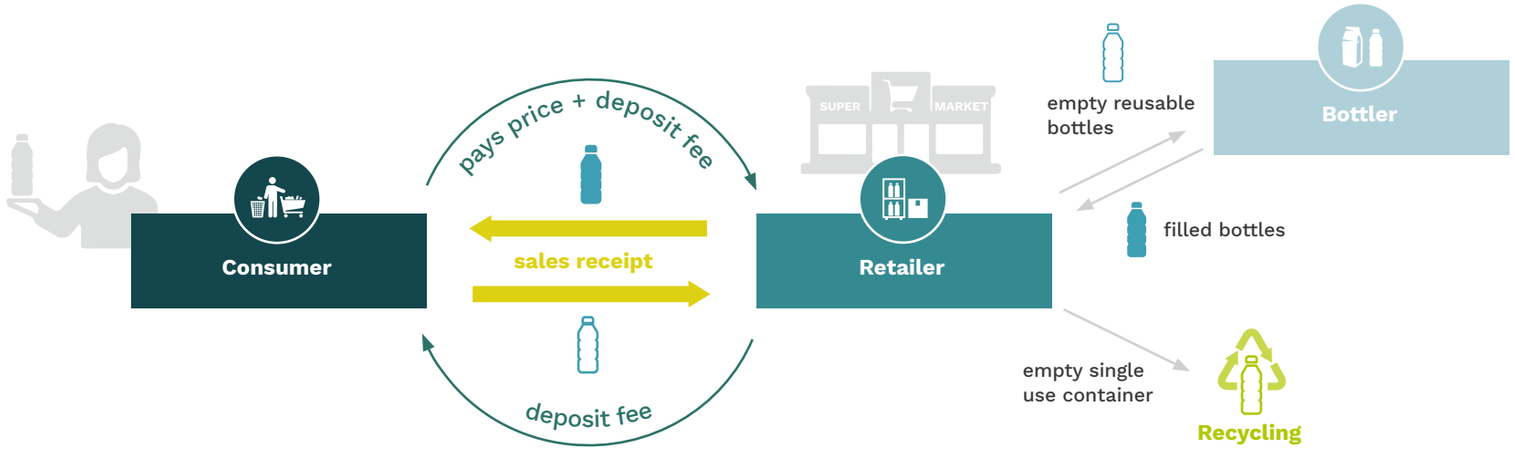
DRS with a direct interaction

In its simplest form, a DRS is built on a **direct relationship between the consumer and the retailer.** In this model, the consumer pays a fixed deposit when buying an item, which is added to the standard purchase price (e.g. €1 purchase price + €0.25 deposit = €1.25). In this kind of simple DRS, the take-back station is the shop where the consumer bought the item. When they return the empty packaging, the consumer shows the retailer the receipt for the item, and the retailer issues them with cash or a voucher, both equivalent to the value of the deposit.

If the item concerned is a single use bottle, the retailer then sells the returned packaging to recyclers, who pay him or her the scrap value of the bottle. Alternatively, if the bottle can be reused, it can be returned to the bottler to be re-filled.

Small-scale deposit refund systems can be set up between individual retailers, by specific companies, or for specific events.

When setting up a small-scale DRS, such as when covering a small geographical market or a specific event, the direct DRS model is often ideal because of the **minimal administration** and **organisational effort** needed to operate it. The first step towards setting up a DRS is to determine exactly which items and points of sale are to be covered; small-scale DRS are often able to accommodate reusable service packaging like plastic cups as well as bottles. If the items concerned can be labelled appropriately (e.g. with the event logo on the cup), or if there is no way anyone can bring their own bottles into the area covered by the scheme (for example if doing so



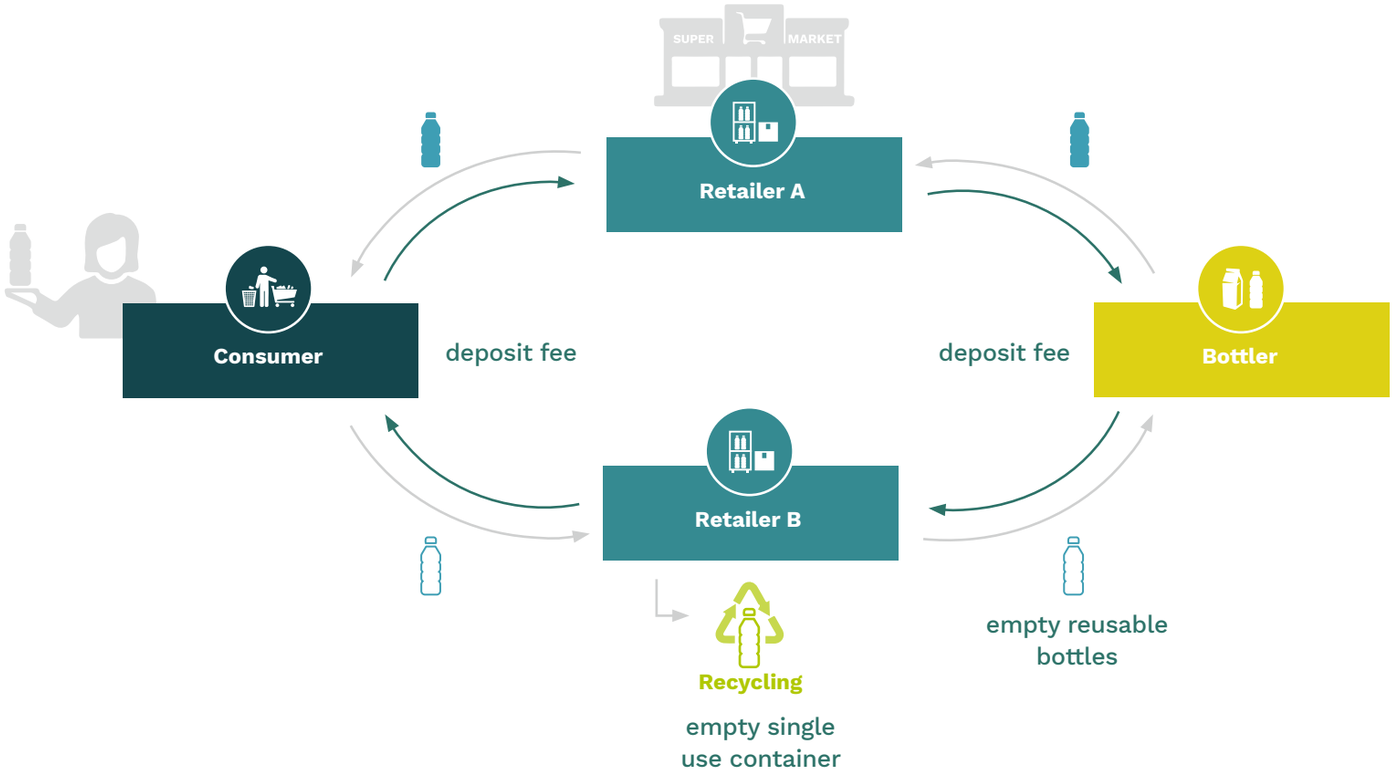
Factsheet 10
Figure 01

A direct DRS

is prohibited at a public event), there will be no need to issue a receipt before the consumer can reclaim the deposit.

Deposit refund systems organised by bottling companies

Another type of DRS can be organised by a bottling company and incorporate multiple retailers. For example, a bottling company could potentially stipulate that all shops selling its products must participate in the DRS. Under this system, consumers can buy the item subject to the deposit in one shop (retailer A) before returning it to another shop participating in the scheme (retailer B) and reclaiming the deposit from this second shop, provided that retailer B also sells the bottler's brands.



Factsheet 10
Figure 02

A DRS organised by a bottler

The retailers then report to the bottler how many bottles they have sold and how many have been returned to determine the net balance of sales and returns. Reusable empty bottles are returned to the bottler, while single use ones are sold on to recyclers.

This kind of DRS can only function if the bottler knows exactly which individual retailers are selling the items subject to the deposit.

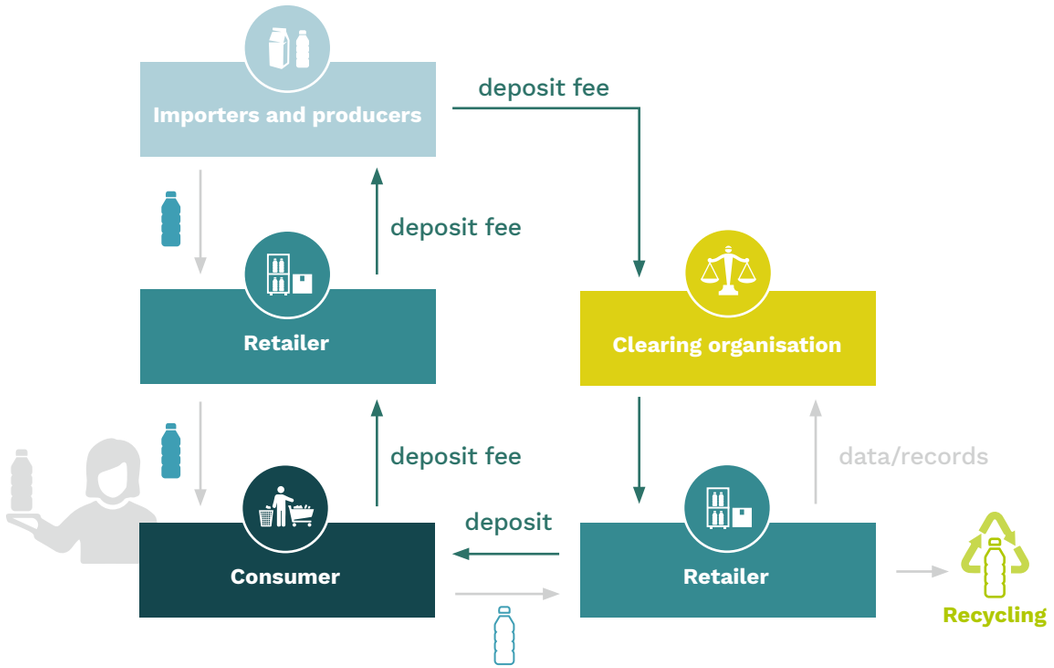
DRS with clearing

DRS with clearing is another common type of DRS. Under this model, the consumer pays a deposit as part of the purchase price of the item concerned. However, in contrast to the other forms of DRS described above, they do not necessarily need to return the packaging to the original point of sale or to another shop selling items from the same bottler. Instead, they can **return the item to one of a range of retailers, who will refund their deposit** regardless of the bottler/brand that produced the item. This model is therefore much more flexible from the consumer's point of view. At the same time, the retailers purchasing items with deposits from bottlers, must pay them the deposit. The bottlers, in turn, must pay the deposit value of the bottles they put on the market to a **clearing organisation** separate to the PRO. The clearing organisation then has the task of ensuring that the system is balanced, i.e. that those retailers who have sold fewer bottles than were returned to them are paid the compensation.

The clearing organisation is therefore the central hub in this kind of deposit refund system, as it is responsible not just for reimbursing retailers, but also for organising and administering the system as a whole. The costs associated with this organisational activity are covered by the producers and importers. At the end of the DRS process, the retailers deliver the empty packaging containers to recyclers, or to the bottlers in case of reusable bottles.

Setting up such a DRS requires:

- Specific labelling or barcodes on the deposited packaging items.
- Significant upfront investment in order to establish the clearing organisation and install the return infrastructure, such as reverse vending machines.
- Extensive organisational and administrative work.
- A sound legal framework.



Factsheet 10
Figure 03

A DRS with clearing

DRS with clearing systems operate in a number of countries around the world, although the precise details of each individual system vary significantly given the complications associated with such schemes. ▶ Figure 03 provides a general, simplified overview of a DRS with clearing scheme.

Criteria	Direct DRS	DRS organised through a bottler	DRS with clearing
Financial aspects	Very small investment for retailers or other organisations setting up the DRS.	Relatively low investment for bottlers.	Significant upfront investment required to set up the clearing organisation and return infrastructure, for instance installing reverse vending machines.
Organisational aspects & practicalities	Can be started on a voluntary basis. Light organisational and administrative burden. Consumer can only return deposited packaging at the original point of sale, and must present their receipt to reclaim the deposit.	Can be started on a voluntary basis by a bottler/ packaging manufacturer, provided that they know exactly which retailers are selling the items covered by the scheme. Relatively light organisational and administrative efforts. More flexible for consumers than a direct system; barcodes and labelling can remove the need to present a receipt. If multiple bottlers/ manufacturers set up their own systems, this will make things complicated for retailers, and a clearing organisation might be needed to co-ordinate the different systems.	The clearing organisation is the central element in the DRS, and is responsible for administering and organising all aspects of the scheme. DRS with clearing systems cannot work without specific labelling or barcodes. The most flexible option for consumers, and labelling or barcodes mean there is no need to keep receipts.
Monitoring/supervision	Supervised by the retailer that sets up the DRS.	Supervised by the bottler that sets up the DRS.	The system is supervised by the clearing organisation. The clearing organisation is in turn monitored by an outside organisation.

◀ **Factsheet 10 Table 01**

Comparing the three models for deposit refund systems

Key readings and other sources

PREVENT Waste Alliance (2021).
Video series:
EPR Explained! (10.1) Deposit refund systems

PREVENT Waste Alliance (2021).
Video series:
EPR Explained! (10.2) Deposit refund system in Germany

CM Consulting (2018). Deposit systems for one-way beverage containers: Global overview.

TOMRA (2021). Rewarding Recycling: Learnings from the World's Highest-performing Deposit Return Systems. *https://www.tomra.com/en/collection/reverse-vending/deposit-return-schemes/white-paper*

MODULE 3

Recycling of packaging waste

Factsheet 11: How can high-quality recycling be ensured?

Factsheet 12: How can the recyclability of packaging be increased?

Factsheet 13: How can the market demand for recycled plastics be increased?

Factsheet 11

How can high-quality recycling be ensured?

This factsheet outlines the key elements of plastic recycling systems, including the technologies required to recycle different types of plastic and packaging. It shows how packaging waste can be recycled in an EPR system.

An important aim behind the introduction of an EPR system is to ensure that the resources contained in discarded packaging are effectively re-used. Moving towards a circular economy means ensuring that packaging waste is recycled to the highest possible levels of quality, among other requirements. In many countries, achieving this objective means gradually building up recycling infrastructure, step by step. An EPR system can be very helpful in providing a sound financial and organisational platform for this development.

One of the requirements the PRO has to meet is to ensure all obligations arising from legislation and regulations are fulfilled. For this to happen, it needs to enter into appropriate contractual agreements with waste management companies and recyclers.

Recycling packaging waste

Definition of recycling

In this EPR toolbox, **recycling is defined as closing material loops**, i.e. processing materials in order to produce recyclates, regenerates, blends or alloys that replace virgin raw materials in standard applications. This benchmark is represented by the dark green line in ▶ Figure 01.

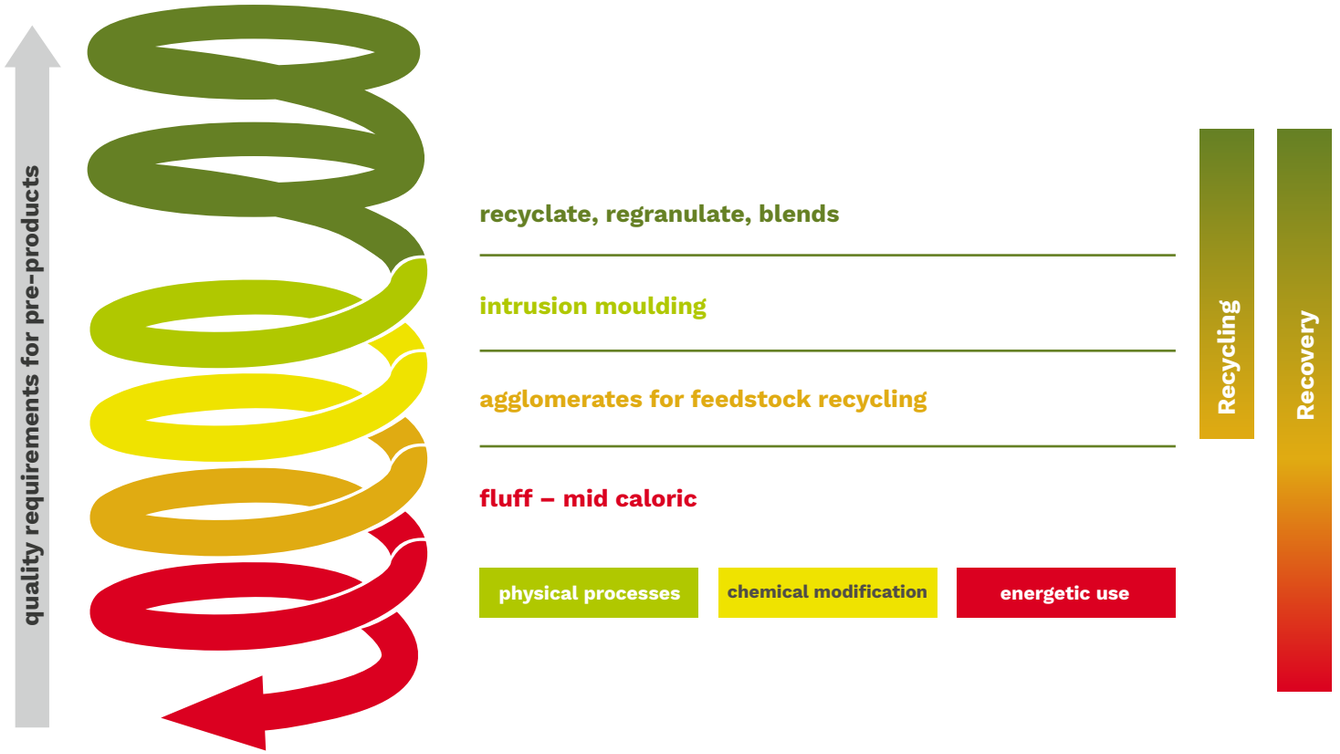
Recyclate, regranulate, blends: The dark green top section of the spiral in ▶ Figure 01 shows the basic understanding of **high-quality closed-loop recycling.** In this case, virgin material can be substituted completely (e.g. bottle-2-bottle recycling). The second dark green spiral indicates a lower level of quality (for example for the production of polyolefin-based regranulates made from yoghurt pots). These re-granulates and blends can also replace virgin material for various non-food packaging applications such as in flower pots or pipes. Only recycled material (recyclates, regranulates, blends) within the top two spirals can replace virgin raw material and therefore, only packaging and products that can be recycled at this level are classified as recyclable.

Intrusion moulded products: This process is also considered as part of mechanical recycling. In this category, plastic material is melted down into a paste and transformed into molten parts using presses. End-products could be park benches or fences. These processes do not require high-quality recycling.

Agglomerates for feedstock recycling: The threshold used to define 'recycling' in this context is that set out in European Union's Waste Framework Directive and in Section 3 of the German Circular Economy Act (Kreislaufwirtschaftsgesetz). It includes products used for feedstock recycling (in gasification processes).

Fluff or mid-caloric materials: This category covers energy recovery. The recycled product is used in co-incineration in cement plants, substituting other fuels.

In preparation for the recycling process, packaging waste must be thoroughly sorted into its various fractions. The main stages of the sorting procedure are: 1) Screening and wind sifting (film sorting for LDPE). 2) Magnetic separation (ferrous metals) and eddy current separation (non-ferromagnetic metals). 3) Sensor-based sorting to sort form-stable plastics by plastic polymer (HDPE, PP, PET and PS).



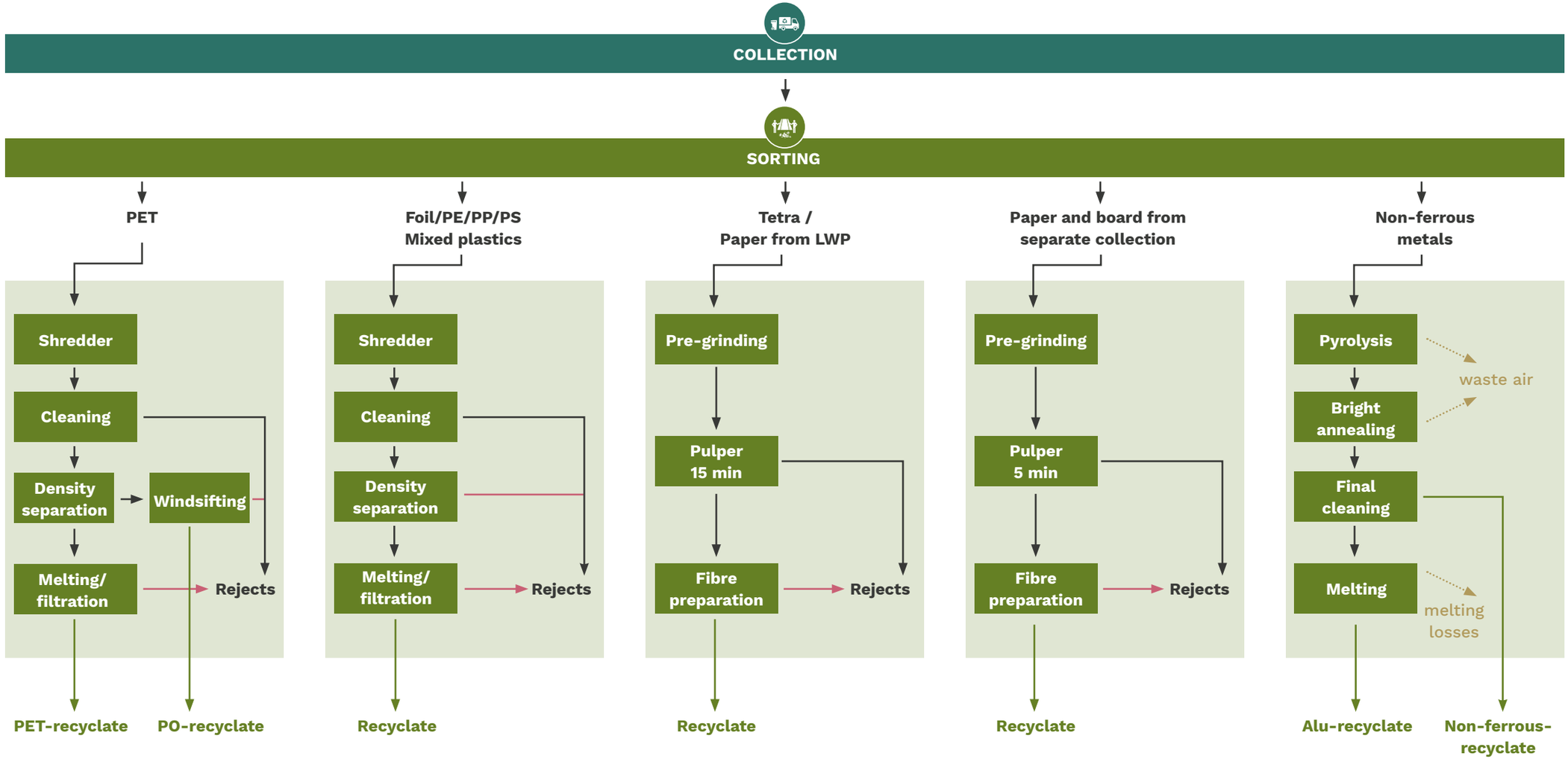
◀ **Factsheet 11**
Figure 01

Defining the term 'recycling'

Source: Institute cyclos-HTP 2019, own representation

Main recycling paths

Sorted packaging can be marketed and recycled depending on their product specifications (e.g. maximum contamination) as agreed upon with the recycler. ▶ Figure 02 gives an overview of the main recycling paths for packaging once it has been sorted. It shows the basic procedures that have to be carried out to produce the various different types of recyclates.



Factsheet 11
Figure 02

Recycling paths for packaging

Source: Institute cyclos-HTP 2019, own representation

Fibre-based packaging (TetraPak/paper made from LWP) is processed in paper mills. Paper and board is collected separately to other waste and is then pulped in an industry-standard process lasting 5 minutes. Liquid packaging board is sent on to special waste paper processing lines designed for longer pulping times (approx. 15 minutes). Aluminium and plastics are rejects in this process, which produces pulp for making paper.

The aluminium fraction (non-ferrous fraction) is then processed further using pyrolysis. In this process, the material is thermally treated under anoxic conditions in order to detach gaseous organic elements, such as plastic coatings, lacquers, residual contents, etc. It can then go on to be re-melted, a process in which oxidized aluminium is slagged. This process produces aluminium recyclates, which are used to refine steel or for casting in the automotive industry.

Thermoplastics (such as PET, PE, PP, PS) are plastics that can be easily re-formed within certain temperature ranges. (For some specific polymer types, the curing process is reversible and if this is the case, they are considered thermoplastics, in contrast to thermosetting polymers.) Reversible means that the reforming process can be repeated, which is important for recycling processes. However, there are limits as to the number of times these plastics can be re-formed. Each heating process shortens the polymer chains in the plastics (so-called 'aging of plastics'). Once a plastic reaches a certain 'age', it can no longer be recycled. This process produces recyclates for injection moulding and thermoforming.

Why is it so important for consumers to sort their waste?

Ensuring that waste is separated at consumer level is crucial for high-quality recycling. Packaging materials must be collected **separately** from residual and organic waste. The better the collected fractions are separated by the time they leave the household, the easier and cheaper it will be to sort them in professional facilities. If consumers comply with instructions to segregate waste, it will be easier to market that waste as an economic resource and an input material for recyclers. ▶ See Factsheet 06 and 09

Recycling of plastic packaging

▶ Table 01 shows the major thermoplastics from the packaging sector.

Type of plastic	Polyethylene Terephthalate (PET)	Polyethylene (PE)	Polypropylene (PP)	Polystyrene (PS)
Recycling code		 		
Density	~ 1.3 g/cm³	0.91 – 0.93 g/cm³ PE-LD 0.94 – 0.97 g/cm³ PE-HD	0.9 – 0.91 g/cm³	1.05 – 1.06 g/cm³
Melting point	~ 260 °C	105 – 135 °C	160 – 170 °C	240 – 270 °C
Characteristics	**Advantages:** High service temperature Good weathering resistance (UV light)	**Advantages:** Low density Low moisture absorption High chemical resistance High elasticity Easy to dye	**Advantages:** Low density No moisture absorption High chemical resistance Good fatigue strength Some types approved for food contact	**Advantages:** Low density No moisture absorption High transparency High hardness rating Surface gloss

Factsheet 11 Table 01

Thermoforms compared (properties, converter demand, applications)

Source: cyclos 2019

Type of plastic	Polyethylene Terephthalate (PET)	Polyethylene (PE)	Polypropylene (PP)	Polystyrene (PS)
Characteristics	**Disadvantages:** Degrades in hot water (> 80°C) Low resistance to strong acids, alkalis, oxidizing agents, alcohols	**Disadvantages:** Not suitable for temperatures > 80°C High stiffness in combination with poor tensile strength	**Disadvantages:** Brittle at low temperatures (if unmodified) Low UV-resistance (unmodified) Low scratch resistance	**Disadvantages:** Brittle Yellows if used outdoors Low chemical resistance
Value	Average material value	Low material value	Low material value	Low material value
Converter demand by polymer types[1] EU28+CH, NO	7.4%	29.8%	19.3%	6.6%
Suitable for	Drinks bottles, trays, films	Rubbish bags, carrier bags, waste bins, jars, bottles	Car battery casings, household products (folding boxes with hinges, bowls, storage containers), flower pots	Cups, CD covers, Can be used as foam for Insulation panels in the construction industry. Shockabsorbent packaging, egg cartons, meat dishes (extruded films)
Processing methods	Injection moulding, blow moulding, filmblowing, extrusion	Injection moulding, blow moulding, extrusion	Injection moulding	Injection moulding, extrusion, film extrusion

Factsheet 11 Table 01

Thermoforms compared (properties, converter demand, applications)

Source: cyclos 2019

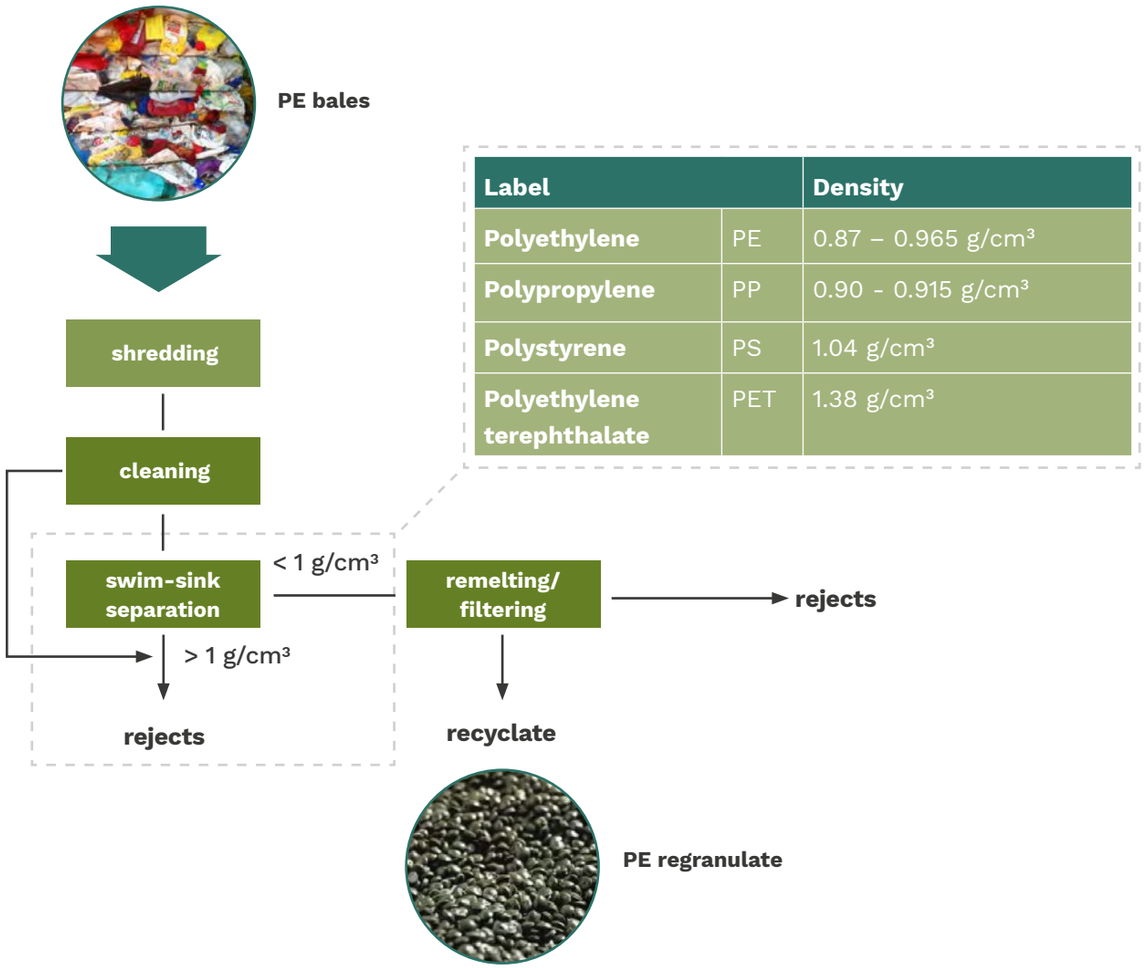
1 European plastic converter demand by polymer types in 2017, Plastics – The facts 2018, Plastics Europe

Recycling PE, PP, PS or foils after sorting

In modern (state-of-the-art) sorting plants, the mixed lightweight packaging material stream is optically sorted using NIR-technology according to the different plastic types in the stream (PE, PP, PS, film).

▶ Figure 03 shows how pre-sorted packaging goes on to be further processed, taking polyethylene (PE) as an example. The process known as swim-sink separation is the key step for recycling PE packaging.

First of all, the input material (in this case the PE packaging) needs to be **shredded into small pieces**. This is followed by a **wet cleaning** phase before **swim-sink separation**, which is the key to producing high-quality recyclates. The material is separated based on the specific weight of the plastics in relation to the water in which it is separated (separation threshold 1g/cm³). **Polyolefins (PE, PP) float (or swim) in water** (the separation medium), whereas plastics with densities > 1g/cm³ (PET, PS, PVC) sink, which helps to separate out any impurities. Polyolefins (PE, PP) are separated in swim-sink tanks. They are discharged via paddle rollers. Afterwards, PE regranulates are produced in a **re-melting** process. The material (regrind) is injected from a hopper and forced forward into a heated barrel via a rotating screw (the melting temperature is about 230°C with PO). Finally, the molten material is filtered in order to remove any remaining impurities.



Label		Density
Polyethylene	PE	0.87 – 0.965 g/cm³
Polypropylene	PP	0.90 - 0.915 g/cm³
Polystyrene	PS	1.04 g/cm³
Polyethylene terephthalate	PET	1.38 g/cm³

Factsheet 11 Figure 03

The recycling path for PE after sorting

Photos: ©cyclos

PE regranulates can be suitable for processing into **high-quality products**. A few examples are shown in ▶ **Figure 04** on the right.

Photo 5: Sorted packaging-PE

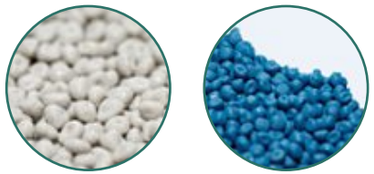


Photo 6: PE regranulates

Product examples after recovery

Photo 7: PE/PP mix recyclate (PO) product example
Photo 8: Product example

Products made of PE regranulates

Factsheet 11
Figure 04

Recycling PE packaging

Photo 6: *©Vogt-Plastic GmbH*

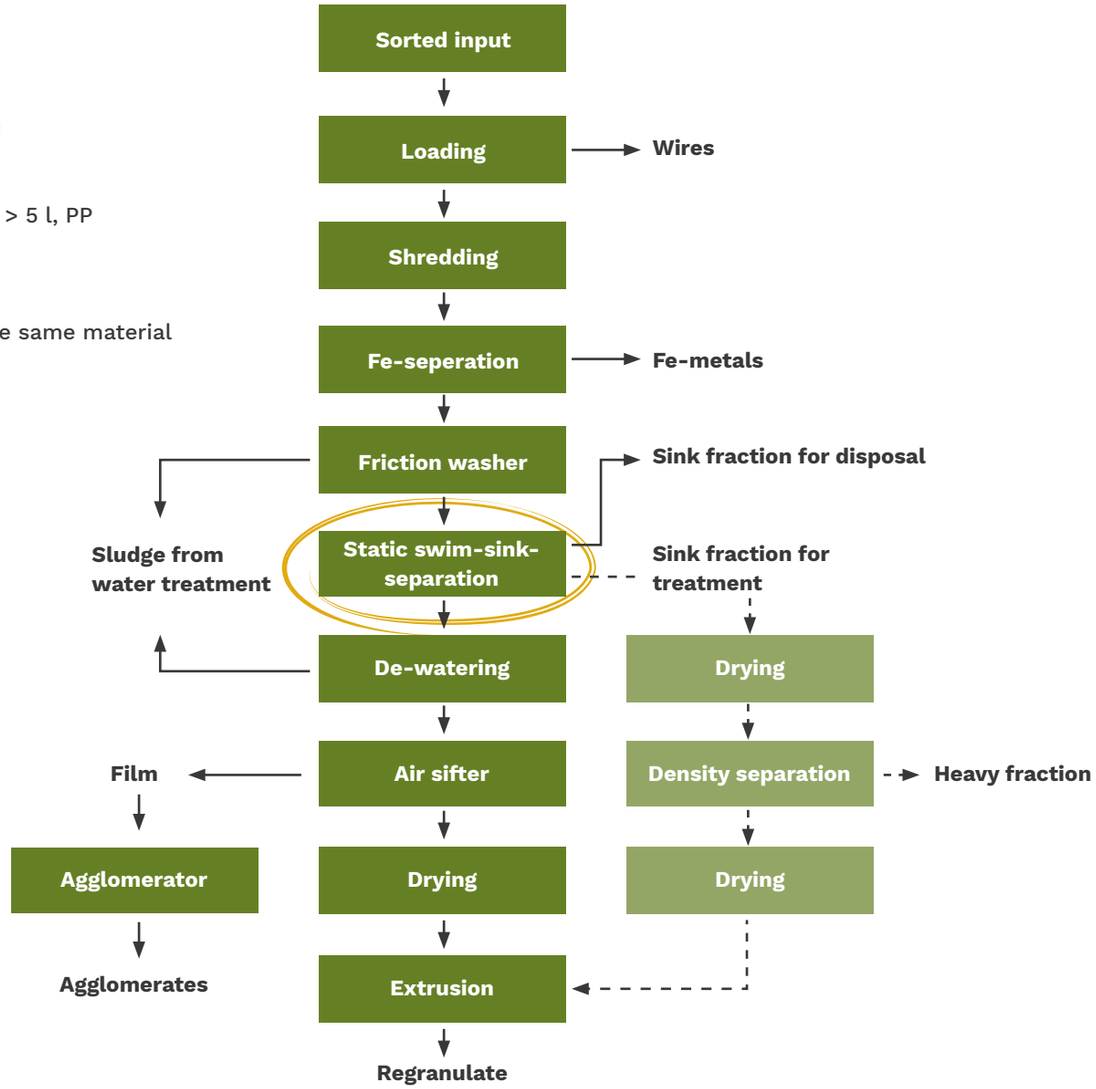
Photo 5, 7, 8: *©cyclos*

The general recycling process is shown here using the example of polyolefins (PE, PP).

As previously mentioned, swim-sink separation is the key step within the recycling path.

Possible Input:

- HDPE bottles
- Hollow items > 5 l, PP
- PE
- Cups
- PS
- Plastics of the same material



Factsheet 11 Figure 05

A recycling path for PE, PP, PS or foils after sorting

Source: Institute cyclos-HTP, own representation

Recycling PET bottles

To produce high-quality recyclates from PET bottles, the first step is to remove **banderols, lids and other items made of materials other than PET.** Since lids are made of PO, an additional separation step is required in order to retrieve the PO fraction.

▶ **Figure 06** illustrates the **state-of-the-art technical process**, required to produce high-quality plastic products. Processing is done using a **two-step washing process** made up of an alkaline hot washing process (at 80°C with caustic soda) and swim-sink separation. **Extrusion** takes place at re-melting temperatures up to 285°C and with melt filtration.

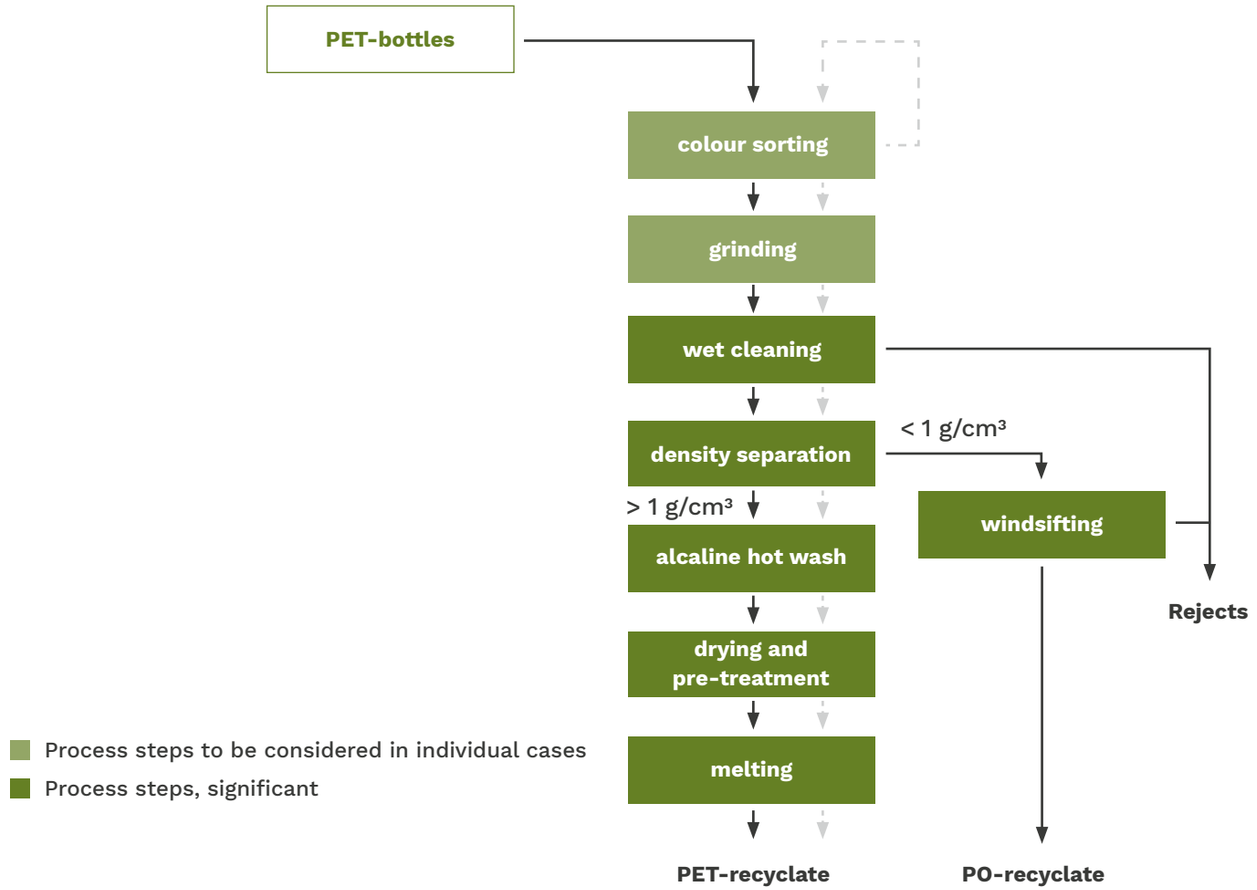
PET flakes can also be further purified for use in **bottle-to-bottle recycling** processes. There are two common processes for this, SSP and URCC:

SSP-process (Starlinger):

- Basic process: Melting – melt filtering – granulation – crystallisation – solid state process (SSP). Produces PET granules.

URRC-process, food-grade PET flakes

- Basic process: Surface treatment of the flakes with caustic soda – material is dried and fed into a large rotary kiln for intense surface cleaning. No re-melting takes place.[3]



Factsheet 11 Figure 06

Recycling path for PET-bottles

Source: Institut cyclos-HTP 2019[2], own representation

2 Institute cyclos-HTP, 2019: "Verification and examination of recyclability"
3 Source: *https://www.veolia.de/urrc-process*

Differences between low-tech, low quality recycling and high-quality packaging recycling

In many countries around the world, packaging and other plastic items are recycled using a very **simple technical process**.

▶ **Photo 01** shows a very simple plastic shredder, used in Jordan for shredding various polyolefin (PE, PP) items. The shredded particles drop straight into a basin of water. The lighter fractions float to the top and are removed for recycling.

The system in the photograph does not comply with environmental standards. Wastewater treatment and other environmental standards must be observed in order to prevent adverse environmental effects on waterways, air and soil, and to stop residual plastic leaking into the environment. Ensuring compliance with occupational health and safety standards is equally important.

Factsheet 11
Photo 01

A plastic recycler in Jordan

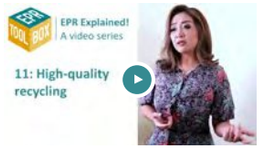
©cyclos 2019

An EPR system should be used to transition from a low-quality recycling system using simple equipment to a high-quality recycling system built on modern technology. Before improved recycling technology can be bought, installed and used, certain conditions need to be in place, and an EPR system can help to create these conditions:

- Certain quantities of secondary raw materials must be available on a regular basis for each fraction and delivered to the recycling plant. Fluctuations in volumes increase the risk to investors and to the continued operation of recycling plants. As EPR systems are used to collect packaging waste over the long term, rather than for short-term pilot projects, they can play a major role in meeting this requirement.
- The quality of the sorted packaging must consistently meet a set high standard, because the technology is designed to process certain grades of packaging. The system operator (PRO) can help to ensure consistent quality by making contractual agreements with the sorting company that delivers the sorted packaging into the recycling system.
- Recycling is not always economically secure and viable. Depending on the fraction and market situation, additional payments may be required to make the system economic. These additional payments can be covered by EPR fees.
- Sales markets need to be created for the quantities being recycled. The higher the quality of the recyclates, the more options there are to use them. Consequently, the more options there are for recyclates use, the easier it is to create markets.

▶ See Factsheet 13

Key readings and other sources



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Video series:
EPR Explained! (11) High-quality recycling

Institute cyclos-HTP (2019). Verification and examination of recyclability.
Available at
http://cyclos-htp.de/fileadmin/user_upload/2019_Katalog/Verification_and_examination_of_recyclability_-_Revision_4.0.pdf

Factsheet 12

How can the recyclability of packaging be increased?

This factsheet outlines the key factors that determine how recyclable packaging is, such as packaging design. It then goes on to describe how EPR schemes relate to packaging producers, fillers and recycling companies.

To ensure recycling of as much packaging as possible, waste has to be collected, sorted and transferred to recycling plants equipped to carry out the recycling processes required. It is also crucial that packaging should be recyclable by design. However, it is worth remembering that if there are no comprehensive, reliable systems for collecting, sorting and recycling ▶ See Factsheets 06, 07 and 11 packaging in a given country, there is no point in trying to make packaging more recyclable, because everything will be disposed of in landfill or dumpsites, or simply left to litter the environment.

If an EPR system is set up, and recycling targets are set in the accompanying legal framework, obliged companies are increasingly forced to take action to increase the recyclability of their packaging. This can pose a challenge, particularly for regional and/or smaller producers and importers. Large multinational producers and importers are already addressing this issue, and can help ensure that the appropriate information is made available in the country concerned. Experts can also help to redesign packaging used by producers.

Recyclability of packaging

Defining recyclability and how to measure it

Recycling is an essential prerequisite for a circular economy and the sustainable use of natural resources. The first step in facilitating it should be taken when packaging is first designed. Packaging designers need to consider a number of factors, including how to make the packaging as recyclable as possible at the end of the in-use phase. Their decisions should be informed by the existing collection, sorting and recycling infrastructure available in the relevant country or region.

This poses the question of how to assess the recyclability of packaging. Objective information on how easy or difficult a given type of packaging is to recycle must be based on verified, clear and transparent requirements and assessment criteria.

Various different approaches to this problem are currently being discussed at European level. The overarching aim is to harmonise the criteria for assessing recyclability. This is a relatively difficult task, because standards for collecting, sorting and recycling waste vary significantly between the various Member States of the European Union. Although it is possible to draw up uniform criteria for **'design for recycling'**, packaging is only **'recyclable'** in practice where the appropriate systems for collecting, sorting and recycling packaging are in place.

With this in mind, the two terms can be defined for our purposes as follows:

- **'Design for recycling'** is used to refer to packaging that fulfils all the key criteria for recyclability provided the necessary infrastructure is in place. Without this infrastructure, packaging cannot be described as recyclable regardless of how well it is designed.
- **'Recyclability'** depends on the composition of the packaging (whether it meets the requirements of design for recycling) and the actual recycling options available once it has beenused.

In addition, for the purposes of this factsheet, the term **'recyclability'** refers to high-quality, mechanical recycling. This definition of recyclability describes the ability of any given packaging **to substitute for virgin raw materials** in typical applications following industrial recovery processes. If it can replace new raw materials, it is recyclable. By the same token, this means that packaging is not recyclable if it can only be used for energy recovery, and biodegradable packaging is not included in our definition of recyclability either. The question of how materials should be classified that can only be recycled through chemical recycling processes, is still being debated, since the processes are still in development.

Recyclability has been an important issue in Europe in recent years. In France, Italy and Germany there is a legal requirement to take recyclability into account when setting EPR fees. Experts and system operators have drawn up various standards in this regard.

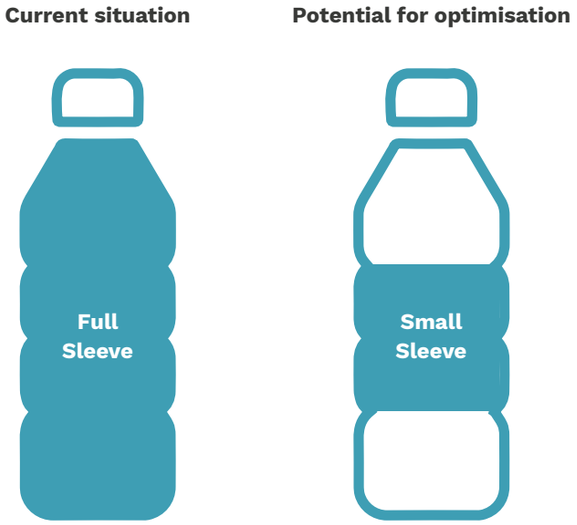
However, packaging that is recyclable in Western Europe, for example, might not be recyclable in other parts of the world. This is why recyclability always depends on local circumstances and the conditions in the area concerned. That said, there are some general principles that can be applied to improve recyclability regardless of local conditions, such as reducing the number of different materials used in individual items and making sure materials are easy to identify and separate. Reducing the variety of materials used and making sure they can be easily separated will always improve recyclability, wherever you are in the world.

How to make packaging more recyclable

In order to improve the recyclability of packaging, it is very important that sorting and recycling companies build close working relationships with raw material suppliers and packaging manufacturers, and that they exchange information and knowledge freely. Recycling and sorting companies should have full details of the composition and material properties of the relevant packaging so that they can handle it in the most appropriate way. On the other hand, raw material suppliers and packaging manufacturers need to know about recycling methods in order to improve their packaging designs.

The examples below demonstrate a number of ways in which recyclability can be improved:

Example 1 shows how recyclability can be improved by swapping a full-size sleeve for a small label. The bottle with the full sleeve cannot be identified using infrared scanners as part of mechanical separation systems, but the bottle with the smaller label will be easily spotted by the scanners.



Recyclability: 0%

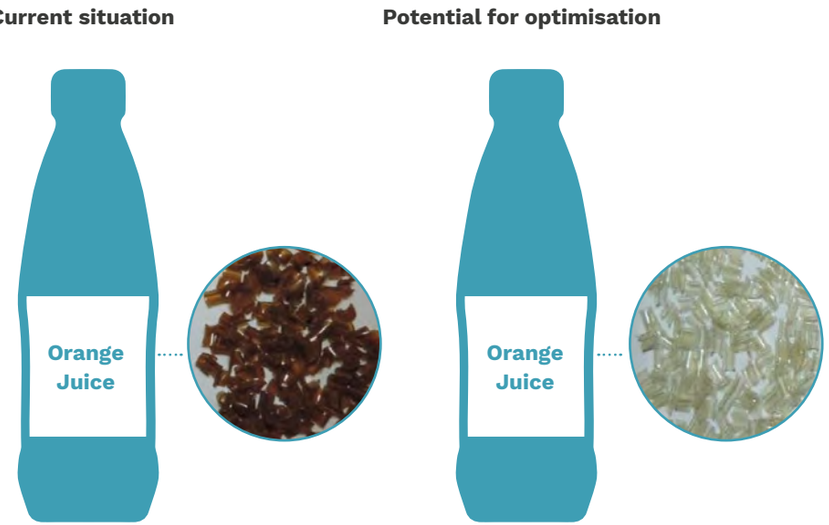
Reason:
Bottle not identifiable

Recyclability: >90%

Option:
Reduction of label size

Example 2 shows what happens to recyclability when a SiOx plasma coating is added to the barrier layer of a fruit juice bottle.

These two examples show that the recyclability of an item often depends on some very specific factors, and they must be considered on an individual basis in order to identify potential improvements.



Recyclability: 0% - 30%

Reason:
PA of PET-PA-Copolymer not thermostable (melting behaviour)

Recyclability: >90%

Option:
Change of barrier in SiOx-plasma-coating (with lower recyclability multilayer with PA barrier)

Factsheet 12 Figure 01 (left)

Full sleeve vs partial sleeve

©Institut cyclos-HTP 2020, own representation

Factsheet 12 Figure 02 (right)

Barrier layers compared

©Institut cyclos-HTP 2020, own representation

Incentivising recyclability by varying PRO fees

How to draw up standards for recyclability

The PRO has an important role to play in improving recyclability, as it can use modulated EPR fees to encourage efforts to make packaging more recyclable. ▶ See Factsheet 03 Despite countless efforts to establish uniform criteria for assessing recyclability, different PROs still take different approaches, as demonstrated by the examples below.

For instance, in Germany, **a minimum standard for recyclability has been published**[1]. This standard includes a list of which properties makes packaging recyclable and which properties can prevent packaging from being recycled. The standard sets out minimum requirements on assessing recyclability in the context of fee modulation, directed at PROs. To ensure that all EPR systems use the same basic framework for assessing recyclability (as defined in Section 21 (1) (1) and Section 21 (3) of the German Packaging Act – Verpackungsgesetz), the agreed standard is officially published by the Central Agency Packaging Register (ZSVR), in consultation with the German Environment Agency. Although these standards have been developed for the German system, this approach could also be applied to other countries to make packaging easier to recycle. ▶ See Country Report Germany

Material Group	Good material description	Disqualification	Recyclable material
Film	System-compatible articles made from plastic film, surface area > A4 in size, like bags, carrier bags and shrink-wrap, including ancillary components such as labels, etc.	Aluminised plastics are disqualified	LDPE (PO) share
PP	Rigid, system-compatible plastic articles made from PP, ≤ 5l in volume, like bottles, trays and cups, including ancillary components such as closures, labels, etc.	Sealant cartridges are disqualified	PP (PO) share
PE	Rigid, system-compatible plastic articles made from PE, ≤ 5l in volume, like bottles and trays, including ancillary components such as closures, labels, etc.	Sealant cartridges are disqualified	HDPE (PO) share

Factsheet 12 Table 01

Material types, material groups and recycling paths

(Information based on German minimum standard[1]; representation based on own modification)

1 Minimum standard for determining the recyclability of packaging included in the EPR system, pursuant to Section 21 (3) of the Verpackungsgesetz (German Packaging Act) *https://www.verpackungsregister.org/fileadmin/files/Mindeststandard/2020-01-22_Mindeststandard_VerpackG_EN.pdf*

Material Group	Good material description	Disqualification	Recyclable material
PS share	Rigid, system-compatible plastic articles made from PS, ≤ 1l in volume, like cups and trays, including ancillary components such as closures, labels, etc.	Foamed plastics, including EPS articles, are disqualified	PS share
PET bottles transparent	Rigid, system-compatible articles made from PET, ≤ 5l in volume. Includes ancillary components such as closures, labels, etc. Examples include bottles containing beverages, detergent and household cleaning agents.	Opaque PET bottles and other PET articles are disqualified	PET-A share, transparent; PO from closures
Beverage cartons	System-compatible retail packaging made from cardboard composite materials, consisting of cardboard/PE or cardboard/aluminium/PE, for liquid and paste product filling, including ancillary components such as closures, etc	Other articles from paper, paper board or cardboard are disqualified	Fibrous material share
Tinplate	System-compatible articles made from tinplate, like beverage or food cans and buckets, including ancillary components such as labels, etc	-	Steel share
Aluminium	System-compatible articles made from aluminium or containing aluminium foil, like trays and wrapping film, including ancillary components such as closures, labels, etc	-	Aluminium share

Factsheet 12
Table 01

Material types, material groups and recycling paths

(Information based on German minimum standard[1]; representation based on own modification)

The minimum standard for determining recyclability in Germany also includes a summary of packaging groups/types and specific materials that prevent them from being recycled. Some examples are given in ▶ **Table 02**:

Group/sort	Incompatibilities
Film and PE-LD	Water-insoluble adhesive applications in combination with wet-strength labels, PA barriers, PVDC barriers, non-polymer barriers (excluding SiOx/AlOx/metallisations), non-EVOH barriers
Rigid PE	Silicone components, components of foamed non-thermoplastic elastomers, water-insoluble adhesive applications in combination with wet-strength labels, PA barriers; PE-X components, PVDC barriers, non-PO plastics with a density of < 1 g/cm
Rigid PP	Silicone components, components of foamed non-thermoplastic elastomers, water-insoluble adhesive applications in combination with wet-strength labels, PA barriers, PVDC barriers, non-PO plastics with a density of < 1 g/cm³
Rigid PS	Foreign plastics or multi-layers with a density of 1.0-1.08 g/cm3; water-insoluble adhesive applications in combination with wet-strength labels
Transparent PET bottles	PET-G components; POM components; PVC components; EVOH barriers; silicone components, PA monolayer barriers for transparent PET bottles, colourless and 'light blue'; PVC labels/sleeves, PS labels/sleeves, PET-G labels/sleeves; other blended barriers; PA additives for transparent PET bottles, colourless and 'light blue'; insoluble adhesive applications (in water or alkaline at 80° C); non-magnetic metals; elastomer components with a density of > 1 g/cm³; direct print (excluding production codes and 'best before' dates)
Glass	Lead and barium from crystal glass packaging

◀ **Factsheet 12 Table 02**

Overview of packaging groups/types and materials that prevent them from being recycled

(Information based on German minimum standard[1]; representation based on own modification)

An example of how fees can be varied based on recyclability
Some countries choose another way to improve recyclability. The criteria are very clear because there is a detailed list of all the packaging and materials that are considered recyclable or not under the present system.

For example: packaging with no recycling possibility are ceramics or PVC packaging while efficient recycling possibilities exist for paper-cardboard, steel, aluminium, glass and PE/PP/PET bottles. It is also possible to have a third category for recycling facilities in the process of development (e.g. for flexible plastics).

A bonus-malus approach can be additionally applied depending on the categorisation.

In addition to this example, other institutions are working with their own assessment frameworks (▶ Table 03).

	DIN EN 13430	Institut Cyclos-HTP	RecyClass	RECOUP	European PET Bottle Platform
Type	Assessment catalogues	Assessment catalogues	Assessment catalogues + DfR guidelines	DfR guidelines	DfR guidelines
Scope	All packaging	All packaging	Plastic packaging	Plastic packaging	PET bottles
Applies to	EU	EU	EU	International standard (focused on Europe, USA)	EU
Reference standards	Various, including CR 14311, EN 13437	DIN EN ISO 14021; DIN EN 13430	-	-	-
Definition of recyclability	YES	YES	-	-	-

Factsheet 12 Table 03

Assessment frameworks and Design-for-Re-cycling (D4R) Guidelines

Source: Institute cyclos-HTP 2018, internal document, own representation

	DIN EN 13430	Institut Cyclos-HTP	RecyClass	RECOUP	European PET Bottle Platform
Object of assessment	Complete packaging	Complete packaging*	Complete plastic packaging	Single components of plastic packaging	Single components of plastic packaging
Assessment parameters	Material recyclability on a sliding scale (0-100%)	Recyclability on a sliding scale (0% - 100%)	Recyclability on a pegged scale (A to F)	Recycling compatibil-ity on an extended binary scale (traffic light system)	Recycling compatibility on an extended binary scale (traffic light system)
Set point to quantify recyclability	Delivery for reprocessing	Recyclate	Recyclate	-	-
Benchmark	New packaging	New packaging	New packaging	New packaging	New packaging
Basis of assessment	Packaging components	Packaging specification and empirical analysis	Packaging specification and questionaire	Classification based on defined materi-al-specific indicators	Classification based on defined material-specific indicators and quick tests
Cross-references	none	Recoup, RecyClass, DIN EN 13430	EPBP	EPBP, COTREP, PRE, Eco Emballages, ...	PRE, COTREP, ...
Testing and assessment criteria	Process-step based, starting with production	Process-step based, starting at after-use stage of product cycle	see DfR guidelines	Not explicitly stated. In practice, criteria are derived from the processspecific qualitative and quantitative requirements for recycling and, to a lesser extent, sortability	

Factsheet 12 Table 03

Assessment frameworks and Design-for-Re-cycling (D4R) Guidelines

Source: Institute cyclos-HTP 2018, internal document, own representation

Key readings and other sources

PREVENT Waste Alliance (2021).
Video series:
EPR Explained! (12) Recyclability of packaging

Institute cyclos-HTP (2019). Verification and examination of recyclability.
Available at: *http://cyclos-htp.de/fileadmin/user_upload/2019_Katalog/Verification_and_examination_of_recyclability_-_Revision_4.0.pdf*

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CONAI.
http://www.conai.org/wp-content/uploads/2019/09/List_of_plastic_packaging_Contribution_levels_2020.pdf

http://www.conai.org/en/businesses/environmental-contribution/

Factsheet 13

How can the market demand for recycled plastics be increased?

This factsheet outlines ways of identifying and approaching suitable markets for recycled materials, and discusses how to use policy instruments to increase market demand. It focuses particularly heavily on obtaining access to financial flows within EPR systems.

The more packaging is collected and recycled worldwide, the more important it becomes to ensure a market for products and packaging made from secondary raw materials exists.

Challenges when trying to generate market demand for recycled plastics

The market for products and packaging made from recycled plastics is limited, despite the fact that many products and packaging items currently made from virgin raw materials could be made partly or entirely from recycled plastic. The main challenges are:

- **Economic issues:** There is a lack of suitable economic incentives to encourage the use of recyclates. Items made from recycled plastics are sometimes even more expensive than items made from virgin material. The raw material is often very cheap (for plastics, prices are dependent on a number of factors, including oil prices) and the cost of obtaining secondary material from plastics is high.
- **Availability and reliability:** Recyclates are often not available in sufficient quality and quantity, and they cannot be produced without effective collection, sorting and recycling systems, such as those supported by EPR schemes. In contrast, large quantities of highquality virgin raw materials are often available.
- **Acceptance and information:** There is a lack of awareness and acceptance of products made partially or entirely from recycled plastics. This can be seen among private individuals as well in companies and public institutions. Consumers at all levels are often sceptical of the quality of recycled materials, and are concerned that using them may cause environmental and health problems.
- **Administrative barriers:** The use of recycled plastics in certain products is restricted for safety or hygiene reasons.
- **Research and development:** There is a lack of research and development activity aimed at finding new applications for recycled plastics.

Economic challenges and ways to address them

Price is an important factor. The price a recycler receives for recyclates needs to cover the costs associated with all the various steps of the recycling chain (collection, sorting, storage, processing and recycling). This means that prices for recycled goods are more closely connected to the costs of the associated services than they are to raw material prices, which is why some products containing recyclates are actually more expensive than equivalent products made from virgin raw material. EPR systems can play a major role in making recycled products more economically attractive by helping to cover collection and sorting costs. **Financial bonus systems** can also be used to support the use of recyclates, and removing any subsidies for the use of virgin raw materials can have a similar effect.

There are a number of ways of creating economic incentives to encourage the use of recycled plastics. A range of **tax benefits** can potentially be applied to items containing recyclates, and **support programmes** can be set up to encourage the manufacturing and use of recycled products.

Charging modulated fees as part of an EPR system is another useful financial tool. The system operator can set up a bonus/malus system to boost demand for recycled plastics in packaging. Specifically, this means that the obliged producer or importer has to pay lower EPR fees for packaging made from recycled plastics. ▶ **See Factsheet 03** Various different types of packaging can already be made partially or entirely from recycled plastic (▶ **see Photo 01**).

Factsheet 13
Photo 01

Bottles made of post-consumer HDPE (Systalen Primus HDPE)

©Der Grüne Punkt Köln 2020

Availability and reliability

Manufacturers of products containing recyclates need a reliable supply of high-quality recyclates that can compete with equivalent new materials on equal terms. Delivering this material is the responsibility of recyclers.

Ensuring there is a consistent supply of high-quality material available to manufacturers requires close **coordination and clear contractual agreements between all stakeholders at every stage of the supply chain:**

- Product specifications and quantities must be clearly stated and agreed between sorting companies and recyclers, along with any other delivery conditions.
- The recyclers need to know the exact composition of the material being fed into the system and be able to rely on the suppliers (i.e. sorting facilities) providing it. They need long-term contracts to encourage them to invest and allow them to operate sustainably over the long term.
- If the recyclers produce regranulates or plastic flakes as an intermediate product, they must meet the customers' specific requirements consistently and reliably.
- Manufacturers of products made from recycled material need a reliable legal framework in which to operate. This framework can be created by implementing appropriate administrative measures.

Checks and verification procedures are essential for maintaining quality and ensuring that all parties are kept properly informed. With this in mind, a variety of national and international **certification schemes** are in place in countries around the world. One European system that is also applied in other parts of the world is the European Certification of Plastic Recyclers scheme, or EuCertPlast.[1]

Factsheet 13
Photo 02

PE regranulates

©Vogt-Plastic GmbH 2020

1 *https://www.eucertplast.eu/*

Acceptance and the need to provide information

Adequate information and a guarantee that recycled materials fulfil all the requirements expected of equivalent new materials are key to increasing **acceptance** of products made from recycled plastics. Safety, hygiene and appearance/design are particular concerns for potential customers. **Campaigns to raise public awareness and certificates and labels** can both make an important contribution to boosting demand for recycled products. Germany's 'Blue Angel' environmental label is an example of a national labelling system that has been adopted internationally.[2]
For a labelling/certification system to be credible, it must be supported by clear assessment criteria that are easy for consumers to understand.

All that having been said, clear technical specifications agreed upon in a formal contract can also go a long way towards supported demand for recycled materials, even if the products concerned are not certified or labelled in any other way.

Administrative measures

It is very important to ensure there is a market for products containing recycled materials, or that such a market can be established. One way of developing such a market is to **consistently favour recycled products in public procurement procedures** by the state. This kind of policy helps to create the economies of scale needed to develop a market and allows the state to act as a role-model to the private sector.

Many products commonly required by the state are (or can be) made from recycled plastics. A large number of such products have already been tested and carry the Blue Angel quality label, such as:

- Toys made from recycled PE/PP (play towers, seating, climbing frames and climbing walls) for school and nursery playgrounds.
- Containers and bins for waste and recyclables (capacities from 60l to 1100l).
- Products for parks and green areas made of PO, such as ground coverings (grass pavers, planks, decking boards), benches, tables, sandpits, fence slats and posts, composters, benches.
- PO products for gardening and landscaping (beams, boundary stones, palisades, flower pots).
- PO products for the industrial sector (noise insulation, sheet piling, grate floors).
- Carrier bags.
- Rubbish bags.
- Tarpaulins for painters and decorators.
- Buckets.
- Office items (e.g. folders).

2 *www.blauer-engel.de/*

Such administrative initiatives can be implemented on a voluntary basis or as a mandatory requirement (e.g. if the government concerned adopts minimum regulations requiring a minimum amount of recycled material to be incorporated into new products and packaging). For example, Article 6 of EU Directive 2019/904 on the reduction of the impact of certain plastic products on the environment states that:

> *"5. With regard to beverage bottles listed in Part F of the Annex, each Member State shall ensure that:*
>
> *(a) from 2025, beverage bottles listed in Part F of the Annex which are manufactured from polyethylene terephthalate as the major component ('PET bottles') contain at least 25% recycled plastic, calculated as an average for all PET bottles placed on the market on the territory of that Member State; and*
>
> *(b) from 2030, beverage bottles listed in Part F of the Annex contain at least 30% recycled plastic, calculated as an average for all such beverage bottles placed on the market on the territory of that Member State."*

Research and development

Developing new markets will require further improvements in the quality of recycled materials. Such improvements can be made to processing systems for separating and cleaning the materials, and in the way new products are developed using recycled plastics. Research and development can improve every area of the recycling process, from sorting and processing to recycling processes, raw material production, packaging and product design.

One way of encouraging research and development under an EPR system is to mandate the PRO to invest in it and set relevant targets in this area.

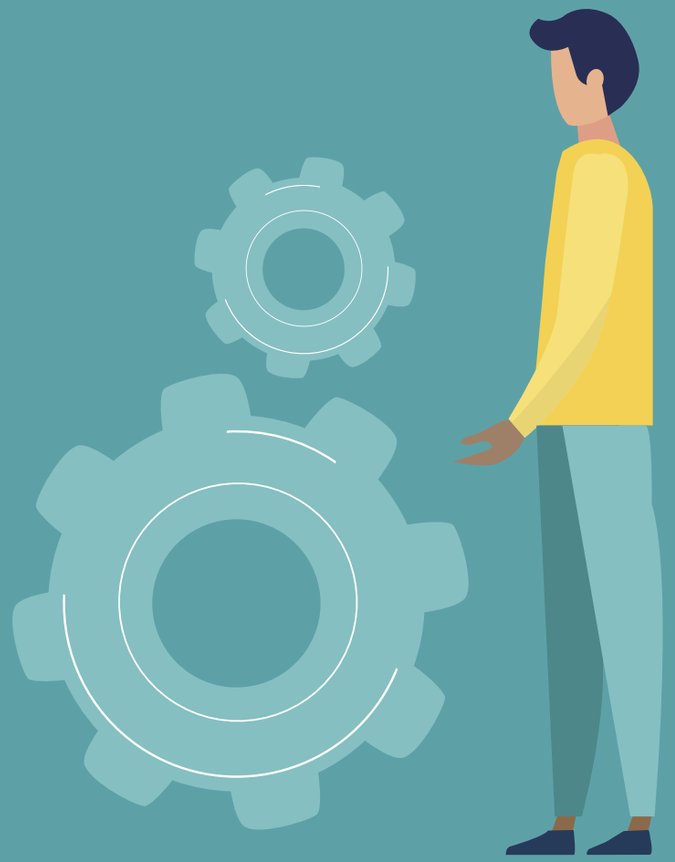
Key readings and other sources

PREVENT Waste Alliance (2021).
Video series:
EPR Explained! (13) Market demand for recycled plastics

https://www.eucertplast.eu/
www.blauer-engel.de/
European Commission Single Use Plastic Directive

BACKGROUND

Complementary approaches to EPR



Background

How can different approaches complement EPR schemes?

When introducing an Extended Producer Responsibility (EPR) system, practitioners in many countries will come across different alternative approaches for organising and financing waste management, as a basis for a circular economy. While some approaches complement the development of an EPR system, others may hinder it. Therefore, this factsheet gives an overview of a selection of different approaches for organising and financing waste management, including the following: Mandatory EPR, "cash for trash", municipal waste fees, plastic credits, CO_2 taxes. The overarching aim is a functioning circular economy for the packaging waste stream, against which all approaches are evaluated. Since EPR is widely understood as the most encompassing and therefore preferred approach, compatibility of the other presented approaches with EPR schemes will furthermore be discussed.

In low- and middle-income countries, approaches to comprehensive waste management are generally limited. Municipal solid waste usually consists of mixed waste fractions and often ends up on landfills or waste dumps. Circular economy concepts and systems for packaging that focus on the use of secondary raw materials are rudimentary and only cover economically profitable materials. At the same time, the problem is increasingly being acknowledged and political decision-makers or private sector initiatives are trying to establish reliable waste collection and recycling systems by applying various approaches. The most encompassing and recognised strategy is the implementation of an Extended Producer Responsibility (EPR) scheme in the field of packaging.

The implementation of an EPR system for packaging is often very challenging. The complex structure of an EPR system requires, among other things, an extensive organisation based on an elaborated legal and institutional framework, and consistent control and enforcement ▶ see Factsheet 01 to 05. Since complex structures are needed for a well-functioning EPR system, decision-makers, companies, or other stakeholders sometimes look for **alternative (financing) solutions** to quickly address (at least partly) the waste problem in their country. **In this context, questions often arise regarding the strengths and limitations of these alternatives**. Stakeholders are also interested to know which approaches could be integrated into an EPR system, and which may hinder the development of such a system.

In the next section, the criteria that are particularly relevant for a reliable, well-functioning waste management system and circular economy are described. Afterwards, the following approaches for organising and financing waste management are presented, analysed, and evaluated with regard to the fulfilment of these criteria: **Mandatory EPR, "cash for trash", municipal waste fees, plastic credits, CO_2 taxes.** The considered approaches present a variety of strategies with different levels of complexity. Since EPR is widely understood as the most comprehensive approach, compatibility of the other presented approaches with EPR schemes will furthermore be discussed.

Please note that each presented approach as such is complex and may vary from country to country. This factsheet thus only provides a general overview and analysis that may not cover every detail. It must furthermore be noted that there are more approaches to waste management / circular economy that are not included in this factsheet.[1]

1 More approaches are for instance presented here: *https://plasticsmartcities.org/collections/financial-instruments*

Criteria for a functioning circular economy for packaging

Packaging presents a major share of waste that eventually ends up in the environment. Achieving circularity for packaging is possible given that the corresponding framework conditions are met and all stages – from packaging design to the after-use phase – are considered.

The aspects listed below are important **criteria for a well-functioning waste management** and for the basis of an operational circular economy for packaging waste.

	Criteria	Why/how these criteria contribute to a circular economy
Financing	a) Funding for infrastructure	To build an infrastructure, the facilities and other necessary measures must be financed. The financing must be dedicated, ongoing, sufficient, and efficient.
	b) Covering running costs	The **financing of all activities** (especially collection, sorting, recycling of packaging) must be guaranteed in the **long term**. To raise funds solely for a specific investment (e.g. for the construction of infrastructure) is insufficient. It must be guaranteed that a qualified use of the equipment and facilities is permanently ensured which involves OPEX and reinvestments. The financing must be dedicated, ongoing, sufficient, and efficient.
	c) Source of funding / polluter pays principle	According to the **polluter pays principle**, the waste producer or owner is the potential polluter and bears (financial) responsibility for any pollution it causes. The 'polluter pays' principle is designed to provide the necessary incentives for environmentally friendly conduct and to encourage the required investment in environmentally-friendly waste management.

Background Table 01

Criteria for a well-functioning waste manage-ment

	Criteria	Why/how these criteria contribute to a circular economy
Infrastructure and know-how	d) All-encompassing approach to waste management, including collection, sorting, recycling	Packaging should be collected **separately** from residual waste. This means that a collection system separate from residual waste must be set up for packaging (if necessary, together with other defined recyclables) in order to avoid contamination and to recycle as much packaging as possible. In preparation for recycling, the packaging must be **sorted** to obtain accurate recyclable fractions and prevent contamination in recycling plants. As far as possible, a separate collection (and treatment) system should cover **all packaging** materials, whether its market value is positive (e.g. metal cans) or negative (mixed plastic). The target should be a nationwide collection (and treatment) of packaging, so that packaging is not only collected selectively or in single regions. This goal should be linked to concrete requirements.
	e) Tailor fit technologies	Infrastructure must be built for collection, sorting and recycling. This requires new technologies (especially plants) in countries where there is no sufficient collection and recycling infrastructure to date. A prerequisite for the commissioning of the system is an investor and an operator for each of the facilities. **Adapted, individual solutions** are required in the different countries. This calls for a solid analysis and appropriate (technical) solutions (**funding for R&D**).
	f) Technical capacities	Ensure **capacities and technical competence** in planning, management and operation of treatment and disposal facilities.
	g) Traceability of material flow	For comprehensive transparency, a **waste flow verification** must be maintained. This verification should list the quantities collected and all downstream facilities for sorting and recycling with respective quantities (incoming and outgoing), also in terms of financing. This will facilitate the monitoring of waste management results.

Background Table 01

Criteria for a well-functioning waste manage-ment

	Criteria	Why/how these criteria contribute to a circular economy
Up-stream effects	h) Design for recycling	The recyclability of packaging depends on the **design of the packaging**. Packaging must therefore be designed in such a way that it can be recycled, taking into due account the existing technical equipment of the facilities to which it is delivered. Another important aspect of the design is the **avoidance of toxic materials.**
	i) Avoid/prevent waste	Ideally, the generation of packaging **waste is avoided** in the first place. A waste system can support waste prevention through certain strategies (e.g. through monetary incentive effects).
	j) Use of recyclates	By using recycled materials for new packaging, **closed loop recycling** is achieved at a high beneficial level. To make **use of secondary material**, an authorised market must be established.
Complexity	k) Simple, practical structures with a low level of complexity for easy implementation	**Simple structures** are easier to build and faster to implement than structures with a high level of complexity. This applies to the revenue of financial resources, their administration, and the development of an infrastructure.
Country aspects	l) General framework conditions as basis for implementation	The successful implementation of a model depends mainly on the framework conditions, especially the **legal framework and its enforcement**. Level of development, administrative structures and readiness for change play an important role.
	m) Suitable models for each country	**Adapted, individual solutions** are required in the different countries. Depending on the established conditions (take-back systems, the state of development of EPR systems, and the existing infrastructure), models might be found suitable for a specific country context to a greater or lesser extent.
	n) Level playing field	Appropriate **checks and balances** should be in place, so that waste services are being delivered by either the public or private sector. Equal opportunities and transparency shall be ensured in bidding processes to allow a level playing field. The service should be carried out by the party able to provide the best service.

Background Table 01

Criteria for a well-functioning waste manage-ment

	Criteria	Why/how these criteria contribute to a circular economy
Social aspects	o) Community engagement	All residents and commercial waste producers must use the designated collection containers correctly to enable a successful recycling management. Consumers should also be sensitized to choose sustainable packaging over unsustainable ones. **Behavioural change** in this regard has to be guided by complementary measures.
	p) Inclusive approach	Ensure that municipal and private service providers (including the formal private, community or informal sectors) are **included in the planning and implementation** of solid waste management systems.

Background Table 01

Criteria for a well-functioning waste management

Analysis of different approaches along criteria for waste management

For this analysis, only approaches that relate to the organisation and financing of waste management measures were selected. Measures that aim exclusively at the prevention of waste (such as bans or penalties) are therefore not considered in this paper. The selected approaches can be directly compared against the criteria outlined in the previous chapter. EPR, as the most acknowledged approached, is presented first, followed by a variety of others, starting with the most common ones:

1. Mandatory EPR
2. “Cash for trash“ / informal valorisation
3. Municipal waste fees
4. Plastic credits
5. CO_2 Taxes

As mentioned before, these approaches present only a selection of available approaches. The approaches’ nature may vary from country to country. The following chapters therefore solely provide a general overview.

1. Mandatory EPR System – more than just a financing responsibility

EPR is an environmental policy approach based on obliging producers to assume full responsibility for their products, both during their life cycle (e.g. by complying with certain health and safety standards) and during the end-of-life phase once the products and packaging become waste. EPR systems can be applied to a number of waste streams, but are not suitable for all types of waste. **The most important aspects on „EPR for Packaging“ are listed in ▶ see Factsheet 0 to 13**. In the following, the fulfilment of the criteria listed in the table above is analysed. **The analysis is based on a mandatory EPR system for packaging that has been introduced on the basis of legal regulation**.

1.1 Financing

The financing of running costs is ensured by a constant financial contribution (EPR contribution) by the obliged companies. Depending on the specific regulation, the contributions of the companies also finance the necessary facilities, other infrastructures, education and awareness campaigns, as well as clean-up actions. A reliable cash flow guaranteeing the operation of an EPR system incentivises further (private) investment.

For the polluter pays principle, the EPR fees must be attributed directly to the packaging (respectively to the packed products). Those who put more packaged goods to the market pay more accordingly. However, cross-financing with other segments of companies is possible, but not desirable.

1.2 Infrastructure and know-how

Separate collection of packaging can be financed and organised within an EPR system. Nevertheless, other collection types are also possible. In a properly functioning EPR system, the requirements for sorting and recycling are specifically defined, implemented and monitored. Experiences from all functioning EPR systems have shown that new technologies are developed through funding security and the reliable collection of all packaging. For example, the world’s most modern sorting and recycling plants for packaging have been built in European countries with functioning EPR systems (e. g. Netherlands, Germany, Belgium, France, Spain). There are indirect effects for companies to invest in research and development.

When an EPR system is introduced, only certain packaging can be included at first (e.g. PET bottles), followed by a gradual expansion. Since all companies that bring packaged goods onto the market must assume responsibility for their packaging, in the long term all packaging materials must be included in the EPR system, throughout the entire country. In a functioning EPR system, collection of packaging should be financed in all regions – those easy to reach (urban), as well as those more difficult to reach (rural), even if the collection in the latter will be more expensive.

1.3 Up-stream effects

EPR fees are usually based on the material and weight of the packaging. Within the framework of an EPR system, the EPR fees can be scaled in such a way that the fees are lower for packaging that can be recycled well (so-called eco-modulation). These modulated fees can be used to influence recyclability given that the difference in fees is significant. In Italy and France, different fee scales exist for different types of packaging based on their recyclability. In Italy, for example, the EPR fees of plastic packaging are more than twice as high, if the packaging is not recyclable

(192,00 €/t if there is an existing sorting and recycling chain and 644,00 €/t if there are deficits in the sorting and recycling chain and the packaging is currently not recyclable[2]). The use of recycled content in the design of a package is another criterion according to which the EPR fees can be scaled. The EPR fees can be lowered if secondary raw materials have been used to produce the packaging. It is expected that this will lead to an increase in recycled content.

The main purpose of EPR is not to prevent the generation of waste, but to enable proper collection and recycling as much as possible. However, the generation of packaging waste can be prevented through an EPR system if the EPR fees are very high, thus creating incentives for obligated companies to use less packaging material.

1.4 Complexity

EPR systems are very complex. This includes the establishment of a structure to identify and register all obligated companies, the collection of the EPR fees and the establishment of infrastructures for (separate) collection, sorting and recycling of packaging. The system needs a proper management during its ongoing operation. This concerns the work of operations (collection, sorting and recycling) as well as the monitoring and verification of recycling quotas and the documentation of volume flows. As a result, EPR takes a long time to be implemented, mostly due to the development of the legal framework.

1.5 Country aspects

The success of an EPR system depends largely on the framework conditions in a country. Particularly the conditions listed below are beneficial or detrimental to implementation:

- **General situation:** Stable political conditions, a sophisticated legal and regulatory framework, a high standard of education and living, and a good geographical location with easily accessible regions are the basis for proper enforcement of power and actions.
- **Waste management situation:** Existing collection systems, technical equipment, level of public awareness, available data and monitoring and the involvement of the informal sector.
- **EPR situation:** EPR regulations, industry and government initiatives and other decision-makers.

The conditions for a successful EPR system are correspondingly unfavourable if all these conditions are not met.

Private and municipal companies as well as the informal sector can become involved in collection, sorting and recycling services. Openness and transparency in tendering procedures to create a level playing field depend on the competence of the Producer Responsibility Organisations (PROs) and the framework conditions of the tenders. The extent to which this will happen depends on the EPR regulations and the general legal framework in the individual countries.

2 *http://www.conai.org/en/businesses/environmental-contribution/contribution-diversification-for-plastic/*

1.6 Social aspects

The necessary communication with citizens and producers is generally a task of PROs and is financed by EPR fees.

2. “Cash for trash” / informal valorisation

In many low- and middle-income countries, “cash for trash” has become established over the years and is the driving force in the recycling sector, leading to increasing recycling rates. The “cash for trash” approach offers citizens financial incentives for collecting certain types of waste. These are then sold on, often informally, to recycling companies or other buyers. Unlike in the case of plastic credits, EPR and municipal fees, collectors working in the cash-for-trash system are paid based on the material they collect rather than the environmental service they provide. For most informal collectors, the revenue from the collected packaging is often their only source of income.

2.1 Financing

Financing of facilities and other infrastructure is only possible for packaging that is permanently available and has a positive market value. Additionally, it is only viable for small scale solutions. Often, the funding is dependent on the financial support from additional donors. Financing of running costs (and cost of living) is also not guaranteed. Economic viability is determined by the recycler and by fluctuating market prices for recyclates. The commercialisation of recyclates must allow for the financing of the entire value chain. This only applies to packaging with a positive market value after its use phase, i.e. less valuable materials are excluded. Therefore, this is not in line with the polluter pays principle.

2.2 Infrastructure and know-how

For informal collectors, usually only marketable recyclables are relevant. For packaging, this only applies to certain types (e.g. PET bottles, metal cans, cardboard boxes and low-value plastics only in a few exceptional cases, provided there is a buyer for them). In addition, sorting only is done for packaging with market value. If certain packaging that can be recycled well is continuously available in reliable quantities, the infrastructure for recycling technologies will continue to develop.

Collection is limited to regions where (informal) collectors collect valuable packaging. **A nationwide collection system can therefore not be established. Structures cannot be applied to packaging waste with little or no value (may differ from region to region)**. Such packaging mostly consists of films, bags and sachets, which are already prone to littering. There are no incentives for collectors and recyclers to collect those types of packaging, as there are no financial benefits.

Selling waste at the recycling plant at a very low price or without marketing revenues is not suitable for financing infrastructure. Economic dependency prevents these models from being extended to all packaging types and also to all regions. The costs and revenues for the collection and marketing of packaging vary considerably and also depend on local contextual factors. In rural areas, the collection of packaging is generally less profitable because the effort for collection and transport to the recycler is higher.

Capacities and technical competence in the planning, management and operation of treatment and disposal facilities are not improved by the “cash for trash” strategy.

2.3 Up-stream effects

“Cash for trash” is not suitable to influence and control the design of packaging nor the use of recycled materials to produce new packaging. Stakeholders involved in the „cash for trash“ business will not focus on waste prevention since this is not their main occupation. However, it can make people become aware that waste materials have value.

2.4 Complexity

The advantages of “cash for trash” include its simple implementation and little required political decisions or legal frameworks for a national system.

2.5 Country aspects

A prerequisite for “cash for trash” is that a market for the collected recyclables exists. In addition, the revenues generated by selling the recyclable materials must cover the costs of collection and transport. This is difficult to achieve in very remote regions or on islands that have no recycling facilities. Also, proper checks and balances are not promoted for waste services that affect both the public and private sectors.

2.6 Social aspects

Communication and education as well as research and development are also not within the competence of the informal sector and cannot be reliably supported by “cash for trash” strategies.

“Cash for trash” & EPR

The introduction of separate waste collection (based on municipal or EPR fees) and the implementation of EPR may be more difficult after the introduction of cash payment for waste, as people are used to receiving money for waste and the revenue is a significant source of income for them. They focus on recyclables such as PET and other valuable plastics, metal, and paper, which are usually covered by an EPR system. Hence, **“cash for trash” can compete with EPR, and there is a risk that informal activities will deprive the EPR of recyclables in significant quantities, with an impact on the economics of EPR**.

On the other hand, in most developing countries, **informal collectors are the driving force for separate collection of recyclables and under certain constellations can be relevant for the EPR system**. Especially in the early stages of EPR, when formal collection is not yet well established, informal collectors can be important actors in separate collection. If clearly defined legal frameworks and cooperation provisions between EPR operators and informal collectors are in place, **“cash for trash” can contribute to the functioning of the EPR scheme. This requires their thoughtful, socially responsible, and legally secured consideration during the planning phase of EPR systems**.

3. Municipal waste fees

Municipal waste fees are payments by citizens for a specific waste management service. Municipal ordinances specify the amount of the fee per waste producer and service. The fees are usually paid by households, homeowners, and businesses.
We assume that municipal regulations can indeed be fulfilled by the municipality under the national regulation / the level of autonomy of the municipality. It should always be noted that in the individual states the competences of the municipalities (e.g. the right to introduce fees, etc.) are regulated differently.

3.1 Financing

Securing funding for facilities and other infrastructure is only possible if the municipality can generate enough money from all obliged parties to cover not only running costs but also further investments.

Financing running costs in low- and middle-income countries is possible if there are clear guidelines, and they are monitored. Often, there is just enough money for the collection and dumping of mixed waste, but not for separate collection of individual waste streams such as different packaging. The reasons for this include a low fee collection rate because residents are not willing or able to pay, unclear costs, an improper charging system and a lack of an accounting system. Waste management is often subsidized from other municipal funds. Municipal fees tend to be rather unpopular, but acceptancy in the population increases with income level and awareness of the problem. Moreover, if the informal sector collects most of the waste that has value and can be marketed, the municipality is left with only the waste that does not bring any benefit to the municipality.

For the polluter pays principle, it must be possible to directly assign a waste quantity to a specific waste producer. In the case of packaging, this is the household and direct identification is possible in general. However, placing (additional) communal bins in public spaces could hinder the direct identification of the waste producer.

3.2 Infrastructure and know-how

In low- and middle-income countries, it is not common for municipalities to systematically collect packaging separately. The sorting of packaging is also usually not covered by municipal fees, which hardly cover the costs of collection and transport to landfills or dumps. As municipal fees cannot be set higher in low- and middle-income countries, the development and maintenance of infrastructures/ technologies beyond mixed collection is often not possible. However, in theory, a municipality could arrange a separate collection of all packaging materials. Private and municipal companies could become involved and capacity building could be carried out and stipulated by the municipality. This service could theoretically also be financed through fees.

By its origin, a municipality is always limited to its geographic area and could at best act as a pilot for other areas. Therefore, a nationwide collection and sorting system cannot be built by waste fees from only one municipality.

Research and development (e.g. of new technologies) are usually not part of the competence of a municipality. Therefore, such measures cannot be financed through municipal fees.

A municipality may require that a mass-flow-analysis has to be performed by the waste management companies that accept the packaging for sorting and recovery and that this record will then be made available to the municipality for verification.

3.3 Up-stream effects

It is not possible for the municipality to influence and control the design of packaging waste. Specifications for the use of recycled packaging (upstream effects, e.g. for recycled content in new packaging) are also not possible within the framework of municipal charges.

In developed countries, a municipality could use its fee system to incentivise the separate collection of certain materials for recycling, e.g. by charging a volume-/amount-based fee for residual waste, from which the target materials such as paper, plastic, glass or metal are excluded. However, this requires a separate collection already being in place or possibilities for separate collection and a system for the quantification of residual waste fees.

As such requirements often lack in developing countries, municipalities can use waste fees to support waste prevention through its citizens and companies, by implementing pilot projects or waste consultations.

3.4 Complexity

Municipal waste fees bear the advantage that the municipality, as the responsible authority of the waste management at the local level, can best decide how to manage any collected funds and invest them according to an integrated municipal waste management plan/strategy. It is simpler to develop a municipal solid waste management and local circular economy strategy if citizens and commercial waste producers are already identified and registered in a municipality. The approach is relatively simply, if only one waste stream (residual waste) is collected and treated. The more advanced a system gets, with separate collection and treatment of different waste streams, such as residual waste, packaging, or organic waste, the more complex it gets.

3.5 Country aspects

Effectiveness of municipal fees strongly depend on framework conditions, for instance administrative structure, country policies etc. However, since municipalities are local authorities, they have a certain degree of power to influence these. In principle, municipal fees can be levied in all countries. Mostly, they are only used to finance the collection of mixed waste and then to send it to landfills. However, in many countries not even this is guaranteed. Only when these services can be financed, the additional financing of a separate collection of packaging by a municipality is useful. If suitable administrative structures are lacking in these municipalities, these issues must first be solved with the initial aim of ensuring that all waste is collected in all areas of the municipality.

Equal opportunities and transparency in tendering procedures to create a level playing field depend on the competencies and interests of the municipalities and the framework conditions of the tenders.

3.6 Social aspects

Communication and awareness-raising can usually be carried out by waste advice services of the municipalities.

Municipal waste fees & EPR

Municipal waste fees and EPR schemes can be well combined. An EPR scheme may, for example, cover all kinds of packaging, while municipal fees may cover all other waste streams, such as mixed household waste or organic waste.

In this context, the fee system can be designed in such a way that it supports the separate collection of recyclables and thus the implementation of EPR. For example, in Germany, fees are charged only for the collection and disposal of residual waste, while for materials subject to EPR, the costs of collection and management are covered by EPR fees. Citizens can save fees by using smaller residual waste bins. In some municipalities in Germany, fees for residual waste are also calculated by

weight, meaning that the collected waste is weighed, which creates an even greater incentive for separate collection.

Clear agreements between the private producers and importers obligated under the EPR scheme, as well as the municipality are necessary. This concerns for example the collection system, public awareness raising and other responsibilities.

4. Plastic Credits

The idea of "plastic credits" comes from the field of climate change mitigation – companies can offset their greenhouse gas emissions by buying carbon credits based on implemented certified measures that reduce CO_2 emissions, for example through industrial emission reduction projects or reforestation. **Similarly, companies or individuals aim to off-set the amounts of plastic they put on a specific market by paying for plastic credits associated with the collection/recovery of plastic from the environment**. Plastic credit schemes have gained significant attention over the last years with various companies exploring whether such an approach could be an element worth implementing in their corporate responsibility strategy, especially in countries without established EPR systems. Nevertheless, this market is still being introduced and therefore still missing any clear definitions and standards. As such, it can be criticised for risking greenwashing or undermining the implementation of ambitious EPR schemes.[3]

4.1 Financing

Plastic credit systems can contribute to financing the collecting and recycling of waste as indicated, especially in countries without EPR systems already in place.

In most of these countries, environmental authorities do not have the financial resources needed to prevent plastic packaging waste from entering and polluting the environment. In such cases, plastic credit schemes can be an opportunity to obtain money from private companies which aim to reduce the environmental impacts of their products that may be generated after the use phase. Under this perspective, plastic credits can be seen as a direct implementation of the polluter-pays-principle: Those companies who put plastic products/packaging on the market are the ones that would finance collection and disposal.

Companies and organisations which provide such plastic credit certificates get paid by those who put plastic products or plastic packaging on the market. The credit organisations then finance the collection and recovery of plastic waste from the environment, mainly in close cooperation with the informal sector. Payments for plastic credits can be used for long-term investments but neither companies nor plastic credit providers are obligated to do so. **There is a risk that actions are publicity-driven for one-off purposes and lack standardised quality criteria**, such as those established by the Ellen MacArthur Foundation for "dedicated, ongoing, and sufficient funding"[4]. Another key challenge is the lack of transparency: Prices for plastic credits from different schemes differ significantly in most cases. Also, clear indications what is covered by these payments and where the revenues end up are missing. Depending on the provider, credits bought in one country might be based on waste collected on a completely different continent. A governance framework as in the realm of the carbon market is absent so far but could address this challenge.

4.2 Infrastructure and know-how

In order to efficiently collect plastic waste from the environment and subsequently issue plastic credits, various plastic credits schemes invest in the establishment of

3 See e.g. *https://prevent-waste.net/wp-content/uploads/2021/11/PREVENT_Discussion-Paper_Plastic-credit-schemes-and-EPR.pdf* or *https://prevent-waste.net/wp-content/uploads/2021/09/Plastic-Credits-%E2%80%93-Friend-or-Foe.pdf*
4 *https://plastics.ellenmacarthurfoundation.org/epr*

basic infrastructures, such as collection points from which waste can be transported to treatment facilities. In most cases, such infrastructures are the very first step towards a sustainable waste management system. By contrast, without such schemes, waste would be disposed of or dumped in a completely uncoordinated manner. On the other hand, it should be noted that the short-term contracts of plastic credit schemes with companies paying them for the collection and recovery of plastic waste often do not allow investments into high quality waste infrastructures with longer pay-back periods, e.g. sanitary landfills. Based on the voluntary nature of these activities, in most cases no quality requirements for the establishment of waste management infrastructures exist. Only a few plastic credit schemes explicitly address the way how they treat waste. In some cases, credits were issued for the collection alone, while there were also reports of open burning of waste.

Most credit schemes focus only on plastics; just a few schemes offer "circular credits" that cover also other materials. It should also be taken into account that **plastic credit schemes mainly operate in specific regions, not on a nation-wide level**. See also below for possible implications for the implementation of EPR systems.

4.3 Up-stream effects

Certainly, payments for plastic credits could be seen as an economic incentive for companies to reduce the amount of plastic waste, similarly to EPR. On the other hand, especially such incentives for waste prevention have been questioned critically.[5] It is rather questionable if limited payments for collection and recovery of plastic waste in specific regions really provide sufficient incentives for big companies to consider the revision of product design or packaging solutions.

It seems plausible that payments for plastic credits are not considered in such strategic considerations, especially when product design and packaging choices are determined for international markets.

Contrarily, there is a risk that intensive plastic waste production and consumption patterns will normalise, especially in countries where plastic waste generation is increasing anyway. Companies could use plastic credits and claims like "plastic neutrality" as an alibi to continuously put products on the market that are clearly non-recyclable. Against this background, plastic credit systems should always be designed in a way that they do not undermine incentives for waste avoidance and do not delay the necessary "change" regarding plastics.

Specific challenges arise from the way most plastic credits are calculated and issued: Credits are normally based on weight and do not consider specific environmental impacts from different types of plastics or different applications in products. In this context, tailor-made incentives for upstream innovation are unlikely. Nevertheless, they often do raise awareness for the responsibility of companies and could initiate discussions what an actual Extended Producer Responsibility scheme could achieve. This could be strengthened, for example, by requiring companies to publish data on which share of their plastic production/use is actually covered by plastic credits and what efforts have been made to minimise waste generation and associated impacts.

4.4 Complexity

The main strength of such systems lies in their **overall simplicity** and the often very short timeframe within which such systems can be set up. Compared to standard

5 PREVENT Waste Alliance Discussion Paper *https://prevent-waste.net/wp-content/uploads/2021/11/PREVENT_Discussion-Paper_Plastic-credit-schemes-and-EPR.pdf*

EPR systems, (at least voluntary) plastic credit schemes require significantly less time to become operational. However, **the schemes might be less well integrated and embedded in more comprehensive local and national waste management and circular economy strategies – and might even be contrary to these plans**, e.g. with regard to coordinated investments in collection infrastructure.

The simplicity of the scheme also stems from weak or sometimes even lacking regulations e.g. with regard to long-term financial accountability or aspects of transparency. In most cases, it stays unclear how exactly plastic credit schemes guarantee the added value of their activities or the final fate of the collected waste. Only few organisations have published quality standards on this.

This causes the risk of fraud and profiteering: How exactly can it be ensured that certificates are not simply duplicated? Standards and norms preventing such simple types of fraud are currently under development. In the long run, also the interoperability between different types of plastic credit schemes would require more administrative background.

4.5 Country aspects

The specific requirements of integrating credit and EPR systems will depend on the status of establishing such systems. As indicated above, plastic credit schemes hold advantages especially in countries that currently suffer from environmental as well as economic impacts caused by plastic waste pollutions due to not yet existing EPR systems - at **low investment costs in a voluntary environment**. Many of these countries lack financial resources to set up at least basic collection infrastructures.

Here, plastic credits could offer faster solutions by engaging large companies which put these materials on the market and demonstrate to governments that producers are willing to take actions. In countries where EPR systems are currently being set up, plastic credits should contribute to the collection and monitoring of relevant data e.g. on waste generation and shares of collected waste amounts. **Plastic credit schemes will be of limited use in countries where these companies already pay licensing fees as part of mandatory EPR systems**. Here they could be used to explore new grounds, e.g. solutions for plastics (multi-layer) or stakeholders (informal sector) that are not yet included in EPR. In any case, they should be fed back into the EPR system and operate under same conditions.

4.6 Social aspects

As described above, **plastic credits should never be allowed as a cheap way out for companies or as an excuse to reduce their efforts to minimize plastic pollution**, for instance with regard to research and development investments on plastic prevention. A transparent use of plastic credits can, on the other hand, also raise awareness amongst companies for the general issue of mismanaged plastic waste or marine littering.

There is also an intense debate on the impacts of plastic credits on informal waste pickers: On the one hand, plastic credit schemes can offer opportunities for job creation. On the other hand, the requirement of additionality also bears the risk to shut out those workers who already try to make a living from collecting plastic waste e.g. from landfills.

Plastic credits & EPR

Plastic credits can have significant side effects, especially along the implementation of EPR systems. Depending on the nature of the system, it can have both supporting as well as hindering effects:

On the one hand, due to plastic credit schemes in place, the collection of plastic waste can easily lead to “cherry picking”, especially if the schemes operate rather disconnected from public administrations: The schemes would focus on plastic packaging materials with the highest market value in order to receive an additional revenue not only from selling the credit certifications but also from selling the collected material. This raises challenges for the establishment of obligatory EPR schemes that would have to cover also non valuable fractions that currently don’t get collected: The operators remain with the low-quality materials and thus have to set higher licensing fees than necessary – driving more and more companies to the cheaper plastic credit systems. Also, regarding the actual amounts of waste for which collection and treatment capacities should be provided, an unregulated market for plastic credit schemes can cause difficulties, lowering average prices for the collected materials and complicating processes such as planning for required treatment capacities.

On the other hand, **plastic credit schemes could also be a first step towards binding EPR systems**. The systems could establish a collection infrastructure, engage with the formal sector and automatically gather necessary data e.g. with regard to amounts of plastic waste put on the market. Specific emphasis should be put on the possibilities of integrating these structures into EPR schemes so that they do not create any barriers for future circular opportunities. However, the above mentioned supporting and hindering effects are rather of a theoretical nature without any experiences from a country to date.

5. CO_2 Taxes

Compared to more local and direct funding mechanisms, **CO_2 taxes offer a completely different opportunity to finance the transition towards a more sustainable waste management and circular economy**. In this chapter, carbon taxes will be briefly addressed to give a more comprehensive picture of different approaches on different spatial levels. CO_2 taxes have been implemented in various forms, e.g. on specific activities like waste management and on specific materials or products. Against this background, the following brief analysis does not go into the details of taxing CO_2 emissions but rather focuses on the comparison to EPR, municipal waste fees or plastic credits.

5.1 Financing and 5.2 Infrastructure and know-how

Compared to the limited income flows of municipal waste fees or especially local plastic credit schemes, **CO_2 taxes offer the opportunity to gather financial resources for large-scale investments e.g. into new technologies or collection systems**. Here, the pooling of resources on the national level can help to initiate actual systemic change compared to often incremental progress on the local level.

However, it should be noted that **taxes are by definition fed into the overall public budget and spending depends on specific decisions by policy makers**, such as the parliament. It is not at all necessary that CO_2 levies, even for certain waste management measures, flow inevitably into the improvement of waste infrastructures. They are

clearly not a dedicated form of financing for a circular economy. Thus, CO_2 levies or taxes can be seen as a comprehensive and efficient approach to organise funding for public expenditures like waste collection and recycling. The initiation, organisation and implementation of such activities is rather separated from this. Depending on the definition of the tax base, CO_2 taxes can nevertheless be an efficient way of applying the polluter-pays-principle.

5.3 Up-stream effects

The key strength of a CO_2 taxation is, of course, the direct effect on the design of production processes: Companies have a very clear incentive to use materials and technologies that cause lower CO_2 emissions. This has a specific impact on decisions whether to use primary or secondary materials: For most materials, recycled raw materials have a significantly lower carbon footprint. Thus, higher prices for recycled materials could be compensated by lowering the taxation for companies.

Looking at **further up-stream effects, companies could consider implementing more circular business models in which they keep control over the materials to ensure closed material loops and high quality of secondary resources**. This might also be linked to incentives for more durable product design or easier repairability.[6]

5.4 Complexity

Against the background of the described potential side-effects, it is clear that **the introduction of CO_2 taxes is extremely challenging, requires careful considerations**, for instance with regard to which companies are actually addressed and how CO_2 emissions can be measured consistently.

Even compared to EPR regulations, the introduction of CO_2 taxes is an enormous endeavour and requires strong political support. Although most studies highlight the potential net benefits of such environmental taxes, they undoubtedly cause winners and losers – making it extremely difficult to be introduced in democratic systems. All those referring to CO_2 taxes as an answer e.g. for circular plastic solutions should be aware of the timeframe necessary to implement them.

5.5 Country aspects

Obviously, CO_2 taxes will lead to very different outcomes in different countries, depending, for example, on the structure of the domestic industry: Countries with a high share of domestic industrial production like Germany would have to deal with another level of impacts compared to countries that depend much more on imports of semi-finished or final products. Another important effect might be carbon leakage: High levels of CO_2 taxation in Germany and/or Europe could set incentives to shift carbon intensive production processes abroad to countries with no or lower CO_2 taxation. Such “carbon leakage” effects could be addressed by carbon border adjustment mechanisms (CBAMs), for instance, that basically put a tax on specific imported products.

Also, the challenging aspect of introducing such taxation systems clearly depends on the political culture and participation processes: For instance, China recently launched the world’s largest emission trading scheme[7]. This process clearly encountered different resistance compared to the discussions in Germany or the US. The introduction of any type of taxes always requires an effective public administration that ultimately is able to enforce the payments and to prevent tax evasion. This capacity is often limited, especially in developing economies. On the other hand,

6 acatech, Circular Economy Initiative Deutschland, SYSTEMIQ Business Models Report: *https://en.acatech.de/publication/circular-business-models-overcoming-barriers-unleashing-potentials/*
7 *https://www.nature.com/articles/d41586-021-01989-7*

carbon taxes could be implemented irrespective of the state of the waste management. Thus, they could represent a complementary but not main source for financing.

5.6 Social aspects

Considering the massive market intervention that CO_2 taxation represents at relevant price levels per ton of CO_2, **different side effects occur**. For instance, from a socio-economic perspective the distributive aspects of CO_2 taxation need to be considered as well. Price increases for products because of CO_2 taxes could especially affect lower income groups, and thus have a regressive distributional effect.[8] For example with regard to mobility behaviour, particularly those living in rural areas who cannot easily switch to other means of transport (e.g. to public transport) could be affected. Also, massive price increases for single use plastic products could especially hurt low-income groups. Against this background, lump-sum repayment mechanisms (with fixed, income-independent per capita payments for all) like in Switzerland should be considered.

CO_2 taxes & EPR

CO_2 taxes have a clear incentive for companies to produce in a more resource-efficient way. These upstream incentives are often criticised as insufficient in EPR systems. At the same time, CO_2 taxes generate additional funds that are suitable to the extent of financing larger infrastructure measures as well as research and development. In contrast to this, EPR schemes are not only a way to provide financing, but rather an approach to organise the management of packaging waste and create the necessary institutional structures. Thus, **both approaches can complement each other**.

However, both EPR schemes and CO_2 taxes require sophisticated and progressive legal and administrative frameworks to be implemented properly and effectively. The development of both systems would overburden most developing countries. Moreover, the introduction of CO_2 taxes only makes sense if there are mechanisms in place to prevent carbon leakage, such as taxing specific imports. These mechanisms may in turn have an impact on international trade. Under these circumstances, complementarity of both systems is a rather theoretical possibility, at least for the foreseeable future.

Summary from previous chapter

The following table is a summary of which objectives and criteria can be achieved with which approaches, if all approaches are carried out with the greatest possible accuracy. This table lists the most important key points for the respective set of topics.

8 *https://wegcwp.uni-graz.at/shift/wp-content/uploads/sites/4/2019/02/SHIFT-Arbeitspapier-Steuerreform-1.pdf*

Criteria / Goals	1. Mandatory EPR	2. "Cash for trash"	3. Municipal waste fees	4. Plastic Credits	5. CO_2 Taxes
Financing a) Funding for infrastructure b) Covering running costs c) Source of funding / polluter pays principle	(Full) financing of running costs and the required facilities as well as other infrastructure must be done by the obligated companies. Polluter pays principle applies.	Funding for facilities and other infrastructure is only possible for packaging that is permanently supplied and has a positive market value. Polluter pays principle is not fulfilled.	Financing of all necessary measures or partial financing (e.g. for collection) is possible if all households and waste producers contribute, and guidelines and monitoring exist. Makes citizens responsible according to the polluter pay principle.	Plastic credit schemes can contribute to financing the collection and recycling of waste. However, it is a voluntary measure taken by only some companies, there are no standards yet, and lacking transparency could be a challenge.	CO_2 taxes can be used to finance investments in waste management. But they can also be used (completely) for other national expenditures, so that funding is not secured. Depending on the definition of the tax base, they can be an efficient way of applying the polluter-pays-principle.
Infrastructure and know-how d) All-encompassing approach to waste management, including collection, sorting, recycling e) Tailor fit technologies f) Technical capacities g) Traceability of material flow	Since the whole infrastructure required for collection, sorting, recycling, and transportation in a well-functioning EPR system is paid for via EPR fees, the required infrastructure can be built and operated nationwide for all packaging and in all regions. Transparency can be achieved through mass-flow-analyses.	Collection, sorting and recycling are limited to regions where recyclers collect valuable packaging on a relevant scale and to materials that have value. The development of new technologies rarely takes place and is limited to these materials. Transparency of material flow and control of waste management results are not achieved.	Municipalities can arrange for the separate collection of all packaging in their area, but not nationwide. Difficult to collect and market all packaging, especially those with a negative market value. Research and development are normally not financed by municipal waste fees. Mass-flow-analysis can be requested.	Participation in plastic credits is voluntary and often temporary, leading to little effects for the development of infrastructure and is often limited to the establishment of collection points. Limitation to plastics collection & recycling and no coverage of all packaging. A mass-flow-analysis can be requested from the paying companies for this partial flow.	CO_2 taxes can support the infrastructure development but cannot guarantee reliable financing of running costs.

◀ Background Table 02

Summary from previous chapter

Criteria / Goals	1. Mandatory EPR	2. "Cash for trash"	3. Municipal waste fees	4. Plastic Credits	5. CO_2 Taxes
Up-stream effects h) Design for recycling i) Avoid/prevent waste j) Use of recyclates	Increase of design for recycling and recycled content can be affected by modulated Companies fees. Waste prevention and communication can be financed by EPR fees.	The model has no influence on design or recycled content.	No side-effects on design for recycling and recycled content of packaging. Avoidance of waste and communication can be supported by a municipality.	Plastic credits normally are weight-based and no side-effects on design for recycling and recycled content of packaging are expected. There is a risk that plastic usage will become more prevalent. Nevertheless, awareness for the responsibility of companies can be created.	Companies have a clear incentive to use or innovate primary or secondary materials and technologies that cause lower CO_2 emissions.
Complexity k) Simple, practical structures with a low level of complexity for easy implementation	EPR systems are very complex, and the system needs a proper management of the ongoing operation as well as monitoring and verification of recycling quotas and documentation of volume flows.	Structures are easy to implement, and no political decisions are required for legal frameworks for a national system.	If citizens and commercial waste producers can be identified and registered, the development of systems become simpler. The more advanced the system gets, the more complex it gets.	Such systems are quite easy to implement. However, they are also susceptible to fraud unless a control system is in place. This makes the process more complex.	Against the background of the potential side-effects, the introduction of CO_2 taxes is extremely challenging and requires careful considerations and time.
Country aspects l) General framework conditions as basis for implementation m) Suitable models for each country n) Level playing field	The state of development of EPR systems varies greatly between countries. In countries where there is no concept for EPR, it will take several years to build a system. EPR systems essentially depend on the framework conditions and EPR regulations.	The prerequisite is that a market for the collected recyclables exists or can be established.	Countries with good and effective administrative structures are more suitable to organise and finance separate collection of recyclables via municipal fees.	Advantages especially in countries that suffer from environmental as well as economic consequences caused by plastic waste pollutions due to an absence of EPR systems.	Depending on the structure of domestic industry, CO_2 taxes will lead to very different results; this also applies to administrative capacities to actually enforce taxation. More direct impacts are expected in countries with a high share of domestic industrial production.

◀ Background Table 02

Summary from previous chapter

Criteria / Goals	1. Mandatory EPR	2. “Cash for trash”	3. Municipal waste fees	4. Plastic Credits	5. CO_2 Taxes
Social aspects o) Community engagement p) Inclusive approach	Indirect effects for companies to invest in research and development. Necessary communication with citizens and producers is generally a task of PROs and financed by EPR fees.	No corresponding side effects can be expected.	Communication and education can be carried out by the municipalities.	Plastic credits can have side-effects especially at the interface with EPR system development; depending on the specificities of the system, both supporting as well as hindering effects.	CO_2 taxation means market intervention. The side effects are essentially influenced by the criteria according to which the CO_2 taxes are calculated.

◀ Background Table 02

Summary from previous chapter

Final Remarks

Combining a mandatory EPR system for packaging with municipal fees for all materials that cannot be covered by the EPR system provides the most solid and reliable funding basis for organizing and financing a sustainable circular economy. CO_2 taxes based on ecological criteria regarding resource savings and usage of raw materials can offer additional financing.

Plastic credits and “cash for trash”-schemes become less relevant with the setup of an EPR scheme. However, these approaches are valuable as transition finance, as long as there is no EPR system established. They can be set up as voluntary initiatives, which eventually can be integrated in a later, mandatory EPR scheme.

EPR schemes may take a long time to be set up, especially due to the comprehensive legal framework required. The (legal) framework in an EPR system enables, among other things, fair (working) conditions, planning security for investments and a level playing field.

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Germany

How Germany's EPR system for packaging waste went from a single PRO to multiple PROs with a register

Germany was one of the first countries to set up an Extended Producer Responsibility (EPR) system for packaging, back in the 1990s, and it has developed significantly since. The legal framework provided by the *Verpackungsverordnung*, or Packaging Ordinance, was amended several times over the years and was recently replaced by a new Verpackungsgesetz, or Packaging Act, that entered into force in January 2019. One of the most significant changes to EPR in Germany has been its transformation from a system based on a single, non-profit PRO to one that incorporates several for-profit PROs, operating in competition with each other. This change was triggered by changes to antitrust regulations. The system for charging fees has also changed over time, moving progressively towards a model based on the types and weights of material in the system. In 2019, further changes were made to encourage the use of more recyclable packaging.

In Germany, all expenses associated with the collection, sorting and recycling of packaging waste is supposed to be covered by fees paid by obliged companies, who have to join a central register and pay fees to a PRO of their choice. The competing PROs manage these fees and conclude contracts and agreements with waste management companies and municipalities. The targets set for the EPR are enshrined in law and changed over time. Originally they focused on making separate collections mandatory and they then began to concentrate on recovery rates. From 2019 onwards, targets focussed on achieving higher recycling targets. Another significant change was the introduction of a deposit-refund system for beverage packaging (PET bottles, cans) in the early 2000s. This system has itself developed over the last two decades and has now been incorporated into the Packaging Act.

The origins of Germany's EPR system for packaging

Why an EPR was set up in the 1990s

Until the end of the 1980s, most of Germany's waste was sent to landfill – separate collections of recyclables were carried out by a mixture of formal and informal operators. In some areas, glass and paper were collected through formal channels on behalf of the municipality or municipality, but most collections were made informally by commercial organisations and community bodies. As far as packaging waste was concerned, only packaging and other waste with a market value was collected, as the revenues generated from these materials could be used to cover the expenses associated with collecting, sorting and marketing them. Along with glass and paper waste, scrap and textiles were often collected on an informal basis. Even now, these fractions are sometimes collected on an informal basis, but any collection activity must be formally reported to the municipality.

By 1990, waste was becoming a major political issue. Many landfills in Germany were full to capacity, and there were not enough incinerators to handle the country's household waste. About half of the waste brought to landfill by volume (and a third by weight) consisted of packaging waste.
To tackle this problem, the national government set targets to stem the tide of packaging waste at landfills. These targets were aimed at retailers and packaging

manufacturers, who were put under an obligation to submit proposals for systems that would allow packaging to be returned, rather than disposed of in landfill.

The first Packaging Ordinance, 1991

The German *Verpackungsverordnung*, or Packaging Ordinance, was initially approved by the German government on 12 July 1991. It would be amended no fewer than eight times before it was finally replaced by the Verpackungsgesetz, or Packaging Act, which became law on 1 January 2019.

The Packaging Ordinance of 1991 was the first legislation anywhere in the world to incorporate the concept of EPR, which had to be assumed in respect of all packaging waste produced by households, commerce and industry. The key provisions of the Packaging Ordinance included:

- A requirement for **transport packaging** to be taken back by producers and distributors and be reused or recycled.
- The distributer was required to remove **grouped packaging** as soon as the product was stocked in store. The retailer was obliged to recycle the packaging.
- The distributor was obliged to take back s**ales packaging** returned to their shop unless an EPR system had been set up to do so. If such a system was in place, producers and distributors of the packaged goods were made to contribute to it financially and pay for the disposal of their packaging. Anyone who introduced sales packaging into the German market and did not allow it to be returned to their shop was made to pay a contribution towards the costs of disposal, payable when the product was sold. This provision laid the foundations for an initial EPR system for packaging.

As it was underpinned by the Packaging Ordinance, Germany's EPR system was mandatory from the outset. The EPR system for sales packaging operated on the basis of a number of specific regulations, including binding targets for collection and sorting rates; these targets had to be met for the first time in 1993. There was also a requirement for the collection material to be fed into material recycling processes. The collection and sorting targets in force between 1 January 1993 and 1 July 1995 are set out in the table below:

The development of Dual System Germany as a single non-profit PRO

The first Packaging Ordinance was passed in 1991, tasking the private industry to set up an EPR system. When the Ordinance came into force in 1993, all requirements had to be fulfilled. This system was to be under private-sector management and charged with collecting, sorting and recycling packaging waste throughout Germany. In preparation for this task, industry representatives set up an association known as Duales System Deutschland – Gesellschaft für Abfallvermeidung und Sekundärrohstoffgewinnung mbh as early as 1990. The association eventually became known outside the country as Dual System Germany, or by its German acronym, DSD.

The inaugural meeting of DSD was held on 28 August 1990, and attended by 95 stakeholders. By 1993, that number had risen to 562, all of them private-sector companies involved in the manufacturing sector, the production and filling of consumer goods and commerce. Later, the symbol that became known as Der Grüne Punkt, or the **'Green Dot'** was adopted and used for DSD's licensing and financial activities. When DSD was first founded, its share capital amounted to three million Deutschmarks[2], and the company was launched as a **non-profit company**. In 1993, it handled transactions worth DM 2.8 billion. A number of waste disposal companies had also been keen to join DSD when it was founded, but this was vetoed by the Bundeskartellamt (Federal Cartel Office).[3]

Packaging material	Collection rate[1)]	Sorted/sent for recycling[2)]	Recycling rate[3)]
Glass	60%	70%	42%
Tinplate	40%	65%	26%
Aluminium	30%	60%	18%
Paper, cartons and cardboard	30%	60%	18%
Plastics	30%	30%	9%
Composite materials	20%	30%	6%

1) The amount of sales packaging to be collected as a proportion of the total packaging consumed.
2) The amount of packaging to be sorted as a proportion of the amount collected. Sorted waste had to be sent on for recycling.
3) The total volume of packaging recycled as a proportion of total packaging consumption (i.e. the collection rate multiplied by the sorting/recycling rate).

Country report Germany Table 01

Collection and sorting quotas under the German Packaging Ordinance, 1 January 1993 to 1 July 1995[1]

1 German Packaging Ordinance (*Verpackungsverordnung*) – 12 June 1991
2 Deutschmark (DM) is the currency Germany used before it adopted the Euro in 2002 (exchange rate in 2002: 1EUR = 1.95DM)
3 Bünemann, Rachut (1993): Der Grüne Punkt, eine Versuchung der Wirtschaft. Karlsruhe: Verlag C.F. Müller

Financing

Producers and importers were required to participate in this system and to ensure their packaging was included in it. At the same time, they were put under an obligation to **make a financial contribution to the system in line with the amount of the packaging they introduced to the German market.** To show they were participating in the system, they were allowed to print the licensed 'Green Dot' symbol on their packaging. This symbol is still in use today and has been adopted by a number of other countries for their own EPR systems.

From 1991-92 onwards, participation in the system and the entitlement to use the Green Dot logo was based on a fee linked to the amount of packaging used. The maximum fee was DM 0.02 per item, irrespective of material and weight. Plastic packaging was subject to an additional levy for recycling. When the EPR system rolled out across Germany in 1993, **it ended up in severe financial difficulty, which led to the introduction of a new fee system based on the weight of each item and the materials used to make it.**

Packaging material	Licence fee[4]
Glass	DM 0.16/kg
Tinplate	DM 0.56/kg
Aluminium	DM 1.00/kg
Paper, cartons and cardboard	DM 0.33/kg
Plastics	DM 3.00 DM/kg
Composite materials	DM 1.66/kg

Country report Germany Table 02

DSD EPR fees from 1 October 1993 onwards

4 At the time, one Deutschmark had roughly the same purchasing power as one Euro does today.

Recycling and industry guarantors

When DSD was founded, it only covered collection and sorting of sales packaging, but it came with a requirement to ensure there was a market for the packaging once it had been collected and sorted and that it would eventually be recycled. This meant the companies and organisations handling the packaging had to find a market for the individual packaging material flows. This led to the designation of 'guarantors' under the scheme, which were organisations made up of raw material suppliers, packaging material manufacturers or converters. These **guarantors were responsible for ensuring the various packaging material streams were recycled.** They agreed to receive the sorted waste fractions and recycle them as appropriate. One guarantor was nominated for each material fraction, and the main ones were as follows:

- **For plastic packaging,** the Deutsche Gesellschaft für Kreislaufwirtschaft und Rohstoffe mbH (DKR GmbH) (or the German Society for the Circular Economy and Raw Materials) was set up in 1991, with an initial share capital of DM 100,000,000. Its shareholders were plastics manufacturers and processors, larger waste disposal companies and DSD itself. Once plastic packaging had been sorted, it was taken to DKR, who delivered it to recycling plants.
- The Recarton-Gesellschaft für Wertstoffgewinnung GmbH (ReCarton GmbH) was established in 1991 and was responsible for **beverage cartons**. Its shareholders were the four carton manufacturers that, between them, covered the entire German market (namely Tetrapak, Elopak, PKL and PWA). As of 2020, ReCarton is still marketing collected and sorted beverage cartons, although it no longer enjoys a monopoly.
- Deutsche Aluminium Verpackung Recycling GmbH (DAVR, or German Aluminium Packaging Recycling) was founded in 1991 to handle **aluminium and aluminium-based packaging**. Its principle shareholders were aluminium manufacturers. DAVR is still marketing collected and sorted aluminium today, although it is no longer a monopoly.
- **For tinplate packaging**, Germany's major steel manufacturers acted as guarantors (specifically Thyssen, Rasselstein and Krupp Hoesch).
- The Association of the German Glass Industry acted as the guarantor for **glass packaging**, and set up the Gesellschaft für Glasrecycling und Abfallvermeidung mbH (CGA) (or the Society for Glass Recycling and Waste Prevention).

For the first ten years or so after they were set up, the guarantors enjoyed preferential treatment when marketing their material fractions. Some of them enjoyed fully-fledged monopolies for marketing and using the material, particularly GGA for glass and DKR for plastics, but these monopolies were eventually broken up following instructions from the German competition authorities.

Dealing with teething problems during the 1990s

Using contracts to set up separate collection systems for packaging waste
The initial contracts for collection and sorting ran for ten years, from 1993 to 2003. In most parts of Germany, sales packaging was collected in three different fractions from 1993 onwards:

- **Paper, cartons and cardboard** and **glass** was collected from central collection points.
- **Lightweight packaging**[5] was usually collected from households in special yellow bags (gelbe Säcke) or yellow bins.

Collections were organised by DSD, which acted as the PRO. It invited tenders for collection services and concluded contracts with companies and municipalities.

This collection system gradually reduced the amount of residual waste in the system, eventually allowing municipalities to increase the intervals between collections from households (e.g. from weekly to fortnightly collections).

Initial financial difficulties
The initial service contracts for the EPR were drafted in accordance with the volumes required by the Packaging Ordinance. Initially, DSD expected to collect 4 – 8kg per person per year between 1993 and 1995, rising to 11.4kg – 13kg from July 1995 onwards. However, in some regions, quantities of up to 20kg per person were being collected as early as 1993, which created huge **logistical and financial problems for DSD**. The contracts had to be amended multiple times over their 10-year terms so as not to jeopardise the existence of DSD.

Problems determining whether separate collection and recovery quotas had been reached
It was difficult to determine whether the legally mandated **separate collection quotas** had been achieved, as the precise quantities of packaging introduced to the market always had to be calculated retrospectively, with the help of a private consultant. Moreover, the collected material contained other waste items besides packaging, which meant a detailed analysis was required to determine exactly what proportion of the collected material qualified as packaging. This system produced rather imprecise numbers.

To solve this problem, an important amendment was made to the Packaging Ordinance in 1998. The law was changed so that the reference quantity of the denominator of the quota would be measured in relation to the quantity of packaging introduced to the German market by the companies participating in the EPR system, rather than on the basis of the amount of packaging being introduced to the German market in total (this change reduced the overall total for calculation purposes, because it excluded free riders who failed to participate in the system despite their legal obligation to do so). At the same time, the **collection quota was replaced by a recovery quota for each type of material.** ▶ Table 03 below shows the recovery quotas that applied from 1998 onwards:

5 At the time, one Deutschmark had roughly the same purchasing power as one Euro does today.

Packaging material	Recovery quota following the 1998 amendment to the Packaging Ordinance of 1998*
Glass	75%
Tinplate	70%
Aluminium	60%
Paper, cartons and cardboard	70%
Plastics	60%

*The percentage is based on the amounts registered with DSD and for which EPR fees were paid.

The amended Packaging Ordinance included a **special regulation for plastics**. It stipulated that at least 60% of plastics had to be recovered, and at least 60% of the recovered material then had to be recycled using material recycling processes. These quotas remained in force until the end of 2018.

In addition, the first amendment to the Packaging Ordinance also stipulated that:

- Producers and distributors that did not want to participate in an EPR system would be obliged to **verify that they had fulfilled the recovery quota** in order to maintain a level playing field between all obliged companies.
- There would be **greater competition between waste management operators**. Specifically, (i) PROs were required to invite for tenders for collection, sorting and recycling services; (ii) collected packaging was to be provided under competitive conditions, and (iii) the costs associated with individual packaging materials were to be published.

Country report Germany Table 03

Recycling quotas after the Packaging Ordinance was amended in 1998

Major revisions during the 2000s

A deposit-refund system for beverage packaging

A **mandatory deposit-refund system for single-use beverage packaging** was introduced in 2003, in response to a decline in the quantity of reusable beverage packaging. Initially, the regulations stipulated that empty beverage containers could only be returned to the original point of sale. However, in 2005 the central organisation Deutsches Pfandsystem GmbH (German Deposit System, known by the acronym DPG), set up a clearing system between retailers and fillers that allowed consumers to return containers to any participating retailer, and not just to the original point of sale.

Most significant amendments to the Packaging Ordinance	
1st amendment, 1998	Waste management services had to go out to tender. Recovery quotas had to be verifiably met by the relevant companies using their own take-back schemes (individual producer responsibility). Changes to the way collection and sorting rates were calculated: quota to be measured on the basis of the total amount of licensed packaging produced.
2nd amendment, 2002	Mandatory deposit-refund scheme (DRS) introduced for single-use beverage containers from 2003 onwards.
3rd amendment, 2005	Clearing organisation set up to simplify the DRS.
4th amendment, 2006	New terms and targets set.
5th amendment, 2008	Producers and fillers in a PRO obliged to participate in the system. Provision was made to exempt companies with their own take-back schemes or participating in an industry-wide system solution. Verified declarations of completeness required for sales packaging produced by the obliged companies.
6th amendment, 2013	Certain terms clarified.
7th amendment, 2015	The option for companies to operate their own take-back systems was abolished. Criteria for exemption from the EPR scheme are tightened.
New *Verpackungsgesetz* (Packaging Act) (2019 onwards)	Certain terms clarified, requirement to increase recycling rates, central packaging register introduced to improve monitoring, incentives introduced to improve recycability of packaging and municipalities given more powers.

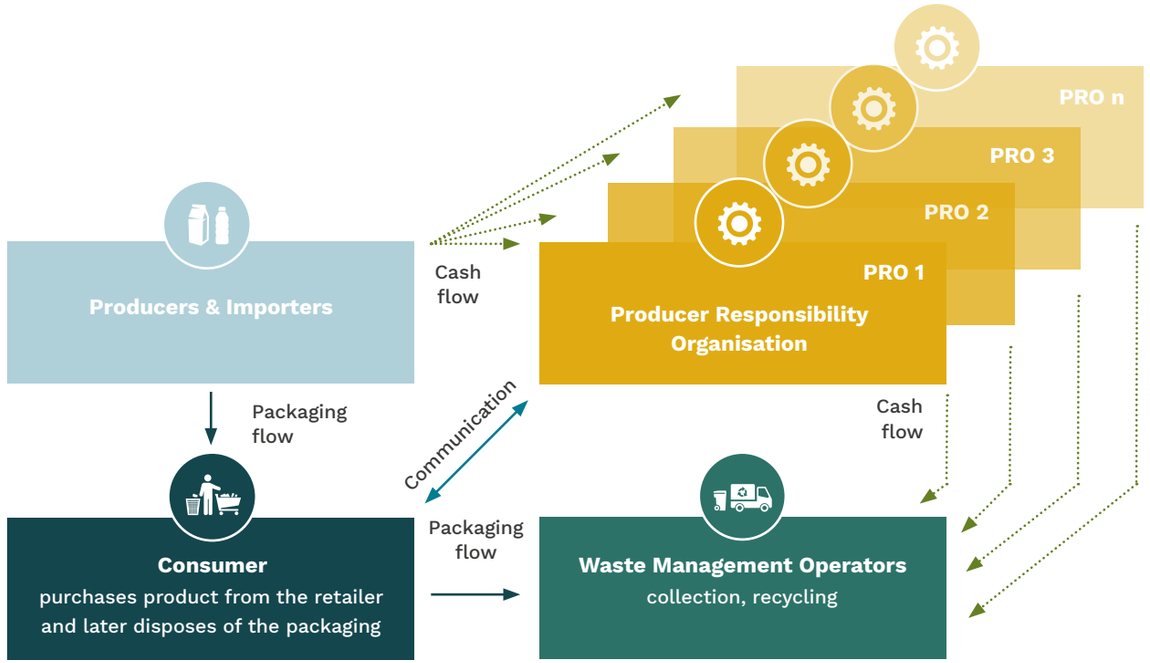
Country report Germany Table 04

Major amendments to the Packaging Ordinance

Moving from a single, not-for-profit PRO to multiple, for-profit PROs in competition

In 2003, a number of additional PROs were cleared to operate alongside DSD. The approval came from Germany's Federal States (*Bundesländer*) as a response to pressure from the national federal cartel office. This meant that **Germany's EPR system for packaging moved from a single, nonprofit PRO acting as the system operator** (i.e. DSD) **to a system in which various for-profit PROs required to fulfil their responsibilities in competition with each other.** This change gave rise to some significant challenges, particularly because there should be only one packaging collection system in each area. This led to the total volume of collected packaging amounts under the EPR system being divided among the various PROs, and this system is still in use today.

Each PRO enters into contracts with certain obliged companies within the system. Once the waste has been collected, each PRO takes responsibility for an amount of waste corresponding to the amount licensed and paid by the obliged countries for which it is the contracted PRO. The diagram below illustrates how the German system works:



Country report Germany Figure 01

Competing PROs in the German EPR system for packaging

Since DSD's monopoly was ended, a large number of PROs have been active in Germany's EPR system, as shown in ▶ Table 05 below:

PRO	Start of operations	Current status
Der Grüne Punkt – Duales System Deutschland GmbH	1992	Still active
Landbell AG	2003	Still active
Interseroh Dienstleistungs GmbH	2005	Still active
EKO-PUNKT GmbH	2006	Operated until 2016
Reclay Systems GmbH	2007	Still active
BellandVision GmbH	2008	Still active
Zentek GmbH & Co. KG	2008	Still active
Veolia Umweltservice Dual GmbH	2009	Still active
Vfw GmbH	2009	Taken over by Reclay in 2008
Recycling Kontor Dual GmbH & Co. KG	2013	Operated unitl 2018
ELS GmbH	2015	Filed for insolvency in 2018
Noventitz Dual GmbH	2017	Still active
PreZero Dual GmbH	2020	Still active

Country report Germany Table 05

PROs in Germany (as of April 2020)

Competing different PROs led to in a reduction in collection and recycling costs. However, it also made the system more complex and opaque. It became impossible to verify whether any given obliged company had actually paid its EPR fees to any of the PROs. The overall quantity of packaging licensed under the system fell significantly, as many obliged companies exploited the situation and failed to license all of their packaging with a PRO. This development, combined with a political prioritisation of environmental issues, led to the adoption of the new Packaging Act (Verpackungs-gesetz) by the German parliament in 2017.

Germany's new Packaging Act[6]

The Packaging Act (also known by the German abbreviation VerpackG) replaced the Packaging Ordinance on 1 January 2019. It brings together regulations covering all the major issues connected to the handling of packaging waste, and is consistent with the EU Directive on Packaging and Packaging Waste. The Packaging Act introduced a number of new requirements and set up new institutions. Although it did not fundamentally alter the nature of Germany's EPR system, it did add the following additional elements:

- A new Central Agency Packaging Register (Zentrale Stelle Verpackungsregister – referred to here as the Central Agency).
- Increased recycling targets.
- Provision to take recyclability of packaging into account when setting EPR fees.
- The new title for obliged companies was 'manufacturer'. However, in this context the term manufacturer is used as a synonym for producers and importers.

The new Central Agency[7]

Anyone who introduces packaged products to the market in Germany, (e.g. to protect a product, to make it easier to ship, or for marketing purposes) must ensure that their packaging will be recycled or recovered appropriately at the end of its life cycle. The person, or firm, who initially introduces these products to market is called an 'initial distributor'.

The **Central Agency Packaging Register (the Central Agency) was created to increase transparency and monitor compliance with the principles of EPR.** In most cases, the initial distributor of a product on the German market is either the manufacturer* or the importer, which means they are obliged to register under the EPR system. The Central Agency is responsible for registering manufacturers*, receiving and verifying data reported by manufacturer* and importers (obliged companies) and PROs and, by extension, for monitoring and enforcing how obliged companies are participating in the system.

Manufacturers* and importers (obliged companies) are subject to a number of basic conditions:

- Manufacturers* and importers (obliged companies) must **register** with Central Agency before they can market packaging materials commercially.
- Manufacturers* and importers (obliged companies) must **register their business-toconsumer packaging materials** with an EPR system before marketing them commercially.
- At least once a year, manufacturers* and importers (obliged companies) must **report the mass (total weight) of the packaging materials** marketed by them, along with details of the materials they contain. Reports must be filed simultaneously to their chosen system and to the Central Agency.

6 *https://www.gesetze-im-internet.de/verpackg/*
7 Source: Zentrale Stelle Verpackungsregister (2019)
*In this context, the term 'manufacturer' implies producers and importers.
8 Source: VerpackG §11 (4)

- When they submit their 'declaration of completeness', manufacturers* and importers (obliged companies) must **report the total weight of the sales packaging they have marketed, broken down by material**, to the Central Agency. Exceptions apply when the amount of waste falls below 80 tonnes of glass, 50 tonnes of paper, cartons and cardboard or 30 tonnes of light-weight packaging.[8]

Should a manufacturer* fail to register, or if it distributes goods that it has not registered correctly, it becomes liable to a **potential fine of up to €100,000 per instance of non-compliance**. Failure to participate in any system is punishable by a fine of **up to €200,000. Moreover, under civil law, the company's competitors are entitled to enforce a ban on the company concerned distributing any products.**

New recycling targets

The new recycling targets under the Packaging Act are shown in the table below:

Material	Target under the Packaging Ordinance (applied up to the end of 2018)	Target as of 1 January 2019	Target as of 1 January 2022
Glass	75%	80% ✓	90%
Paper, cartons and cardboard	70%	85% ✓	90%
Ferrous metals	70%	80% ✓	90%
Aluminium	60%	80% ✓	90%
Beverage cartons	60%	75% ✓	80%
Other composites		55%	70%
Plastics	60%	90%	90%
Mechanical recycling (plastics)	36% ✓	58.5%	63%

✓ Target has already been met

Country report Germany Table 06

New recycling targets

Integrating recyclability

Section 21 of the new Packaging Act serves as basis for new operational guidelines for EPR systems. It states:

> *"(1) Systems are obliged to calculate their participations fees in such a way that incentives are included with a view to the production of packaging subject to system participation to promote the use of materials and material combinations that allow for the highest possible percentage to be recycled, considering the practice of sorting and recovery [...]"*

Working together with the German Environmental Agency, the Central Agency drew up a 'minimum standard for determining the recyclability of packaging subject to system participation pursuant to section 21 (3) VerpackG (Verpackungsgesetz –Packaging Act)[9]". The **minimum criteria for recyclability** are defined as follows:

> *"2. Minimum criteria When determining recyclability, the available recyclable content of a packaging should be taken as the minimum starting point for further considerations. In determining the available recyclable content, at least the following three requirements must be taken into account:*
>
> *1) The existence of a sorting and recycling infrastructure that allows for high-quality mechanical recycling for this packaging,*
>
> *2) the sortability of the packaging as well as, where applicable, the separability of its components,*
>
> *3) incompatibilities of packaging components or substances contained therein that might render a successful recycling impossible with currently used technology".*[10]

This means that the starting point for the consideration is the part of the packaging that is potentially recyclable. For instance, only 99% of a PET-bottle is considered recyclable, since the sleeve is not. These 99% are thus considered the minimum starting point and the 3 mentioned criteria are then applied to determine recyclability. The minimum standard includes a number of specific provisions, including:

- Definitions of specific types of packaging and their recyclability.
- A summary of different groups/types of packaging, along with a list of specific elements that make materials unsuitable for recycling.

The standard has the status of an official regulation in Germany and is increasingly applied in other countries, too.

9 An electronic copy of the Packaging Act is available at: *https://www.verpackungsregister.org/fileadmin/files/Mindeststandard/2019-10-07_Mindeststandard____21_VerpackG_EN.pdf*

10 *https://www.verpackungsregister.org/fileadmin/files/Mindeststandard/2020-01-22_Mindeststandard_VerpackG_EN.pdf*

Conclusion and outlook – outcomes from Germany's EPR system

- The improvement of EPR schemes is a continuous effort. It took almost 29 years, that a packaging act and therewith a central registry avoiding freeriding effectively, was installed in Germany. The capacity of the waste and recycling sector improved significantly in that time. The recovery rate of packaging materials (material recycling and energetic recovery) increased from 37.3% to 94.3% from 1991 to 2017.[11]
- However, due to mainly changes in consumption behaviour (take-away and e-commerce) and living conditions (e.g. single households), the amount of packaging raised from 15.6 million tonnes in 1991 to 18.7 million tonnes in 2017.
- Approximately 2.5 million tonnes of lightweight packaging and about 2 million tonnes ofglass waste packaging are collected by the PROs every year.
- Paper, cartons and cardboard packaging are collected directly from households (as are newspapers, magazines, etc.). In 2014 this amounted to about 5.8 million t/year.
- The collection, sorting and recovery of packaging by the PROs generates total revenues of over €1 billion per year.
- Lightweight packaging is sorted in about 45 sorting facilities across Germany.[12]
- The amount of waste going through each recycling path must be officially reported on an annual basis. The figures for 2017 were:[13]
    - Glass: 1.87 million tonnes
    - Paper, carton, cardboard boxes (for packaging): 1.2 million tonnes
    - Aluminium: 0.07 million tonnes
    - Tinplate: 0.27 million tonnes
    - Beverage cartons: 0.14 million tonnes
    - At total of 1.2 million tonnes of plastics were recovered. Of those, 0.46 million tonnes were mechanically recycled.

Information correct as of June 2020

11 *https://www.umweltbundesamt.de/daten/ressourcen-abfall/verwertung-entsorgung-ausgewaehlter-abfallarten/verpackungsabfaelle#verpackungen-uberall*
12 Source: Bundeskartellamt, 4. Beschlussabteilung B4 – 21/19, Fusionskontrollverfahren
13 Data (rounded) from: Kurt Schüler (GVM) „Aufkommen und Verwertung von Verpackungsabfällen in Deutschland im Jahr 2017", Umweltbundesamt Texte 139/2019

Key readings and other sources

PREVENT Waste Alliance (2021).
Video series:
EPR Explained! (10.2.) Deposit refund system in Germany

EU Directive. *https://eur-lex.europa.eu/legal-content/EN/TXT/?-qid=1585617716849&uri=CELEX:01994L0062-20180704*

Packaging Act (Verpackungsgesetz). *https://www.verpackungsregister.org/fileadmin/files/Mindeststandard/2019-10-07_Mindeststandard____21_VerpackG_EN.pdf*

Chile

Developing a legal framework for EPR in Chile

A mandatory EPR system for packaging is currently introduced to the country of Chile. An associated legislation by the constitutional court to provide a legal framework (Ley N°20.920, Ministry of Environment, 2016) is underpinned. A draft of the decree on packaging was first published in spring 2019 and after passing through public consultation, the decree was finally approved by the Council of Ministers in May 2020. Two system operators (PROs) have already been founded in order to prepare oneselfs once the system is opened.

Introduction

Chile has a total population of over 18 million inhabitants. The South American country borders the South Pacific Ocean to the west; its coastline is over 6,000 km long and the country covers a total area of approximately 756,000 km². Around 90% of the population lives in urban areas, primarily in the metropolitan area of Greater Santiago.

Waste management in Chile

Current collection and recycling systems

The waste collection rate across Chile is at almost 100%. Approximately 8 million tonnes of municipal solid waste are generated every year, showing an increasing trend ¬- particularly in the metropolitan area of Santiago. Between the years 2000 and 2010, the waste volumes rose by 30%. In most cases, everyday household waste is collected door-to-door in plastic bags, with collection coverage of almost 100%. Recyclables are collected primarily at central collection points equipped with containers. Kerbside collection takes place in fewer than 10 local authority areas. Of these, only 2 have a comprehensive and extensive collection system.

In Chile, household waste management services are generally funded through the payment of real estate contributions. Nearly 80% of properties are excluded from tax, and thus do not pay for the collection and disposal of their waste. This causes a **funding problem for the municipal authorities**.[1]

There are 7,277 central drop-off points, of which 87 are staffed and equipped with a compactor (as of 2018). As far as sorting is concerned, there is currently only one sorting plant, at which mixed recyclables are sorted manually.

No household waste is currently incinerated. More than 95% of waste generated by households is disposed of in landfills. About 23% of waste disposed of in Chile ends up at dumps that do not comply with the regulations for sanitary landfill.

Up to now, recycling of waste is done almost completely by the informal sector. It is estimated that 4% to 10% of municipal-level waste is recovered, and 8.5% of all plastic waste is recycled. About 17% of total recycled plastic waste originates from households.[2]

1 OECD, Environmental Performance Reviews: Chile 2016. *https://www.oecd.org/env/oecd-environmental-performance-reviews-chile-2016-9789264252615-en.htm*

2 Ministerio del Medio Ambiente, “Ministra Schmidt convoca a grandes empresas a unirse a pacto para combatir contaminación por plásticos,” *https://mma.gob.cl/fundacion-chile-sera-el-articulador-del-inedito-acuerdo-ministra-schmidt-convoca-a-grandes-empresas-a-unirse-a-pacto-para-combatir-contaminacion-por-plasticos/; accessed* 02 June 2019, 2019

National Waste Programme

There is a **National Waste Programme in place, which is designed to support sustainable waste management systems.** Nonetheless, the majority of the received funding is invested in projects which aim to increase the percentage of waste that is finally disposed of in sanitary landfills and/or to close facilities that lack the appropriate public health or environmental authorisations. However, the fund can also finance initiatives to encourage the reuse, recycling and recovery of waste. Waste management solutions have to be developed by municipal-level organisations; applications from others will only be granted in exceptional circumstances.

A **Neighbourhood Improvement Programme operates in addition to the National Waste Programme and aims to improve sanitation**. This includes financing waste management projects. The programme is funded via the public sector budget, and aims at municipalities and municipal associations. Multiple initiatives can be financed concurrently. This includes initiatives avoiding household waste generation and improvement of waste management practices, including management models, infrastructure and equipment for recycling-drop-off stations.

National Waste Strategy

In 2007, the Council of Ministers for Sustainability approved the National Waste Policy 2018-2020. Since the policy has not been signed by the President of the Republic yet, it has not been officially published. However, it is applied in practice already. Its objective is to establish, coordinate and guide public efforts to increase waste recovery rate to 30% between 2018 and 2030.

The national strategy and its action plan guide the Ministry of Environment until the Circular Economy Roadmap, a long-term planning tool, is developed. During March 2020, 25 key actors were asked to be part of the strategic committee tasked with drawing up the roadmap, which will in turn drive the adoption of the circular economy in Chile.[3] These key actors included trade unions, public bodies, universities, innovation centres, consumers and informal recyclers, among others. The roadmap will be developed by the Eurochile Business Foundation, and decisions will be taken by an executive council advised by a number of European countries, the OECD, the IDB, the World Economic Forum and the Ellen MacArthur Foundation. A number of topics have already been set in prior to discussions, such as modifications to increase the cost of disposing of waste in sanitary landfills as well as defining the role to be played by waste-to-energy systems in Chile. The landfilling target of only 10% by 2040 is also currently discussed.

In January 2020, the **Plastics Pact Roadmap** was officially launched. It sets out 18 challenges, 35 solutions and 81 concrete initiatives designed to encourage appropriate use of plastics in industry and to reduce their impact on the environment.[4] The Pact aims to meet the four goals by 2025 agreed upon by a group of seven founding companies in April 2019, and to prompt concrete action aimed at establishing a circular economy. The Plastics Pact in Chile set the following four goals for 2025:

- Take action to eliminate problematic single-use plastic containers and utensils through redesign and innovation.
- 100% of plastic containers should be designed to be recyclable, reusable or compostable.
- A third of all plastic containers must be recycled, reused or composted de facto.
- The various types of plastic containers should contain an average of at least 25% recycled material.

3 *https://www.paiscircular.cl/consumo-y-produccion/medio-ambiente-convoca-a-25-actores-clave-para-desarrollar-la-hoja-de-ruta-que-impulsara-la-adopcion-de-la-economia-circular-en-chile/*
4 *https://www.paiscircular.cl/industria/pacto-de-los-plasticos-se-fija-su-hoja-de-ruta-innovacion-normativa-y-una-nueva-cultura-de-consumo-aparecen-como-primeros-desafios/*

Plastic bag ban

In August 2018, Chile published a law that will eventually prohibit single-use plastic bags given out by businesses throughout the country, making it the first South American country to do so.[5] For the first six months after the law came into effect, a maximum of 2 plastic bags could be issued to customers for each purchase. After six months, large companies, including supermarkets and retailers, were banned from issuing them. By August 2020, the ban on issuing plastic bags will expand to cover micro, small and medium-sized companies, effectively covering every business in the country by this law. This ban also affects biodegradable plastic bags, as they are not subject to any official standards in Chile.[6]

Proposal to ban disposable products[7]

In March 2020, a draft law was approved by the Senate Environment Committee which, if fully implemented, would prohibit the use of disposable products, mandating that a high percentage of recycled plastic should be used in plastic bottles and improving returnability. Specifically, it states that all plastic bottles will have to consist of at least 25% recycled material by 2025, and 50% by 2030 – an even more stringent requirement than the one set by the European Union in 2019. In fact, the law, which has not taken effect yet, aims to go even further by increasing the percentage of recycled material to 70% by 2050. The law also forces large retailers to provide returnable packaging, which will have an effect on e-commerce and packaging for deliveries. It prohibits the supply of any single-use, non-recyclable container by any establishment that sells food, and also allows for inspections by 'popular initiative'; in other words, any citizen will have the power to report violations of the law and to demand the establishment concerned comply with it.

EPR scheme for packaging

Development

Chile has ratified a number of important international treaties in this area. Because Chile has become a OECD member in 2010, it is forced to meet higher standards on waste management and recycling policies, according to the evaluations and recommendations set out in the Environmental Performance Reviews reports. In an effort to meet these higher standards, the first steps towards implementing an EPR scheme were taken by public-private working groups. The members of these groups built solid relationships that facilitated later work.

In 2013, a long-awaited waste management bill entered Congress. It was officially published in 2016 as the **Waste Management, Extended Producer Responsibility and Recycling Incentives Act** (Ley N°20.920, Ministry of Environment, 2016)[8]. The law sets conditions for establishing EPR systems for six priority types of waste:

1. Tyres
2. Packaging
3. Lubricant oils
4. Electrical and electronic equipment waste (WEEE)
5. Automotive batteries
6. Portable batteries

5 *https://www.leychile.cl/Navegar?idNorma=1121380&buscar=21100*
6 *http://chaobolsasplasticas.cl/*
7 *https://www.paiscircular.cl/industria/ley-que-prohibe-envases-de-un-solo-uso-obliga-a-incorporar-un-alto-porcentaje-de-material-reciclado-en-botellas-e-impulsa-retornabilidad/*
8 *https://www.leychile.cl/Navegar?idNorma=1090894*

The law makes **producers of priority products liable for organising and financing systems to manage the products** they market in Chile. Under the law, producers must:

a. Register in the Pollutant Release and Transfer Register (RETC)[9] system.
b. Organise and finance the collection of waste generated from priority products anywhere on Chilean territory, as well as the storage, transportation and treatment of this waste by a system operator.
c. Comply with the objectives and other obligations set out in the decrees applicable to each category of priority product.
d. Ensure that waste associated with priority products is managed by authorised and registered managers.

Specific details, including the setting of objectives and the obligations associated with the producers, will be regulated individually by a separate legislation.

After almost a decade of preparation and drafting (initial studies were carried out as early as 2007), the law will now be gradually phased in with specific regulations and targets (collection and recovery rates) to be published in 2020 and in years to come:

- The decree for tyres (DS N°8/2019, Ministry of Environment) is approved in principle, but is still under review by the Comptroller General of the Republic of Chile.[10]
- The preliminary draft[11] of the decree covering packaging passed through public consultation in 2019.[12] The Decree was finally approved by the Council of Ministers in May 2020 to then enter the Chilean General Accounting Office.[13]
- The decrees for lubricant oils and batteries are still be drafted; preliminary drafts are expected shortly.

EPR Decree for Packaging

On May 30, 2019, the **draft of the decree covering packaging,** associated with the EPR Law N°20.920, was published. Its key provisions included:

- Provision for 5 categories of materials, each with separate targets. These categories are beverage cartons, metal, paper and card, plastic and glass.
- Different targets for industrial packaging and packaging for private consumers. The targets for industrial packaging cover metal, paper and card, and plastic only.
- Increasing rates over eight years.
- Producers of industrial and commercial packaging can choose whether to take responsibility for their obligations individually or to do so collectively by participating in the PRO. If they do so individually, industrial consumers must report the quantities of waste they recover directly to the Ministry's registration system (RETC). If the responsibility is joint, companies can enter into agreements with a PRO, which assumes their responsibilities and will carry out the necessary activities on their behalf. The law also provides for a third arrangement whereby the producers remain responsible for recovering waste, but the registration and the records are done by the PRO.

9 Registro de Emisiones y Transferencia de Contaminante, *https://retc.mma.gob.cl/*
10 Approved published decree: *https://rechile.mma.gob.cl/wp-content/uploads/2020/01/DS8-REP-neumaticos-f.pdf*
11 Draft decree: *https://rechile.mma.gob.cl/wp-content/uploads/2019/06/58-RES.EXENTA-0544-APRUBA-ANTEPROYECTO-DE-DECRETO-SUPREMO-EYE.pdf* Proceedings: *https://rechile.mma.gob.cl/envases-embalajes/*
12 Publication deadline extension: *https://rechile.mma.gob.cl/wp-content/uploads/2020/01/resolucion-1443.pdf*
13 *https://www.paiscircular.cl/consumo-y-produccion/decreto-final-metas-envases-y-embalajes/*

- Micro companies[14] are exempted from any obligations under the law; they are not even required to provide information. There are also exceptions for small producers (less than 300kg of packaging/year), but they must provide information on the quantity of packaging they introduce to the market.
- For household packaging, each district/municipality can only be served by one system operator. If there is more than one system operator, it is defined which areas of the country each system operator should operate in to ensure the whole country is covered.
- A kerbside collection service must be provided, and must be expanded over time. It should cover 10% of the population initially, but this figure will eventually rise to 85% of the population.
- The PROs have to report annually. The report must be audited by technical bodies authorised by the Superintendence of the Environment.
- The PROs are obliged to integrate waste pickers into the system.

Objectives

The preliminary objectives that have already been announced will allow Chile to go from the current average of 12.5% of household packaging being recycled to 60% by 2030. The decree establishes specific recycling targets for each material by 2030 as follows:

- Beverage cartons (60%),
- Metal (55%),
- Paper and cardboard (70%),
- Plastics (45%),
- Glass (65%).

As for industrial waste, 70% of metals will have to be recycled. The figures for paper and card and plastics will be 85% and 55% respectively.

The decree defines two quotas – one collection quota and one recycling quota. However, the decree defines that only the recycling quota must be met.

Collection system

Considering that these collection targets must be met, the decree establishes a specific scheme for the collection of household packaging waste using a kerbside system. This means householders will no longer have to dispose of waste at central recycling drop-off points (bring system).

Collection (Article 44): Requirement for separate delivery at source and selective collection of waste:

System operators must carry out household collection of waste, allowing the separate collection of waste types and thus allowing waste to be delivered separately to the waste treatment plants. The collection system must cover a certain percentage of the country's total population. This percentage will increase annually up to 85% of households. The kerbside collection system should be uniform throughout the territory of Chile, and may vary only in terms of population density. This system and any exceptions from it must be set out in sufficient detail in the management plan. The bag used for segregating household waste at source must be yellow.

14 Ley No 20.416, Art. 2: Microenterprises are defined as enterprises whose annual income from sales and services and other business activities did not exceed 2,400 unidades de fomento (UFD) in the previous calendar year. As of 24 March 2020, this corresponded to €73,445.

System operators

Leaving aside the option for companies to carry out their responsibilities on an individual basis, it is, in principle, possible for more than one PRO to operate simultaneously. In this respect, a distinction is made between two categories of system operators:

1. **PROs with less than 20 obliged companies contributing to the system must meet their targets from packaging waste introduced to the market by the obliged companies only.** The same rule applies to obliged companies carrying out their responsibilities individually.
2. **PROs with more than 20 obliged companies making contributions can meet their targets using any packaging waste, as long as the packaging is in the same sub-category as the packaging the relevant companies introduce to the market.**

Each system operator must disclose the obliged companies among its members and how much packaging each of these companies introduces to the market for consumption in Chile. All systems must operate on a non-profit basis.

Since there are different targets for household and industrial packaging, there will likely be separate systems for each of these waste types (although this is not a legal requirement). Given that PROs with less than 20 participants are only responsible for their own waste, and that only one system is allowed to operate in each district, it is unlikely that multiple parallel systems will be set up for household packaging in Chile.

To be approved, each PRO must submit a management plan giving various details, including a description of how their system is financed. Each system operator is also required to submit an annual report which sets out how the fees received relate to the disposal costs they have incurred and account for any gaps in the calculations. Moreover, PROs are required to submit a pro-forma guarantee of compliance with the targets and other associated obligations.

The targets will be phased in from 2022 onwards in order to leave enough time for companies to establish PROs and the relevant entities responsible for ensuring compliance with the provisions of the law. Failure to comply will carry fines up to 10 million US dollars.

Obliged companies will be offered incentives for reducing waste through projects that focus on reducing waste amounts in the first place. The obliged companies involved in these projects will be paid subsidies in proportion to the effective decrease in the quantity of packaging introduced to the market.

Currently, two PROs are set up. The first PRO was established by the Food and Beverage Association AB Chile even before the preliminary draft of packaging decree passed through public consultation in June 2019. **This system operator will cover both household and industrial/commercial packaging waste for a range of different packaging applications.** Currently, this system operator has 26 obliged national and international members, including large FMCG companies such as Coca-Cola, Unilever and Nestlé. This PRO is currently in the process of being certified as a non-profit, industry-led corporation, and a general manager has already been appointed.

The first activities undertaken by this system operator focused on corporate governance, cost estimates, working with the environmental authorities and setting up a pilot project involving various actors in the recycling chain, such as informal recyclers, local authorities, and collection and recovery managers. A pilot recycling

plan was formally launched in the Providencia commune of the Santiago Metropolitan Region in September 2019, which eventually will expand separate waste collections services for packaging waste covering 90% of all properties in Providencia. The experience and data gained from this project will serve as the basis for a large-scale roll-out of the system, which will be required to operate from 2022 onwards.

A second PRO collecting non-household waste exclusively is also being established in parallel. In November 2019, the Sociedad de Fomento Fabril (SOFOFA) officially presented its system operator. It is focused on industrial and commercial packaging, which is a priority category under the EPR Law. This explains why SOFOFA has been playing an active role in planning since the regulations were first suggested, and has continued to do so into the implementation phase. SOFOFA is a non-profit association of companies und unions linked to the Chilean industrial sector. It counts around 4,000 companies, 48 sector associations and 22 regional business unions among its members.

The development of the PRO is facilitated by the following organisations:

- SOFOFA Hub: A working group made up of companies focusing on the circular economy. The working group sets the posture of the system operator and the guidelines under which it operates.
- Rigk Chile: A German PRO for industrial packaging, plays an active role on technical and operational issues, along with Valipac.
- Valipac: A Belgian industrial packaging PRO. Plays an active role on technical and operational issues, along with Rigk.
- Carey & Cía: A Chilean law firm providing legal advice for the system operator.

So far, this PRO has only 4 members. Due to the small number of partners currently involved, it is not yet self-financing. Despite this, the system operator has drawn up an activity plan including, among other things, a pilot project for the collection and recovery of industrial packaging waste. This project will not start until the final packaging decree has been promulgated.

Roles and responsibilities of other stakeholders

Waste management companies must prove that they are successfully utilising the resources contained in the waste they process. Companies that process waste with no positive market value are obliged to certify that there is a demand for their products derived from the waste.

The municipal authorities covered by the system operator's collection scheme for household packaging waste must commit to collect waste source separated to waste collection plants and encourage recycling into the appropriate municipal ordinance.

Waste pickers who are registered on the national register (RETC) will be able to participate in the waste management system with a view to reaching the targets set in the decree. For registration purposes, these waste pickers must be certified under the National System of Certification of Labour Competences established in Law No. 20 267. Separate tenders must be submitted for collection and recycling associated with the EPR system; local authorities and informal recyclers have preferential status in the tender procedure. A PRO is required to draw up the bidding regulations under which waste pickers will be selected for collection and recovery services available free of charge. In addition, the system operator's Inclusion Plan (Article 13) must state the mechanisms and tools to be used for training, financing and inclusion of these waste workers.

The Ministry of Environment has also released a **Policy for the Inclusion of Waste Pickers 2016-2020**. This policy includes a work plan to **promote the social, economic and environmental inclusion of informal workers** through training and certifying their labour skills and, by extension, promoting their formal participation in the EPR system as authorised waste managers. Another aim of the plan is to make their important role in the waste value chain visible. In order to implement this policy, an Operations Committee has been set up, chaired by the Under Secretary of the Ministry of the Environment. An additional collaboration agreement is in place with the country's sole organisation for informal recyclers, the National Movement of Waste Pickers of Chile (MNRCH AG).

All consumers will be obliged to deliver packaging waste to the respective PRO, subject to the underlying conditions set and published by the system operator.

Inspection and sanction mechanisms will be run by the Superintendence of Environment.

The targets and other associated obligations will take effect 24 months after the publication of the final decree. All other provisions will take effect immediately on publication.

Additional financing

The Extended Producer Responsibility Law also contains provision for a recycling fund, which is intended for recycling projects run by municipalities or associations.

A total of CLP 344 million (about 450,000EUR) was distributed to 33 projects in 2018, and in 2019 a total of CLP 502 million was assigned to 6 projects. Funds for 2020 will be focused on pilot models for the selective collection of packaging waste and certifying the skills of waste pickers. The recycling fund is not currently being used for waste infrastructure purposes.

An important individual project financed with state funds, is known as 'Santiago Recicla'. The project foresees the construction of 22 drop-off recycling points in the Santiago Metropolitan Region, at a cost of CLP 4 billion (about 5.2 million EUR), and corresponding education and awareness campaigns at a cost of CLP 900 million (about 1.2 million EUR).

Information correct as of June 2020

Key readings and other sources

Official pages of the Ministry of the Environment:

mma.gob.cl/economia-circular
mma.gob.cl/economia-circular/ley-de-fomento-al-reciclaje/
www.leyrep.cl/
rechile.mma.gob.cl/

Principal legal references

EPR Law 20.920/2016. *https://www.leychile.cl/Navegar?idNorma=1090894*

Draft Packaging Decree 2019. *https://rechile.mma.gob.cl/wp-content/uploads/2019/06/58-RES.EXENTA-0544-APRUEBA-ANTEPROYECTO-DE-DECRETO-SUPREMO-EYE.pdf*

Search for advances in the EPR decree on packaging: *https://rechile.mma.gob.cl/envases-embalajes/*

Library of the National Congress of Chile, waste legislation. *https://www.leychile.cl/Consulta/listaresultadosimple?cadena=residuos*

National Waste Policy 2018-2020. *http://santiagorecicla.mma.gob.cl/wp-content/uploads/2020/02/Politica-Nacional-de-Residuos_final-V_sin-presentacion.pdf*

You can search for EPR and PRO news on:

www.paiscircular.cl
www.diariosustentable.com

South Africa

The country of South Africa states an example of the development from a voluntary, industry-led Extended Producer Responsibility (EPR) scheme for packaging to a mandatory scheme. This change has been in place since 05 May 2021 in accordance with the Extended Producer Responsibility Regulations, Section 18 of the National Environmental Waste Management Act.

Multiple voluntary EPR schemes for different packaging waste streams have emerged since the early 2000s, leading to an increase in separate collection and recycling rates for the materials covered by the scheme. There is still scope for further improvement that shall be addressed through the mandatory EPR scheme. Consultation to develop a mandatory EPR system started in 2017. The so-called 'Section 28 Notice', which set out plans for an EPR system funded by a tax collected from producers and managed by the government, was withdrawn in December 2019. It was replaced by the Section 18 Notice – Extended Producer Responsibility Scheme. This new Notice provides for a more co-operative relationship between industry and government. It requires, however, **full EPR implementation for the sectors paper and packaging and some single use products, electrical and electronic equipment, and lighting by 05 November 2021**.

Introduction

South Africa has a population of approximately 59 million,[1] heavily concentrated in urban agglomerations along the south and south-east coast and around Johannesburg. South Africa is a regional economic leader but faces major socio-economic challenges. Growth in population and GDP combined with a raising urbanisation rate led to an **increased waste generation** rate. Separate collection and recycling rates for various packaging waste streams have been increasing, but there is room for further improvement. The number of people working in the **informal waste sector** is estimated at 60,000. Their work collecting waste and keeping it out of landfill is estimated to save municipalities/local authorities 700 million rand (approximately 35 million euros) a year.[2]

Extended Producer Responsibility for packaging in state policy initiatives

South Africa's **National Environmental Management**: Waste Act, 2008 (Act No. 59 of 2008) entered into force in 2009 and was amended in 2014. It provides the basic legal framework for waste management in South Africa, and is aimed at "avoiding and minimising the generation of waste; reducing, re-using, recycling and recovering waste; treating and safely disposing of waste as a last resort [and] preventing pollution

1 Government of South Africa, 'South Africa at a glance', Website, *https://www.gov.za/about-sa/south-africa-glance*
2 See Department of Environmental Affairs of the Republic of South Africa (2019) Draft 2019 Revised and Updated National Waste Management Strategy. Gazette No. 42879, 3 December 2019. P. 6, 44-45. *https://www.dffe.gov.za/sites/default/files/docs/2020nationalwaste_managementstrategy1.pdf*

and ecological degradation (...)".[3] In order to achieve these objectives, a **National Waste Management Strategy** was drawn up in 2011. It reinforces the importance of the waste hierarchy set out in the above extract from the Waste Act, and sets eight measurable objectives, including a 25% diversion rate from landfill, a waste collection coverage rate of 95% in urban areas and 75% in rural areas, and the creation of 69,000 new jobs and 2,600 small and medium-sized enterprises and cooperatives in the waste services and recycling industries.

In December 2019, the Department of Environmental Affairs published a draft 2019 Revised and Updated **National Waste Management Strategy** for public consultation, and was published as amended in January 2021. The document focuses on the circular economy, and specifically on 'closing the loop' between resource extraction and waste disposal by the application of waste avoidance, reuse, repair, recycling, and recovery throughout the economic cycle to minimise waste and reduce demand for virgin materials as production inputs (...)". The revised strategy also envisages a shift from "a top-down, state-led approach to management and regulation of the waste sector" to "supporting innovation and partnership with the private sector, collaborating with other government departments (...)".[4] This is in line with South Africa's **Operation Phakisa on Chemicals and Waste**, which took place in 2017. Between 24 July and 24 August 2017, stakeholders from the public and private sectors, civil society and academia worked together with the Department of Environmental Affairs and the Department of Planning, Monitoring and Evaluation to draw up a number of targets and initiatives for waste management.[5]

Extended Producer Responsibility is defined in Section 18 of the Waste Act as "measures that extend a person's financial or physical responsibility for a product to the post-consumer stage of the product, and includes (a) waste minimization programmes, (b) financial arrangements for any fund that has been established to promote the reduction, re-use, recycling and recovery of waste; (c) awareness programmes to inform the public of the impacts of waste emanating from the product on health and the environment; and (d) any other measures to reduce the potential impact of the product on health and the environment."[6] The definition of the term 'person' is consistent with earlier legislation and includes companies.[7] Art. 18 of the Waste Act gives the Minister of Environmental Affairs the power, in consultation with the Minister of Trade and Industry, to 'identify a product or class of products', 'specify the extended producer responsibility measures' and 'identify the person or category of persons'. The Minister of Environmental Affairs can specify requirements in relation to the operation of EPR programmes, financial and institutional arrangements associated with waste minimisation programmes, the percentage of products to be recovered by such programmes and labelling requirements for the products concerned. However, affected producers must be consulted on any changes, and scientific evidence must be taken into account.

3 Republic of South Africa (2009) No. 59 of 2008 – National Environmental Management: Waste Act, 2008. Government Gazette, No. 32000, 10 March 2009. Art. 2a. *https://www.environment.gov.za/sites/default/files/legislations/nema_amendment_act59_0.pdf*

4 See Department of Environmental Affairs of the Republic of South Africa (2019) Draft 2019 Revised and Updated National Waste Management Strategy. Gazette No. 42879, 3 December 2019. P. 4, 6 and 8: *https://www.gov.za/sites/default/files/gcis_document/201912/42879gon1561.pdf*

5 Department of Environmental Affairs, Website, "Operation Phakisa – Chemicals and Waste Economy, last accessed on 15 April 2020. *https://www.environment.gov.za/projectsprogrammes/operation-phakisa_chemical_waste_economy*

6 Republic of South Africa (2009) No. 59 of 2008 – National Environmental Management: Waste Act, 2008. Government Gazette, No. 32000, 10 March 2009. Art. 1: *https://www.dffe.gov.za/sites/default/files/legislations/nema_amendment_act59_0.pdf*

7 Republic of South Africa (2009) No. 59 of 2008 – National Environmental Management: Waste Act, 2008. Government Gazette, No. 32000, 10 March 2009. Art. 1. And Interpretation Act 33 of 1957, Art. 2 Definitions. *https://www.justice.gov.za/legislation/acts/1957-033.pdf*

EPR in South Africa needs to be considered in the context of the **Industry Developed EPR Schemes that are developed by the relevant PRO's on behalf of their Producer Members**. Their purpose, scope and content are also defined in the Waste Act. The National Waste Management Strategy of 2021 lists them as a tool for waste management, along with EPR and a number of other instruments. The basic idea behind the Industry EPR Schemes is to invite the private sector to work together to set joint targets and the EPR fees, and agree measures to achieve the targets for specific waste streams, by the establishment of mandatory EPR schemes.

In December 2017, the Department of Environmental Affairs issued a **'Call on the paper and packaging industry, electrical and electronic industry and lighting industry to prepare and submit Industry Waste Management Plans to the Minister for approval'**.[8] The call for Industry Waste Management Plans was made under a Section 28 Notice. The Section 28 Notice envisaged that an EPR system would be set up, but that the funds raised from levies paid by the industry would be transferred initially to the government. The government would then release that funding back to the PRO's, which would in turn distribute a portion of the funds to individual companies to help them deliver their obligations under the Industry Waste Management Plan. Membership of the PROs was to be mandatory for industry participants in the EPR scheme, The Section 28 Notice required each PRO to submit an Industry Waste Management Plan, either for each individual industry involved in the scheme or as a single consolidated document. Of the 13 Industry Waste Plans drawn up, 12 of them demanded that funds should be raised and managed by industry, rather than by the government and the PROs.

Eventually, in December 2019, **the government under the Leadership of a newly appointed Minister withdrew the Section 28 Notice as it was deemed to be legally flawed and announced its intention to publish a Section 18 EPR Notice shortly thereafter**. Due to this decision, the submitted Industry Waste Management Plans were no longer relevant. Instead, the Minister announced her decision to adopt a new approach "centred on the extended producer responsibility (EPR) principle". She would "intend to have further engagements with the relevant industries that have been identified as generators of waste, on the specific EPR measures that must be taken in respect of the product or class of products, as contemplated in section 18(1) of the National Environmental Management: Waste Act, 2008."[9]

The new Section 18 Pre-Notice appears to move towards a **more 'co-operative' approach between government and industry, as it allows for financial contributions to be paid by producers and managed by industry**. The Minister appointed staff members from the Chemicals and Hazardous Waste Management Department to facilitate workshops between Industry and the department. The aim of these workshops was to engage industry representatives and invite them to participate in drafting the content of the intended Section 18 policy framework. It was intended that these proposals would then be collated and taken into consideration when the

8 Department of Environmental Affairs (2017) Call on the paper and packaging industry, electrical and electronic industry and lighting industry to prepare and submit Industry Waste Management Plans to the Minister for approval. Government Gazette, No. 41303, *https://www.dffe.gov.za/sites/default/files/gazetted_notices/nemwa59of2008_paperandpackagingindusrty_electricalandelectronicindustry_gn41303_0.pdf*

9 Government Gazette (2019) 'National Environmental Waste Act (59/2008): Withdrawal of the Section 28 Notice calling for Paper and Packaging Industry, Electrical and Electronic Industry and the Lighting Industry Waste Management Plans in terms of Section 28 of the Act'. 13 December 2019, Vol 65, No. 42909. *https://www.greengazette.co.za/notices/national-environmental-management-waste-act-59-2008-withdrawal-of-the-section-28-notice-calling-for-paper-and-packaging-industry-electrical-and-electronic-industry-and-the-lighting_20191213-GGN-42909-01659*

final policy document was drafted and finalised by the Department of Forestry, Fisheries and the Environment (DFFE). The initial timescale for this process was set at 6 to 12 months, and the first workshop was held in February 2020. However, COVID-19 prevented any further face-to-face meetings from being held.

Despite the disruption caused by the virus, the DFFE went on to request individual industries to work on their amendment proposals[10] and submit them by e-mail by 08 May 2020, with the Section 18 policy released on 05 November 2020 as a final document for implementation[11]. The various industry Sectors were not satisfied as the published regulations did not include any of the proposed amendments made by industry. The Minister then issued an extension till the 05 May 2021, to allow for engagement between the DFFE and the different sectors to negotiate the amendments. A Ministerial Task Team was established by the Minister, comprising of one representative from each sector and the Head of Policy from the DFFE. In these negotiations many of the concerns were addressed and amended but not all were changed. A time period of six months was granted by the DFFE to allow the sectors to organise themselves before full implementation on the 05 November 2021. After the amendment period was completed, **the final policy document was signed by the Minister for publication with the amendments on the 05 May 2021**. The definitions in the EPR regulations can be seen in the source linked below.[12]

Products covered under the EPR scheme

Until now, the South African EPR scheme had covered PET, polyolefins (PP, HDPE, LDPE and LLDPE), polystyrene, vinyl, glass, paper and metals.

Since the implementation of the mandatory EPR Regulations stated products added to this known as “identified products” in the regulations are as follows:

The following identified products at the end of their life:

(1) Paper & paper packaging material including office paper
(2) Plastic packaging
(3) Biodegradable and compostable packaging
(4) Single-use products
(5) Single-use compostable products
(6) Single-use biodegradable products
(7) Glass packaging; and
(8) Metal packaging containers; but excludes
(9) Plastic carrier bags and plastic flat bags.

Further breakdown of the “identified single use Products” are as follows:

Single-use products:

(i) Films/Flexibles: agricultural mulch films, garbage bags, pallet wrap;
(ii) Injection moulded products: cups, tubs, cutlery (knives, forks and spoons), stirrers;
(iii) Blow moulded products: bottles, containers, jars;
(iv) Extruded products: straws, sheets; and
(v) Thermoformed products: trays, punnets, cups, various packaging.

Single-use compostable products:

(i) Compostable Films/Flexibles: agricultural mulch films, garbage bags, pallet wrap;
(ii) Compostable Injection moulded products: cups, tubs, cutlery (knives, forks, spoons), stirrers;
(iii) Compostable Blow moulded products: bottle, containers, jars;
(iv) Compostable Extruded products: straws, sheets; and
(v) Compostable products: trays, punnets, cups, various packaging.

10 *https://www.gov.za/documents/national-environmental-management-waste-act-regulations-extended-producer-responsibility-0*
11 *http://sawic.environment.gov.za/documents/12418.pdf*
12 Definitions in the EPR regulation: *https://www.gov.za/sites/default/files/gcis_document/202105/44539gon400.pdf*

Single-use biodegradable products:

(i) Biodegradable films/flexibles: agricultural mulch films, garbage bags, pallet wrap;
(ii) Biodegradable Injection moulded products: cups, tubs, cutlery (knives, forks, spoons), stirrers;
(iii) Biodegradable Blow moulded products: bottles, containers, and jars;
(iv) Biodegradable Extruded products: straws, sheets; and
(v) Biodegradable products: trays, punnets, cups, various packaging.

Further breakdown of the "identified metal Products" are as follows:

Metal packaging including:

(i) Tinplate (ferrous); and
(ii) Aluminium (non-ferrous).

Producers' role and obligations

Producer Responsibility Organisations (PROs) have been set up by representatives of the industries concerned, often in cooperation with other stakeholders at other points in the relevant value chains, such as consumer goods companies, retailers and waste management operators which include informal waste pickers. Before the adapation of the mandatory EPR Regulation these PROs operated voluntarily collecting voluntary EPR fees and voluntary grants. Today, these PROs collect mandatory EPR fees from their Producer members. The PROs use the revenue they generate among other regulatory requirements to support work to collect, sort and recycle recyclable material against regulated targets that apply for a period of 5 years from the date of the implementation of the extended producer responsibility scheme. The activities are carried out by informal waste pickers and small to large sized enterprises. Examples of the regulated targets can be seen on the *next page*:

Product or class of Products	Year	Product Design (recycled content) [%]	Reuse Target [%]	Collection Target [%]	Recycling Target [%]	Energy recovery/ exports/ other
Plastic PET Beverage Bottles	1	10	-	60	54	-
	2	12.5	-	64	58	-
	3	13	-	66	59	-
	4	15	-	68	61	-
	5	20	-	70	65	-
Glass: Alcoholic Beverage (ready to drink)	1	20	6	46.4	38.4	-
	2	25	7	52.5	43.44	-
	3	30	8	58.4	48.32	-
	4	35	9	64.6	53.45	-
	5	40	10	65.4	54.12	-
Aluminium (non-ferrous) (Used Beverage Cans)	1	24	-	62	30	32
	2	28	-	64	32	32
	3	32	-	66	33	33
	4	36	-	68	34	34
	5	40	-	70	35	35

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Examples of regulated targets:[13]

13 The complete list of regulated targets can be found here: *https://www.gov.za/sites/default/files/gcis_document/202105/44539gon400.pdf*

The obligated sectors, paper and packaging; electrical and electronic equipment producers had to register as a Producer with the DFFE and a DFFE registered PRO before the 05 November 2021.

Each sector had to establish a PRO as a not-for-profit company, in compliance with the regulations and each PRO had be registered with the DFFE. The Board of Directors must be made up of Producers. Producers that did not establish a PRO had to register with an existing PRO that is registered with the DFFE. The PRO had to be "operationally ready" with all EPR funding in place by the 05 of November 2021. Producers/PRO's must develop and submit an extended producer responsibility scheme implementation plan according to the Extended Producer Responsibility Regulations by the 05 November 2021.[14]

The PRO's will be required to submit their operational budgets by the 05 January 2022, and their first progress report to DFFE by June 2022.

The process surrounding the Section 18 Notice has been very different to the one used for the previous Section 28 Notice. Now that the Section 18 Notice is published, there will be no further invitations to submit plans and no approval phase; the parties affected by the new legislation will simply have to comply with the new law.

14 *http://sawic.environment.gov.za/documents/12418.pdf* and *https://www.gov.za/sites/default/files/gcis_document/202105/44539gon400.pdf* (have to be read together)

Existing mandatory PROs for packaging

Overview of mandatory PROs
Several mandatory, industry-led EPR schemes for different waste streams are now currently operating in South Africa. Due to the new regulation published in May 2021, there might be new PROs emerging, and existing PROs will be requested to register with the DFFE. The following PROs work with the paper and packaging industry:

PRO	Packaging materials	Operating since	Details
PET Recycling Company (PETCO) *www.petco.co.za*	PET (beverage, empty bottles for private use, thermoformed containers)	2004	Professional operational team of 10 people, 12 non-executive directors representing every stage of the value chain in the industry. A voluntary EPR fee is collected, paid on a rand-per- tonne basis by converters manufacturing bottles from PET resin, bottlers who fill PET bottles and and PET importers. Grants are also paid by brand owners, resin producers and retailers. The revenue collected is used to: 1) Support recyclers, particularly during adverse economic cycles. 2) Support, train and mentor reclaimers and waste entrepreneurs. 3) Fund consumer education and empowerment initatives, joint venture projects and the drafting of recycling guidance across the industry.

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Overview of mandatory PROs in the paper and packaging industry

PRO	Packaging materials	Operating since	Details
The Polyolefin Responsibility Organisation (POLYCO) *www.polyco.co.za*	LDPE (films, bags, etc.) LLDPE (films, bags, etc.) HDPE (boxes, bottles, containers, bags, etc.) PP (food packaging	2011	Not-for-profit industry body. Voluntary EPR fee per tonne for polyolefins, paid by 11 members (polyolefin packaging converters). Funding support for collection and recycling companies provided through grants or interest-free loans and e.g. the Packa-Ching scheme (recyclables collected in informal settlements by mobile units with payments made electronically).[15]
Expanded Polystyrene Association of Southern Africa (EPSASA) *https://epsasa.co.za/*	Expanded Polystyrene (EPS) High Impact Polysterene (HIPS)	2007/ 2009	Non-profit Product Responsibility Organisation (PRO) funded by converters of polysterene. 10 full members and 5 associate members, including raw material suppliers, manufacturers, recyclers and retailers. Provides funding for recycling projects.
South African Vinyl Association (SAVA) *www.savinyls.co.za*	Polyvinyl Chloride (PVC)		A representative body of the South African vinyl industry rather than a PRO. Has drawn up a Product Stewardship Commitment, including recycling.
The Glass Recycling Company (TGRC) *www.theglassrecyclingcompany.co.za*	Glass	2005	Voluntary industry initiative with 18 members (manufacturers, consumer goods companies). Brand owners pay EPR fees per tonne of glass bought from glass manufacturers. Manufacturers buy recyclable glass for recycling. Provides funding for 'glass banks' (big containers for glass collection in public spaces).
Fibre Circle (PAMDEV) *https://fibrecircle.co.za/*	Paper Paper packaging Liquid packaging board	2016	The PRO for the paper and packaging industry's voluntary EPR scheme. Involves paper manufacturers, importers, brand owners and retailers and aims to increase separation at source. Supports awareness-raising and job/business creation in collection and recycling.

Country report South Africa Table 02

Overview of mandatory PROs in the paper and packaging industry

15 For more information, see: *https://www.polyco.co.za/packa-ching/*

PRO	Packaging materials	Operating since	Details
RecyclePaperZA *https://www.thepaperstory.co.za/*	Newspapers, magazines, corrugated/ solid cases/craft papers, office/ graphics papers, mixed and other papers	2003	Provides information about paper recycling. Currently has 10 members. Previously known as Paper Recycling Association of South Africa (PRASA) prior to change of name in 2018.
METPAC-SA *www.metpacsa.org.za*	Metal packaging (aluminum, steel, tinplate.)	2017	Industry body, 17 members.

Country report South Africa Table 02

Overview of mandatory PROs in the paper and packaging industry

In the past, the **extent of industry participation, activity and recycling rates all vary** between these PROs. For metal packaging, MetPac-SA reported a collection rate of 75.8% for 2017 (equating to 138,900 t), with 40% of industry stakeholders participating in the voluntary EPR scheme.[16] Fibre Circle and RecyclePaperZA reported a collection rate of 71.7% for recoverable paper and paper packaging in 2018 (about 1.28 million t), compared to 66.7% in 2015.[17] According to statistics from RecyclePaperZA for 2018, about 54.8% of all paper consumed was recovered or recycled. On the other hand, the Glass Recycling Company reported that about 80% of glass was diverted from landfill in 2018 (including reusable glass), with 42% being recycled. According to their statistics, the glass recycling rate rose from 18% in 2006 to 42% in 2018, and about 4,000 'glass banks', – large collection containers, have been installed in public places. They estimate that new glass products contain about 40% recycled glass.[18]

As far as different types of **plastic packaging** are concerned, POLYCO projects that the recycling rate for polyolefins (LDPE, LLDPE, HDPE, PP) will rise to 35% by 2020 (234,000 t of a total of 670,000 t).[19] It currently receives EPR fees for 20% of all polyolefins introduced to the market.[20] On the other hand, the Polystyrene Association of South Africa reported a collection rate for polystyrene of 20.41% (7,929 t) in 2017, with a total of 5,384 t being recycled into products including picture frames, trays, cement blocks and outdoor furniture.[21] According to PETCO's independently audited

16 Packaging SA (2018) Packaging SA Extended Producer Responsibility Plan – Volume 1. p. 68-69
17 *https://fibrecircle.co.za/paper-industry-encourages-people-to-continue-recycling-amid-challenging-times/* and statistics at *https://www.thepaperstory.co.za/paper-recycling-statistics/*
18 See *https://theglassrecyclingcompany.co.za/*
19 See *https://www.polyco.co.za/about-polyco/*
20 Packaging SA (2018) Packaging SA Extended Producer Responsibility Plan – Volume 1. p. 70.
21 See for collection rate: Packaging SA (2018) Packaging SA Extended Producer Responsibility Plan – Volume 1. p. 72. See for recycling rate: *https://epsasa.co.za/*

recycling rates, 98,649 t of PET post-consumer bottles were recycled in 2018, equating to 63% of the total quantity on the market, compared to 16% in 2005 and 45% in 2012.[22] Its figures also indicate that 90% of the PET bottle industry is already participating in PETCO. PETCO is currently working together with two thermo-form-producing companies who have recently joined the PRO (and started paying EPR fees) to set up a system for PET thermoform recycling. However, PETCO does not currently have any representation from the PET edible oils sector. PETCO estimates that it covers around 61% of the total South African PET market.[23]

As stated above, in the future product specific targets regarding recycling and reuse have to be fulfilled by the PROs.

PETCO: a globally recognised mandatory PRO

The **PET Recycling Company (PETCO)**, founded in 2004, is one of South Africa's oldest and best-known PROs. It has started as voluntary PRO. Following the new regulations of May 2021, PETCO registered with the DFFE as a PRO and will thus continue to play a part in the South African mandatory EPR scheme. It sees itself as an 'industry-driven and industry-financed environmental solution for PET'. As of 2020, PETCO has a professional team of 10 employees and 2 contractors, as well as 12 non-executive directors representing various stakeholders along the value chain of each obliged industry (resin producers, converters, bottlers, collectors and recy-clers, consumer goods companies, retailers).[24] In 2019 it had 26 voting members and 73 associate members, including collectors and small and medium-sized enterprises.[25]

PET manufacturers and importers of PET raw materials pay EPR fees to PETCO, and consumer goods companies provide it with funding through voluntary grants. About 70-80% of this revenue is used to provide additional funding for recycling projects. PETCO makes payments to recycling companies for each kilogram of PET they purchase from collectors. The amount paid per kilo is variable depending on fluctuations in the PET market, which are monitored by PETCO. PETCO also provides basic bailing, weighing, transportation and protection equipment to start-ups.[26]

In order to ensure that a large proportion of collected PET bottles was recycled, PETCO entered into five-year contracts with recyclers from other countries to encourage them investing into local PET recycling plants in South Africa. PETCO's strategy focused on recyclers with ambitious growth targets for the recycling market (8%-10% per year). PETCO makes performance-related payments to the recyclers if the growth targets are met.

PETCO also invests in schemes to increase demand for recycled PET. In the first few years after PETCO was set up, most contracted recyclers produced fibre-based products (such as clothing or textiles, some of them used in industrial and automotive applications). This eventually led to the local market for these products reaching saturation point in 2009. To tackle this problem, PETCO added an additional incentive to recyclers to export their fibre-based products, thus reducing the supply pressure on the local market. At the same time, they also encouraged the establishment of new bottle-to-bottle recycling plants and drew up a Design for Recycling Guide to encourage recycling.[27]

22 See *https://petco.co.za/how-is-pet-recycled/*
23 See Packaging SA (2018) Packaging SA Extended Producer Responsibility Plan – Volume 1. p. 71
24 *https://petco.co.za/who-we-are/* and *https://petco.co.za/member-portal/current-members/*
25 *https://petco.co.za/member-portal/current-members/*
26 *https://petco.co.za/start-a-recycling-business/*
27 *https://petco.co.za/wp-content/uploads/2019/08/PETCO_Design-for-Recyclability_Guideline-Docu-ment_2019_FINAL.pdf*

Awareness-raising and educational activities for consumers are also part of PETCO's activities. Consumers can access a list of drop-off sites from the PETCO website, for example. Moreover, PETCO estimates that the informal collection of PET bottles provides a livelihood for upwards of 60,000 people, on the basis of a collection rate of 1.45 t of PET per person per year (200 bottles over 240 days) and its total collection of 98,649 t in 2018. During the COVID-19 crisis in 2020, PETCO shared various information about government support programmes with informal sector stakeholders and small and medium-sized enterprises.[28]

Thanks to its stability and the financial incentives on offer, South Africa was the first African country to produce PET bottles with locally recycled PET. PETCO is currently expanding to other African countries, including Kenya, and has also plans to operate in Uganda and Ethiopia.

Outlook

The new Section 18 Notice brings fundamental changes to the EPR scheme in South Africa. With the **new legal requirements, before voluntarily organised activities and funding are mandatory as of November 2021**. The Section 18 Notice is the result of an intense consultation process between the **public and private sectors**.

The continued interest in **multi-stakeholder dialogues** between the public and private sector, civil society and academia in South Africa was in evidence at a number of recent events and fora on environmental issues. In November 2019, the Department of Environmental Affairs organised a Plastics Colloquium, working together with Plastics SA, the Consumer Goods Council and the South African Waste Pickers Association.[29] In December 2019, it submitted a revised and updated draft of its National Waste Management Strategy for public consultation. February 2020 saw the launch of a South Africa Plastic Pact, incorporating a number of ambitious targets for 2025 in line with the Ellen MacArthur Foundation's vision of a New Plastics Economy[30]. The pact states that "100% of plastic packaging should be reusable, recyclable or compostable; 70% of plastic packaging effectively recycled; and an average of 30% of total plastic packaging should be recycled"[30]. These developments might result in an even more advanced EPR system for packaging in South Africa over the next few years.

Information correct as of November 2021

This Country Report was updated with friendly support of Patricia Schröder, Urban Elements (Pty) Ltd. *https://www.urbanelements.co.za/*

28 *https://petco.co.za/covid-19/*
29 Department of Environmental Affairs (2019) Speech by Minister Barbara Creecy at the opening of the Plastics Colloquium. Website, 22th of November 2019, *https://www.environment.gov.za/speech/creecy-opens_plasticolloquium*. Documentation of the Plastics Colloquium available at: South African Waste Information Centre (SAWIC) (2019) Website – Plastic Colloquium November 2019. *http://sawic.environment.gov.za/?menu=357*
30 The SA Plastics Pact, Website, *https://www.saplasticspact.org.za/how/*

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Republic of Korea

The Republic of Korea's EPR system for packaging: an Asian role model

The Republic of Korea introduced its EPR system for packaging in 2003. The system significantly increased recycling, making the country a shining example of sustainable waste management in Asia.

Background and development

The Republic of Korea is a high-income country located in the southern part of the Korean Peninsula. It has a land area of 100,363 km2 and had a population of 51.362 million in 2017[1]. Urbanisation and rapid population growth led to an increase in the amount of waste generated in the country, bringing with it major waste management challenges. Its densely populated cities, including the capital, Seoul, suffer from many of the problems encountered by cities the world over, such as traffic congestion, housing shortages and waste treatment problems. Waste collection in rural and under-developed areas of the country can be challenging, as roads tend to be narrow and are easily blocked. Collection in these areas also has to be done door-to-door using small vehicles, which in turn means that more labour is required and raises the cost of operating an effective waste management system.

One of the Republic's major priorities has been to minimise its use of resources while meeting the country's high demand for energy. This was one reason why it adopted an efficient system for recovering resources from landfill and encouraging reuse and recycling. The Ministry of Environment drew up and implemented a number of laws on waste management designed to embed the principle of the '3Rs' - Reduce, Reuse, and Recycle. The firm legal foundation provided by this legislation makes it easier to implement these policies in the private sector. The government of the Republic of Korea introduced a number of recycling initiatives, such as a Volume-Based Waste Fee System, Extended Producer Responsibility, a deposit refund system and a waste charging system.

EPR was introduced after the Waste Deposit Programme was implemented in 2003, and there are also a number of waste-to-energy schemes operating in the Republic of Korea. Due to the combination of the huge range of products on the market, shorter product life cycles and lifestyle changes, the volume of packaging waste produced in the country has been increasing steadily for many years; packaging currently accounts for 30% of total household waste by weight and around 50% by volume. Waste generated in detached homes and small business premises is collected by local authorities and transferred to material recovery facilities (MRF) (public and private) for further treatment. Packaging from large apartment blocks and other buildings is collected by private recyclers and sent to privately-operated MRFs, from which it is then delivered to recyclers and manufacturers to produce recycled products.

The Korea Environment Corporation monitors the EPR system and ensures that producers and importers comply with requirements to report their sales and import

1 Korean Statistical Information Service.

data, as well as data on waste collection and recycling. The central government is responsible for drawing up and implementing regulations on EPR, while local governments are tasked with ensuring effective, responsible waste collection and improving rates of recycling and reuse. Apartment blocks contract private recycling collectors to collect their waste and sell it on to recyclers. Monitoring is enhanced by a number of labelling systems for products covered by the EPR system, including information on the recyclability of packaging and how it should be disposed of. These labels are produced by importers and manufacturers.

As part of the Republic's transition to a sustainable waste management system, the Ministry of Environment enacted and later amended the Enforcement Decree and Enforcement Rules associated with the Waste Management Act to increase the amount of material to be recycled. In 1982, over 96% of municipal solid waste was disposed of in landfill and the recycling rate was almost zero. Thanks to a combination of a consistent, long-term policy and adept implementation, the proportion of household waste going to landfill reduced to 13.5% by 2017.[2] Recycling, incineration, and other treatment options of municipal solid waste and industrial waste also became much more common over this period.

The legal framework for the EPR system

EPR was introduced to promote the reduction, reuse and recycling of waste by encouraging manufacturers to consider the environment at every stage of the product cycle, from product design to manufacturing, distribution, consumption and disposal. Every year, the Ministry of Environment announces a mandatory recycling rate for each product covered under the EPR system.

The EPR system primarily covers the following packaging: metal cans, glass bottles, cartons and card, PET bottles and synthetic resin packaging. These packaging are used to pack food and beverages, agricultural products, marine products, livestock products, cleansers, medicines, cosmetics, etc. It is currently being expanded to cover a total of 32 products including fluorescent lamps, packing films, mobile phones, audios, air conditioning units, PCs and batteries (see OECD 2014).

The deposit refund system that existed before 2003 was discontinued in 2003 and replaced by the EPR system. All products that had been covered by the deposit refund system, such as carton packaging, glass bottles, tyres etc. have automatically been covered by the EPR system since. New items including air conditioning units, TVs, refrigerators, etc. began to be added to the EPR from 2003 onwards. In 2004, packaging films and fluorescent lamps were added to the scheme, and audio equipment and mobile communication devices were added in 2005. Waste prevention regulations, such as restrictions on the use of hazardous materials, have been strengthened.

The EPR system has expanded significantly since inception, with a particularly strong focus on 27 specific types of electronic items including refrigerators, TVs, washing machines, air conditioning units, PCs. Printers, copiers, and fax machines were added in 2006, cosmetics were added in 2007, and in 2008 the system was further expanded to include manganese batteries, alkaline manganese batteries and Ni-MH batteries, as well as various electrical and electronic products (Table 1). Target recycling rates are set for each category of product, and any producer that fails to meet their targets is obliged to pay an additional recycling fee to cover the shortfall.

2 Environmental Statistics Yearbook from Ministry of Environment, Republic of Korea.

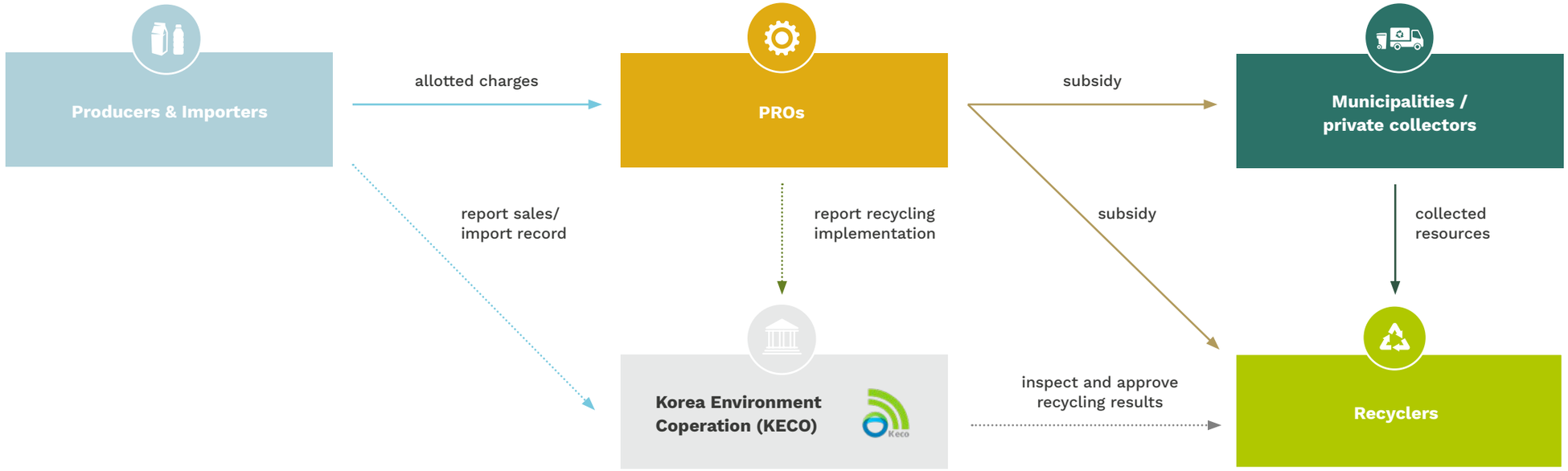
EPR scheme	Legal basis	Target item	
Take-back with recycling targets	Act on the Promotion of Saving and Recycling Resources	Packaging (4 types)	Metal cans, glass bottles, drinks cartons, and synthetic resin packaging, used to pack food and beverages, agricultural products, marine products, livestock products, cleansers, medicines, cosmetics, etc.
		Products (11 types)	Batteries (mercury, silver oxide, lithium, nickel-cadmium, manganese, nickel-hydrogen), tyres, lubricants, fluorescent lamps, styrofoam.
	Act on Resource Recirculation of Electrical and Electronic Waste and End of Life Vehicles	Televisions, refrigerators, washing machines, air conditioning units, computers, audio, mobile phones, copiers, fax machines, printers, vending machines, electric water purifiers, electric ovens, microwaves, food waste dispensers, dishwashers, bidets, air purifiers, electric stoves, electric cookers, water softeners, humidifiers, irons, fans, blenders, vacuum cleaners, video cassette recorders	

Country report Republic of Korea Table 01

The legal basis of the Republic of Korea's EPR scheme

Source: OECD 2014, own representation

Producers and importers of EPR items collect and recycle products or packaging at the end of their life cycles, or pay the relevant fees for the PROs to do so on their behalf. Producers and importers are also facilitate recycling by developing recycling technology, using resource efficient design techniques, restricting the use of hazardous substances, and producing or importing products that are easier to recycle. Producers or importers have the option of setting up a PRO to carry out their recycling responsibilities on their behalf (▶ See Figure 01).



Country report Republic of Korea Figure 01

Roles and responsibilities in the Korean EPR scheme

Source: OECD, 2014, own representation

Recycling rates for paper, plastic, metals, construction waste and e-waste are very high (>90%). Resource recovery facilities are in place to handle various separate waste streams, including paper, plastic, metals, construction waste and e-waste. The number of recycling companies has increased from 2,941 in 2001 to 5,972 in 2018. There are 217 public sector recycling facilities, with combined capacity of 4,723 tonnes/day. Private sector recycling facilities number 524, with a combined capacity of 60,291 tonnes/day. In 2016, the Republic of Korea Ministry of Environment issued a loan worth a total of 103.6 billion won (around USD 94.18m) to finance investment in recycling activities. The loan was to be paid back over 10 years, at an interest rate of 1.51%.[3]

Information correct as of June 2020

3 United Nations, "Republic of Korea," *https://www.undp.org/content/dam/uspc/docs/USPC%20Policy%20Brief%203.pdf*

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Tunisia

ECO-LEF in Tunisia: a case study

The ECO-LEF system for managing packaging waste in Tunisia is an example of a state-run system; it has been operated by the national waste management agency, known as ANGeD (Agence Nationale de Gestion des Déchets), since 2001. Companies that introduce packaged products into the market have the option to contribute voluntarily to ECO-LEF, but are not obliged to do so. The private companies participating in the system do not play any active role in the management of ECO-LEF. Most of the recyclable material collected under the system is provided indirectly by waste pickers working in the informal sector. However, these informal pickers are unable to access ECO-LEF's storage points, and have to sell their recyclables to intermediaries for lower prices than they would otherwise achieve. The quantity of recyclable materials collected under the system (primarily certain types of plastic and aluminium) has decreased significantly since 2009. Currently, the ECO-LEF system is undergoing a process of reform.

Background

Tunisia is a lower middle-income country located in North Africa, with a total population of over 11.7 million.[1] Its coastline extends for over 1,148 km and it is a major tourist destination; 9 million tourists visited the country in 2019.

In the course of the decentralisation process initiated with the Constitution of 2014, new municipalities have been founded. Today there are 350 municipalities covering the country's territory and decision-making is transferred to the municipal level. The first municipal elections in May 2018 and the publication of the "Code des Collectivités locales" represent a first step in the decentralisation transition. Waste management has partly become the responsibility of the municipalities. In addition to the newly acquired competencies, however, municipalities require the necessary budget to set up a functioning waste management system. In order to improve solid waste management systems, local authorities across the country will need to work together with the private sector and NGOs.

Current waste collection and recycling provision in Tunisia

Since the promulgation of **Law no. 96-41 on Wastes and the Control of their Management and Disposal**[2], together with the associated legislation required to apply it, Tunisia has set up several systems for collecting and treating certain categories of waste and recovering valuable materials, one of which is known as **ECO-LEF**. In an effort to strengthen the waste collection and recycling industries, the Tunisian government has passed measures to encourage the creation of micro-enterprises in the sector in 2004.

1 *http://www.ins.tn/fr/themes/population*
2 Loi n° 96-41 du 10 juin 1996 relative aux déchets et au contrôle de leur gestion et de leur élimination

The municipal-level waste collection rate across Tunisia is at almost 80%.[3] The country's entire land area, including rural areas, is now covered by municipal-level services for collecting solid waste based on the decentralisation process through increasing the number of municipalities. Responsibility for waste management is devolved to local authorities. The country produces over 2.8 million tonnes of solid waste a year (Diagnostic, Solid waste management strategy, Ministry of local affairs, 2019), and this figure is increasing at the rate of 2.8% per year. According to the MLAE, about 80% of waste generated is disposed of appropriately, while about 20% is dumped in inappropriate areas or stays in the environment.

Waste is only separated at source in a small number of areas. A number of waste sorting projects have been set up since 2005 in an attempt to demonstrate the benefits of an organised sorting system, including those at Hay El Khadhra, Sidi Bousaid, Djerba and Tunis. One project that is appreciated by other communities that want to implement similar systems is the city cooperation between the Tunisian municipality El Guettar and the Waste Management Company of the district Böblingen in Germany. A first concept of plastic waste collection was put in place and permits to pay municipal taxes. Besides, a recycling centre with a small sorting unit has been opened in December 2019.[4] The success of other projects was however limited, due to financial and organisational challenges.[5]

Despite all these efforts, 95% of all waste collected is landfilled or dumped. There are currently ten landfill sites and 56 transfer stations operating in Tunisia. However, three landfill sites (Monastir, Kerkennah and Djerba) and six transfer stations were closed due to protests in the aftermath of the Arab spring. Currently, there are no waste treatment facilities (e.g. mechanical-biological treatment or waste incineration plants) anywhere in the country.

Financing solid waste management in Tunisia

Details of the costs associated with the management of solid waste are patchy, as there is no analysis-based accounting system in place. Solid waste management in Tunisia is financed from various sources, including municipal taxes, the proceeds of a so-called 'eco-tax' and hotel taxes (particularly in areas popular with tourists). The following points are worthy of particular mention:

- As of 2017, only 27% of the population pays municipal taxes.
- The Depollution Fund (FODEP) is a special fund attached to the Tunisian Treasury and set up under Law No. 92/122 of 29 December 1992, which incorporated provisions on funding management in 1993. It is the main source for 80% of funding for waste treatment (landfills) and forms part of ECO-LEF. The eco-tax has to be paid on certain imported raw materials and unfilled packaging made of certain materials, such as plastic.
- Hotels pay 2% of their turnover each year (1% to municipalities, 1% to a tourism protection fund) to cover various services, including solid waste management.
- The central government also contributes to funding.

Despite these different sources of funding, the financial resources currently available are not considered sufficient to manage current and future waste levels properly.

3 Diagnostic, Solid waste management strategy, Ministry of local affairs, 2019
4 *https://www.wtert.net/bestpractice/306/El-Guettar-Tunisia-Project-Partnership-of-the-Waste-Management-Company-Boeblingen-Germany.html*
5 WAMA-Net report, Waste separation experiences in Tunisia, 2019

Legal basis

From a legal point of view, waste management in Tunisia is governed primarily by two pieces of legislation: the Local Government Code of 2018 and Law No. 96-41 of 10 June 1996 on Wastes and the Control of their Management and Disposal. The full list of laws governing the EPR also includes:

- Law 96-41 of June 1996 on Wastes and the Control of their Management and Disposal.
- Law 92-122 of December 1992 establishing a depollution fund (FODEP) and introducing an eco-tax.
- Law 97-11 of February 1997 promulgating the local taxation code.
- Decree 2317-2005 of August 2005, establishing a national waste management agency (ANGeD).
- Decree 97-1102 of June 1997, as amended by Decree 2001-843 of April 2001, on conditions and procedures for the take-back and management of used packaging bags and packaging material.

Plastic bag ban

As a response to the grave environmental problems caused by single use plastic bags, a Ministerial Council meeting on 18 December 2015 approved measures to reduce the use of single-use plastic bags and replace them with more environmentally -friendly alternatives.

A new government decree banning single use plastic bags was published in the Official Journal of the Republic of Tunisia (JORT) on 16 January 2020. The decree, known as Decree No. 32, was preceded by a series of measures that paved the way for its provisions. Since 1 March 2020, single use plastic bags (defined as bags with thicknesses of less than 40 microns or capacities of less than 30 litres, primary packaging bags more than 15 microns thick and oxo-degradable plastic bags) have been banned in supermarkets. On 1 January 2021 the ban will be extended to cover all forms of production, importation, marketing and storage activities.

EPR for packaging: the ECO-LEF system

About the system

ECO-LEF is a public system for the recovery and recycling of packaging waste, delivered in partnership with local authorities. It covers the collection of packaging waste under agreements with the national waste management agency ANGeD and the recycling of certain types of plastic waste, carried out under set terms of reference and in accordance with agreements in order to obtain monthly quotas of the materials concerned.

ECO-LEF focuses particularly on plastic and metal packaging items with capacities of 100ml and over. Most of its materials come in the form of drinks bottles (PET), milk bottles (HDPE), plastic films and bags (PP) and metal boxes (aluminium). Under the current system, producers and other companies contributing voluntarily to ECO-LEF are not involved in organisational decisions related to the system's operations.

Financing of ECO-LEF

The ECO-LEF system is **governed by a decree** that specifies how packaging waste should be collected and managed. The initiative is **financed primarily from the eco-tax fund**.

In addition, the system also standardises conditions and arrangements for **taking back** and managing packaging bags and used packaging. **Companies that introduce packaged products into the market** are required to do one of the following:

- Recover the packaging themselves, in which case they are responsible for managing the used packaging they introduce to the market;
- Delegate this task to an authorised company, operating on their behalf.
- Use the state system for recovering used packaging.

Since producers contribute to ECO-LEF **on a voluntary basis, only a small part of ECO-LEF's budget comes from producer contributions**. Selling the collected materials also generates a small portion of the scheme's funding.

Country report Tunisia Photo 01

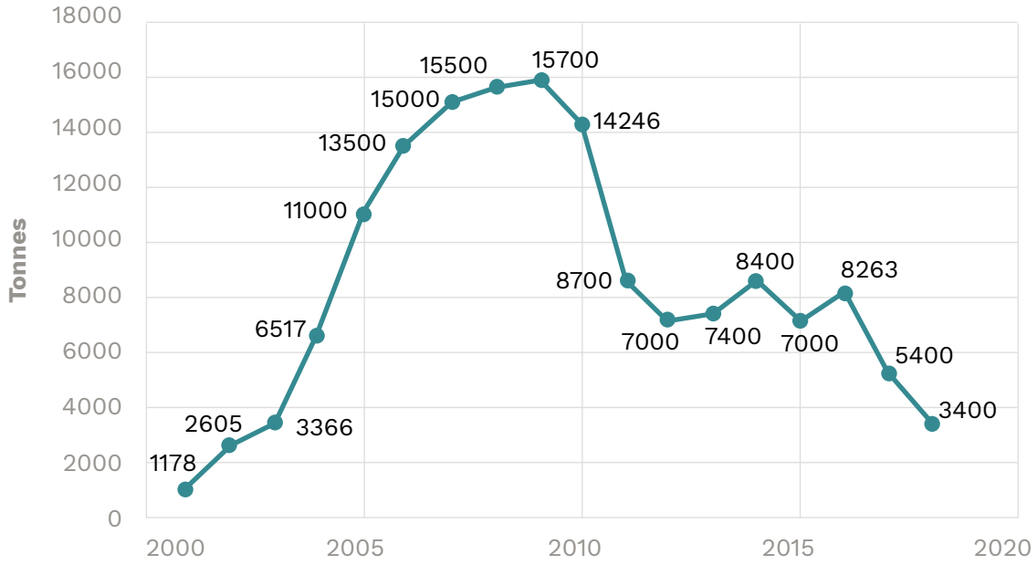
A recycling truck in Tunisia

©cyclos 2018

Collection of packaging waste within ECO-LEF

Under the ECO-LEF system, recyclable materials are collected by small companies that are approved and authorised by ANGeD. The authorised collection companies buy the materials from informal collectors known as 'Barbechas' and pay them immediately after the recyclables have been weighed. In practice, the collection companies sell what they collect to ECO-LEF, however, they are not under any obligation to do so. The quantities collected are brought to 'ECO-LEF points', a network of dedicated storage facilities and prepared for sale to recycling companies.

As the graph shows, the quantities of waste collected under the ECO-LEF system have **decreased considerably since 2009** and amounted to just 3,400 tonnes in 2018. There are a number of reasons for this, including changes in the economy (such as material market and price), competition between ECO-LEF and private collectors, in addition to more waste management activity being carried out by informal collectors. Interest among recyclers in participating in the system has also dropped due to the decreased collected quantities. Furthermore, by the current ECO-LEF system, there is no obligation to carry out separate collection, and there are no mandatory targets for collection or recycling. The fact that the system is funded by voluntary contributions by producers putting packed goods on the Tunisian market, makes it also difficult for ECO-LEF to secure sustainable funding.



Country report Tunisia
Figure 01

Quantities of waste collected under the ECO-Lef system

Source: Chaabane et al. 2019[6]

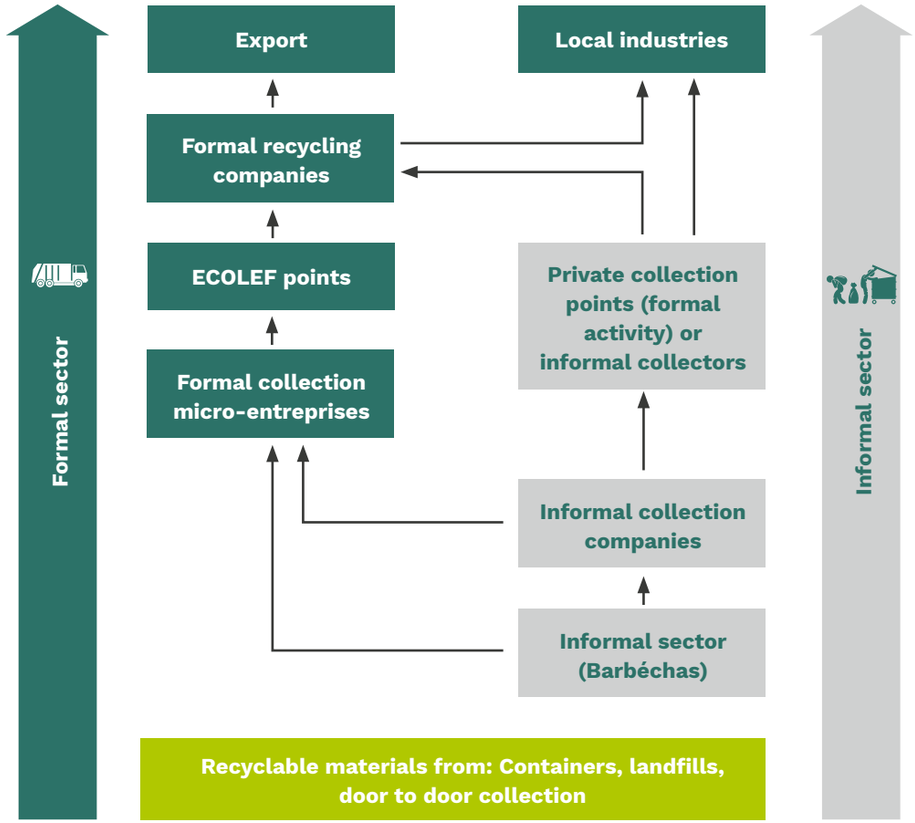
6 Chaabane et al. 2019: Shifting Towards Sustainable Tourism: Organizational and Financial Scenarios for Solid Waste Management in Tourism Destinations in Tunisia: *https://www.mdpi.com/2071-1050/11/13/3591*

ECO-LEF and the informal waste sector

The recycling sector is currently driven almost exclusively by informal collectors/ waste pickers known as 'Barbechas', who collect recyclable fractions from containers and/or landfills without having any legal status. The existence of this informal waste management sector is considered a sensitive issue in Tunisia. The Barbechas operate in both high- and low income districts of every city in the country. The conclusions of a recent analysis of formal and informal waste management activity are summarised in ▶ Figure 02 to the right.

Informal waste collectors are not sufficiently involved in the current ECO-LEF system, despite their significant contribution to recovering materials and preserving the ecosystem. Incorporating the informal collectors into the formal economy could be beneficial for the Barbechas in terms of income and social security as well as for the Tunisian population at large in terms of public and environmental health and economic prosperity.

Under the current ECO-LEF system, Barbechas have no direct access to the system's collection points, which are open only to holders of commercial licences approved by ANGeD. This means that **the majority of Barbechas cannot profit from the high prices guaranteed by ECO-LEF and are forced to work with intermediaries offering lower prices. ECO-LEF buys 1 kg for 750 millimes, and sells the same quantity to the recyclers for 250 millimes**[7]. The government subsidizes 500 millimes per kilograms. The price is not flexible and does not take the materials' market price changes into consideration.



Country report Tunisia
Figure 02

Material flows and role of the informal sector

Source: Chaabane et al. 20191, own representation

7 250 millimes equal about 0.08 Euro (as of Sept. 2020)

Current challenges in the ECO-LEF system

The current ECO-LEF system offers potential for optimisation regarding several aspects, some of which are set out below:

- **Organisational set-up and responsibilities of stakeholders:**
  - **Only a few producers** are members of the ECO-LEF system, and they are not subject to mandatory fees. Contributions are made on a voluntary basis and are not monitored.
  - Producers are not involved in the organisational aspects of the system, meaning they cannot influence how ECO-LEF and its financial flows are managed.
  - **Consumers are not obliged** to comply with a specific separate collection system, since they are not part of the system and their responsibilities within the system are not clear.
- **Lack of (reliable) data:**
  - **The total quantity of collected "packaging material" entering the waste system at national level is not calculated.** The available data only covers packaging waste collected officially under ECO-LEF and does not include collection by formal and informal private companies not member of the system. Also, the available data concerns the total mixed waste collected by the municipalities as well as the waste entering the landfills.
  - There is a **lack of accurate data** on the amount of packaging being introduced to the Tunisian market.
- **Financial sustainability:**
  - The system of payment for collection is not flexible enough to take into account variations in prices for recyclables, hence, currently, **ECO-LEF only becomes relevant to formal collectors when the prices offered by the private sector decrease.**
  - The cost of waste collection has to be covered by municipalities (local authorities) and the **financing model is unsustainable**.
- **Scope of and access to ECO-LEF:**
  - ECO-LEF **only accepts certain materials** with positive market values, such as foils, bags and PET beverage bottles. Other materials are not collected or recycled, and many resources are consequently lost.
  - **Waste pickers**, of which there are reckoned to be between 10,000 and 15,000 in Tunisia, **collect around 80% of the total packaging collected** but are not formally part of the system. They only collect materials with positive market values, such as PET and cans.
  - The system of payment for collection is not flexible enough to meet the needs of collectors and recyclers.
- **Littering is still a pressing and visible problem** everywhere, and the tourism sector as an important sector in Tunisia (beach resorts in particular) is affected by this highly visible pollution caused particularly by the non-collected packaging waste and the poor recycling infrastructure in the country.
- There is a **lack of incentives** for innovation or to expand the recycling industry in Tunisia.

Lessons learned

We can thus identify the following lessons from Tunisia's experience:

- EPR systems should be based on a participatory approach involving multiple stakeholders. Producers must play an important part of the EPR system to ensure the organisation and a sustainable funding of the system.
- A clear legal framework is needed for the system to work effectively.
- Targets should be set in order to measure the success of the system.
- If stakeholders are given more than one way of fulfilling their obligations, there must be a system for checking exactly what action they are taking in this regard.
- Government should be more involved in the system to ensure that standards and targets are enforced.
- The responsibilities of all the stakeholder groups involved must be set out clearly.
- When setting up EPR systems in low- and middle-income countries, it is important to consider the role small-scale collectors and recyclers should play.
- Transparency is essential.
- The role of the municipalities/local authorities must be well defined, and its staff must be informed, educated and trained accordingly.
- The structure of the EPR should be flexible enough to adapt as necessary (e.g. to economic changes or technological developments).

Information correct as of June 2020

Contact details for national authorities

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Email:
Website: *http://www.anged.nat.tn/*

FAQ

Frequently Asked Questions

FAQ

Frequently asked questions

How can roles and responsibilities in packaging value chains be defined?

1. Is it possible to implement an EPR system on a regional/local/city level?

Establishing voluntary initiatives or getting voluntary commitments at regional level or below is generally fairly easy. However, implementing a mandatory EPR system is more complicated. A mandatory EPR system has to be underpinned by a legal framework that obliges producers and importers to participate in the EPR system, both financially and, if feasible, from an organisational point of view as well. It is very important to make sure that any EPR system can be controlled at regional level. There are two distinct possibilities:

Example 1: An EPR **regulation** is implemented **at national level**. However, on closer inspection of the legal framework, it becomes clear that only a limited section of the population is immediately covered by the system, and the whole population will be covered only after some years. For instance, it could be stated in the regulation that the EPR system shall cover 20% of the households in the first year, and then increase the rate gradually in the following years. Here there would be a good argument **for launching the EPR system in one or two cities or in other sub-national contexts over the first few years**, before extending it across the rest of the country step by step. In this example, the EPR system is thus implemented on a regional level – however, only for a **transitional period.**

Example 2: An **EPR law** is implemented, but it **only applies to a specific part of a country**. Since it is not a national regulation, the EPR system will also not cover the whole country. Before the law can be applied some additional information is required about material flows. There are two options to determine which companies need to pay into the system and how much they should pay:

a. Only companies that produce packaged goods in the region covered by the law, or that deliver such goods into that area for consumption there, are expected to participate in the system. For this option to be viable, **the area concerned must be clearly demarcated** (as must the country as a whole) **so that it is possible to determine both which companies are delivering in that region and how much they are delivering.** If this information is available, it becomes possible to determine the proportion of overall packaging waste for which each individual company is responsible, allowing an **EPR system to be implemented on a small scale.**

b. In most cases, it is **not possible to clearly demarcate the area concernedand to determine with certainty the amount of packaging individual companies are producing or delivering in that area**. Failing this prerequisite of case a, all obliged companies should be made to participate in a nationwide system. If you know the total nationwide revenue of each producer, you can calculate their percentage of the total revenue generated across the country and set up an EPR system on that basis, even if it only applies in one region initially (see example 1). In such circumstances it might be possible to consider exemptions for producers that could prove they were not producing or delivering anything in the area covered by the EPR system.

2. Does an EPR system disrupt competition between companies?

Voluntary initiatives by companies may negatively impact or even disrupt competition within their industries, as some companies may decide not to take part. In contrast, mandatory EPR systems create an additional financial flow by obliging all the companies concerned to pay into the system. This maintains a level playing field between them (i.e. ensuring fair competition/avoiding free-riding). However, if the regulatory framework for the EPR system does not provide for appropriate monitoring mechanisms and prevent free-riding, competition may be disrupted even in a mandatory EPR system.

▶ See also Factsheet 05

How can a PRO be established?

3. What is a PRO?

The acronym PRO stands for Producer Responsibility Organisation. The PRO functions as the ‘system operator’ within the EPR. It is the joint entity set up by the obliged companies or through legislation that assumes responsiblilty for the individual obliged companies concerning waste collection and disposal obligations. A PRO operates as the coordinating body between producers and take-back/recycling operators; it assumes the responsibilities of all the producers (or a group of producers) and organises take-back and recycling activities on their behalf. The PRO is also responsible for providing information about the system and maintaining communications between the stakeholders in the supply chain.

This wide range of responsibilities makes the PRO the most important stakeholder organisation within the system; it is responsible for setting up, developing and maintaining the system, as well as assuming the take-back obligations of the obliged companies.

In some countries, the acronym PRO is also used for ‘Packaging Recycling Organisation’. A packaging recycling organisation does not cover responsibilities along the whole supply chain and is therefore a less powerful body. The more neutral term ‘system operator’ is sometimes used to avoid confusion, but in most cases, PRO can be assumed to stand for ‘Producer Responsibility Organisation’.

▶ See also Factsheet 02

4. Why should producers and other companies care about implementing an EPR system for packaging?

Many companies that introduce packaging and packaged goods into markets are concerned about waste management issues, and some (particularly multinational corporations) have already agreed to voluntary targets. However, delivering reliable collection and recycling systems for household packaging waste and other packaging waste is expensive, and they can only be funded effectively if all the companies introducing packaging and packaged goods to the market, contribute. This is one reason why companies should be interested in introducing mandatory EPR systems. Moreover, an EPR system allows companies to engage with the issue of waste on a level playing field, because the system is based on shared responsibility. Companies that decide to play an active role in an EPR system from the outset will also have the opportunity to influence how the system operates.

▶ See also Factsheet 05

5. Is it enough to implement a voluntary system?

Voluntary initiatives are a great way of bringing together a variety of individual experiences gained through pilot projects. However, a national waste collection system covering all packaging waste cannot be organised on a voluntary basis.

Voluntary initiatives are always limited in terms of the number of companies participating, the geographical areas they can cover, and the types and amounts of packaging they are able to collect and recycle.

Since none of the companies involved are under any obligation to participate, they can decide for themselves how much they want to invest in a project. This means that voluntary schemes cannot provide secure long-term financing to cover running costs. The financial contribution each company makes to a voluntary scheme tends to be lower than the fees companies are obliged to pay under a mandatory EPR scheme. Moreover, there are rarely any official monitoring systems or high-level planning expertise for voluntary schemes. Taken together, these factors limit the outcomes such schemes can achieve, and projects are often wound up once the initial objective has been completed or initial funds are used up.

▶ See also Factsheet 05

6. Who should the PRO members be?

Most PROs are industry-led, meaning that they are set up by companies, associations or other organisations in the private sector. These PROs are supervised by state authorities to ensure they perform their roles and carry out their responsibilities, but the implementation of the EPR system by the PRO is not directly connected to any public body. It is possible for a PRO to be set up as a state authority, for example, as a department within a ministry, but an industry-led PRO is usually preferable to a state-led PRO, as a close link between a public-sector PRO and the tax system increases the risk of funding being appropriated for other purposes. Encouraging companies to assume responsibility for their waste as part of an industry-led solution is also closer to the original idea of genuine producer responsibility. If a PRO is state-led, the underlying framework needs to make clear which state body is responsible for the EPR system.

▶ See also Factsheet 02

7. What role should government play?

It is up to governments to implement clear, mandatory regulations for the EPR system. The government should also monitor the system, or at least ensure that appropriate monitoring mechanisms are in place, both to make sure all the relevant requirements and targets are met, and to guarantee a level playing field for all companies involved. This responsibility also encompasses the imposition of sanctions if individual obligations are not fulfilled. It is also important that the government keeps the system under constant review and ensures it is modified as required.

▶ See also Factsheet 01 and Factsheet 05

8. Is it better to have one PRO, or multiple PROs competing with each other?

At the beginning at least, it is important to make sure there is only one PRO, or one PRO for each specific area of operations, and that no two PROs are in competition. For instance, the collection and recycling of lightweight packaging, industrial packaging or glass could each be organised by different PROs, because each of these waste streams has its own separate infrastructure.

Some countries do have multiple PROs operating in competition with each other, but even in these countries, the EPR system started with just one PRO. A structure with multiple PROs can only work if there is an independent monitoring mechanism that has an overview of all amounts each PRO has contributed to the system. This is the only way to prevent free-riding, ensure all the competing PROs set up and operate the relevant infrastructure, and make sure they fulfil their recycling obligations.

▶ See also Factsheet 05

How can financial flows be managed and fees and payments be set?

9. Will an EPR system significantly increase the price consumers have to pay for the products? Won't it make them too expensive for people on low incomes?

Wherever possible, EPR systems should operate nationwide and include all packaging. Strict cost controls and strong governance structures must be in place to prevent free-riding. If all these measures work properly, the fixed costs of such systems are shared by all the obliged companies and apply to all packaging, thus keeping additional costs for individual packaging items at a low level.

If the fees paid are spread across all the items concerned, the additional cost per item is not significant and is unlikely to be noticed by individual consumers. For instance, if you have a large plastic bottle weighing 25g and subject to an EPR fee of €300 per tonne, the EPR fee per plastic bottle is just EUR 0.0075. Moreover, these costs are also distributed fairly: only consumers buying the packaged goods will have to pay for that packaging to be collected and disposed of, whereas people buying unpackaged goods pay nothing. The fee depends on the weight of the packing concerned and the materials used to make it. The total fees charged to obliged companies can also be modified to reflect the amount of pollution for which they are responsible. The costs of operating the EPR system as a whole are covered by the EPR fees and depend on local circumstances.

▶ See also Factsheet 03

10. What is the difference between EPR fees and the other fees and taxes payable in many countries around the world?

Municipal fees are charges levied for specific services (e.g. collection, sorting and recycling). Municipal fees cannot be used to 'steer' the design of packaging or to promote the use of recycled materials.

Taxes, on the other hand, can be used to influence behaviour in various ways (e.g. relating to the use of resources or to imports). Taxes can be imposed based on a range of different criteria, which might include, for instance, the way packaging is designed or the proportion of recycled material in a given product. However, taxes based on criteria like this will not have any impact on the way packaging is handled after use, except if the tax system includes incentives for using recycled materials in new packaging. Any tax paid goes to the relevant state authority, and often ends up in the general state budget, where it can be spent on anything at all. Hence, this kind of tax-based system does not help to strengthen the principle that producers should be held responsible for their waste.

EPR fees are designed to cover the costs of the entire EPR system, including those associated with the collection, sorting and recycling of waste (or of recovery if recycling is not possible), communications, removal of litter and the cost of disposing of any packaging still disposed of by the municipal authorities. The level of these costs is directly tied to the volume of packaging on the market in the country concerned and the materials used to make it. Additional factors can also be taken into account when assessing EPR fees, such as the recyclability of the materials concerned or the proportion of recycled materials used. This means EPR fees can be used to influence both the design of the packaging and the way it is handled after use.

▶ See also Factsheet 01

11. How can we prevent double payments of EPR fees?

EPR fees should not be paid twice on the same packaging within the supply chain. With this in mind, it is crucial to identify a set point in the supply chain at which each obliged company can be clearly identified. Experience shows that this point is best set where the companies concerned introduce the goods for consumption in the country covered by the EPR legislation. Once they have been introduced to the market, these goods are consumed and, finally, disposed of, without leaving the country. The companies involved in this chain for EPR purposes are the companies that use the packaging, fillers and brand owners (which can be grouped together under the umbrella term 'producers') and the companies importing the goods for sale and consumption in the country concerned. Both producers and importers are obliged to pay into the EPR system.

Service packaging could be considered an exception, as it is only filled at the point at which the goods are sold. In this instance, identifying the filler requires much more effort and therefore offers more scope for free riders, so it is sometimes advisable to assess fees for this type of packaging by identifying the company that sells the empty service packaging to retailers, street food outlets and other places where the service packaging is filled.

▶ See also Factsheet 03

12. What kinds of packaging should be included in the EPR system?

Industrial packaging can be collected and recycled on the basis of individual responsibility (it is often composed of mono-materials, it is clear exactly where the waste will be generated, making take-back easy to organise, and there is a high level of traceability in the supply chain). For industrial packaging and packaging generated at other major points of origin, a collective EPR system is unnecessary, as it is easy to attribute packaging at the various points in the supply chain to the party that produced it in the first place. Disposal systems are already in place for the majority of such waste streams.

This is not true of packaging generated by households and at equivalent places of origin. In an EPR system, the waste management responsibilities of producers and importers are transferred to a PRO, so packaging from households and equivalent places of origins should be included in the EPR system. The same applies to service and shipment packaging.

▶ See also Factsheet 03

How can a register of obliged companies be established?

13. Why is a register necessary, and how do you set one up?

The primary function of a register is to ensure that companies are registered and to prevent free- riding. Registers provide information on the quality and material composition of the obliged companies' packaging. PROs then rely on this information to set fees and to identify free riders. Obliged companies must report their packaging volumes and the packaging materials they use, and this information should be recorded in order to determine exactly how much each company must pay to the PRO.

▶ See also Factsheet 04

14. How can you make sure that companies actually register?

The list of registered companies should be published on a register website. This allows anyone to check whether a given company introducing packaged goods or service packaging to the market in the country concerned is registered and paying EPR fees.

▶ See also Factsheet 04

15. Which companies should be registered?

All companies obliged to pay an EPR fee for their packaging must be registered and fulfil their obligations. The registration criteria must be clear and set out in law.

Most EPR regulations define an obliged company as the company that introduces packaged products to the market 'for the first time'. Companies that introduce packaged goods to the market are obliged to register. This means that any company that imports packaged goods must register and pay the PRO for the packaging concerned. The same applies to companies that produce goods domestically and introduce them to their domestic market. Companies producing exclusively for export are not obliged to register in the country in which they produce their goods. It is also sensible to consider separate regulations for service packaging (▶ see also question 11 above).

The registration regulations must also state who is obliged to register when production (filling) is done on behalf of a third party. Such filling occurs when one company owns a given brand, but the brand's goods are produced and filled by a third party, rather than by the brand owner. In such circumstances, the company on whose behalf the filling is carried out should be obliged to register.

The register should include basic company registration information confirming that the company is under an obligation, along with specific data on the volume and numbers of packaging items produced, if applicable. The precise data required will depend on how the fees are charged. They may be based exclusively on the volume

of packaging the company produces in each defined material, the number of units (also in relation to a filling volume) or a combination of both.

It is also possible to link permits for the distribution of packaged goods to a registration. Doing so would prevent companies that fail to register from selling the goods concerned.

▶ See also Factsheet 04

How can a regulatory framework be designed?

16. What kind of regulatory framework is needed?

A mandatory system cannot work unless the key aspects of the system are properly regulated. Specifically, these include definitions, the conditions applicable to the obliged producers and importers, the PRO, and ensuring the collection and recycling systems are described in detail and set measurable, manageable targets. Appropriate monitoring and enforcement systems must also be set out in the regulatory framework, along with any sanctions for breaches of regulations. The regulatory framework may be provided by a law or any other suitable legal provision that is compatible with the legal system in the country concerned.

▶ See also Factsheet 05

17. What are the most important steps for designing a regulatory framework?

The aim is to progress from isolated voluntary initiatives to a mandatory system. The first major step is to find allies (government and public authorities, major political parties, producers, importers, NGOs). Doing that means identifying objectives and solutions for achieving them, as well as connecting relevant stakeholders, either in one-to-one meetings or in larger group events or workshops. The next step is to mobilise all the stakeholders to discuss specific solutions and to gather information on experience obtained in other countries. Once this stage has been completed you should be able to draft an initial version of the framework.

▶ See also Factsheet 05

18. Who should be involved in designing a regulatory framework?

All political decision-makers must be kept informed of any plans for EPR legislation and included in the process. The more widely a regulatory framework is accepted, the easier it will be to implement it successfully. In the context of an EPR system, it is particularly important to include the companies that will be required to contribute to funding and organising the new system, or which are likely to become part of the PRO; such companies should also be consulted and involved in any discussions at an early stage. These companies might also begin the process of setting up an EPR regulatory framework themselves. It is also important to involve all the actors who will be important in ensuring the system is implemented successfully. These actors are likely to include producers, consumer organisations, national/local authorities, recyclers, PROs, NGOs and, in some cases, standardisation bodies.

▶ See also Factsheet 05

How can the collection of packaging waste be organised?

19. What factors influence the cost of waste collection?

The main factors are the local circumstances (collection systems on islands or in rural areas are usually more expensive to run); the type of collection system used (kerbside collection is generally more expensive than bringing waste to a central collection point), the intervals between collections; the total amount of waste to be collected and the distance between collection points and sorting plants.

▶ See also Factsheet 06

20. Which collection system is best?

The choice of collection system always depends on the circumstances. In densely populated cities, it is often easier to set up collection points in public places and on the street, than to set up the infrastructure needed for kerbside collection. In rural regions, kerbside collection is often the better option. It is important to ensure that all citizens covered by the collection system are aware of it and happy to use it.

▶ See also Factsheet 06

How can sorting procedures for packaging waste be organised?

21. What factors influence the cost of sorting waste?

The cost of sorting waste depends on what waste is collected and the technical facilities and labour required. Manual sorting is a good option if the system collects a lot of clean mono fractions. On the other hand, for state-of-the-art mechanical sorting systems to work properly, it is important to minimise contamination and to ensure that the waste collected is made up of fractions the sorting plants can handle.

▶ See also Factsheet 07

22. What fractions should be sorted in a sorting plant?

Mixed packaging needs to be sorted into marketable fractions and pressed into transportable bales. Even packaging collected as part of a single-fraction collection also needs to be sorted to separate out any material that should not have been included in the collection and to prevent contamination, which would make the material harder to recycle and commercialise. Glass containers are an exception: glass fractions are separated during recycling, so they do not have to be sorted immediately after collection.

▶ See also Factsheet 07

23. What are the main components and costs of a sorting plant?

A state-of the-art sorting system for lightweight packaging should include the following:

- A bag opening mechanism for separating mixed packaging (if it is collected in bags).
- A classification system. This system screens the material collected and assigns it to between 3 and 5 different categories according to the size and coarseness of individual particles. This allows the system to filter out fine particles and organic material, and to remove large pieces of material that might cause disruption during sorting. The rest of the material will be of more or less average size (the exact size depends on the size of the packing) and easy to sort.
- A wind-sifting system for separating film and paper.
- A magnetic separation system for recovering ferrous metals/tinplate.
- Eddy current separation for separating out non-ferrous metals.
- Sensor-based optical sorting.

The system described above is not suitable for packaging waste like glass containers or paper collected in mono collections. These materials need their own separate sorting processes.

▶ See also Factsheet 07

How can the informal sector get involved in the system?

24. Should informal waste pickers be paid according to the amount of recyclables they collect?

Where waste is collected informally, the only way to pay waste pickers is by the number or amount of recyclables they collect. However, this incentivises workers only to collect waste with a market value, meaning that other types of waste remain uncollected. For a sustainable waste system to work, all types of waste must be collected, including waste with little to no economic value. To ensure that all waste is collected, people have to be paid for the service of waste collection, sorting, recycling and disposal services, rather than for the value of the waste they handle. In turn, this means integrating waste pickers into the system, taking them out of the informal waste sector and into formal employment with contracts.

▶ See also Factsheet 08

25. Should informal waste pickers be registered if they are working under an EPR system?

If informal workers work directly on behalf of the PRO as part of the EPR system, either as business partners or as self-employed contractors, then they should be registered. People currently working informally must have an appropriate employment or service contract if they are employed by a waste management company to collect or sort waste, or if they are working on behalf of such a company.

▶ See also Factsheet 08

26. Who pays informal workers in an EPR system?

If informal workers are working directly for, or on behalf, of the PRO, either as business partners or independent self-employed contractors, the PRO pays them directly. If they are employed by, or working on behalf of, another company providing services to the PRO, they are paid by the company concerned.

▶ See also Factsheet 08

How can citizens be incentivised to separate packaging waste at source?

27. What is the role of municipalities/local authorities?

The most important challenge for municipalities and local authorities is to ensure that all citizens are informed about the waste collection system and the fact that packaging and other recyclables will be collected separately. Local authorities are also the key point of contact for groups and institutions that can act as awareness multipliers for the rest of the population, such as nurseries, schools, universities, clubs and other organisations. The precise remits of municipal authorities differ across the world, and their roles in the EPR system will vary accordingly.

The PRO needs to work closely with the local authorities. One way of designing an EPR system is for the municipality/local authority to collect the packaging on behalf of the PRO, and for the PRO to pay the authority for this service.

▶ See also Factsheet 09

28. Which residents are most important for a system of separate collections?

It is important that the entire population of the area/country concerned are included in any separate collection system. Nurseries, schools and universities can accelerate the transition by driving change. The first step is to educate the population about waste, how it should be managed, and the harmful effects that can arise when it is not dealt with properly, and to promote best-practice procedures.

▶ See also Factsheet 09

How can deposit refund systems be set up?

29. What kinds of items can be included in a deposit-refund system?

PET bottles, beverage cans and glass bottles are especially suitable for inclusion in deposit-refund systems, since they are easy to store, separate and recycle. PET bottles and beverage cans can also be easily returned to reverse vending machines. Other types of packaging, such as cardboard used to package liquids (TetraPak) or sachets are less suitable for deposit-refund systems.

▶ See also Factsheet 10

30. Is it possible to set up local deposit-refund systems?

If you want to set up a DRS on a small scale, for example to cover a small geographical area, such as the area covered by a specific company operating on a market or a specific venue during a public event, a direct deposit-refund system model is the most suitable option, as it requires minimal effort to run.

The simplest form of deposit refund system is one based on a direct relationship between the buyer and the retailer. Under this model, the buyer pays a fixed deposit when they buy a given item, which is added to the sale price. When they are finished with the item (for example when they have consumed the contents) the buyer can solely return it to the point of sale where they bought it, which acts as the only take-back station under this model. The retailer then returns the deposit to the buyer on presentation of a receipt, either in cash or in the form of a voucher.

▶ See also Factsheet 10

31. What incentive systems are there besides the deposit-refund system?

Charging a deposit is not the only way to encourage people to return empty packaging. Retailers or consumer goods companies can offer consumers other rewards for returning packaging, such as cash, products, services, phone credits, electronic payments or vouchers.

How can high-quality recycling be ensured?

32. Which recycling processes should be encouraged?

According to the waste hierarchy, the best option is to prevent the generation of waste in the first place. Where this is not possible, the next best option is to re-use the item concerned, or to prepare it for reuse, followed by recycling, recovery and, as a last resort, permanent disposal. The best recycling processes are those that allow the materials to be reused in new products similar to the initial one. As far as packaging is concerned, this would mean turning used packaging into a secondary product that is as similar as possible to the original in terms of its material composition. However, since packaging waste often contains mixed plastics or other compound materials, the scope to recycle packaging without 'downcycling' is often limited. Therefore, it is important to duly consider the available waste treatment techniques with respect to the waste hierarchy for each waste material concerned.

▶ See also Factsheet 11

33. How can we promote high-quality recycling?

Making new, high-quality products from used packaging requires high-quality recycling infrastructure, including good treatment and sorting systems. The recycled material does not necessarily have to be used to make new packaging; the first priority is to reduce the need for virgin raw materials by replacing them with recycled ones. This can only happen if the secondary raw material can meet the same key requirements as equivalent virgin raw material, meaning that the recycled material has to meet a clearly defined and controlled specification, and must do so consistently enough to be used in production in the same way as new raw material. Recycled material will only be able to meet these requirements if the original packaging is designed to be easy to recycle, and if appropriate recycling technology is available for processing each individual type of material to be recycled.

▶ See also Factsheet 11

34. How can we create incentives to invest in the recycling market?

One of the key ways to encourage investment is to ensure planning reliability to recycling companies for their operations. For an investment to be profitable, secondary raw materials have to be available in consistent quantities and quality for the entirety of the planning cycle (e.g. 5 years). Establishing an EPR system, underpinned by a solid legal framework, also helps to create good conditions for investments in the recycling market. The biggest incentive you can provide is a stable legal framework that provides for mandatory collection and recycling targets and measures to enforce them. This creates certainty for investors, which in turn encourages more investment.

▶ See also Factsheet 13

How can the recyclability of packaging be increased?

35. What factors influence recyclability of packaging?

The recyclability of packing depends to a large extent on the following factors:

- The packaging must be designed to be recyclable. This means that the need to ensure a high level of recyclability should be factored into the design and production stages.
- There must be appropriate infrastructure for the collection, sorting and recycling of the packaging, and it must be available for use as part of the recycling system.

To put it another way, this means that packaging that is designed for recycling but is not recycled, in practice, for instance because it is not collected, not sorted or not taken to a recycling plant, cannot be considered recyclable.

▶ See also Factsheet 12

36. How can we influence the recyclability of packaging?

Recyclability can be influenced by a number of different factors. For instance, recyclability can be increased by offering a cash bonus for recyclable packaging, or by imposing a financial penalty for non-recyclable packaging. Such incentives can be controlled by modulating the EPR fees within an EPR system. Taxes on non-recyclable materials or packaging can also be used as a financial tool to increase recyclability. Mandatory regulations and labelling/certification systems are another way of encouraging recycling.

However, many packaging designers do not know which types of packaging are recyclable, or which elements in packaging make it difficult to recycle. With this in mind, one of the most important steps towards improving recyclability is to ensure there is a dialogue between raw material suppliers and packaging manufacturers on the one hand, and recycling companies on the other.

▶ See also Factsheet 12

37. How can we promote the use of recyclates?

There are a number of factors that can increase the use of recyclates, and several approaches to doing so.

Manufacturers using secondary raw materials need to be confident that this material is of the same quality as a primary, non-recycled raw material. In turn, this means that recyclers must be able to ensure a reliable supply of high-quality recyclates. Moreover, there has to be a market for the products containing the recycled material, or it must be possible to establish one. One way of doing this might be, for example, to make state authorities follow green procurement policies that encourage the purchase of recycled products. This would allow the bodies concerned to act as role models at the same time as creating the economies of scale needed to establish the market. Another way is to set binding standards for the use of recyclates in law. For instance, Article 6 (5) of the EU Single Use Plastic Directive states that:

"With regard to beverage bottles listed in Part F of the Annex, each Member State shall ensure that:

(a) from 2025, beverage bottles listed in Part F of the Annex which are manufactured from polyethylene terephthalate as the major component ('PET bottles') contain at least 25% recycled plastic, calculated as an average for all PET bottles placed on the market on the territory of that Member State; and

(b) from 2030, beverage bottles listed in Part F of the Annex contain at least 30% recycled plastic, calculated as an average for all such beverage bottles placed on the market on the territory of that Member State."

Another important aspect is price. The price a recycler obtains for the sale of their recyclates must, at the very least, cover the costs incurred throughout the entire recycling chain (collection, sorting, storage, processing, recycling). Indeed, the price depends more heavily on the costs of these services than on the price of virgin raw materials, which in turn means that products made from recycled materials are often no cheaper than equivalent raw materials; in some cases they are actually more expensive. This is one reason why financial bonuses, whether in the form of tax incentives or bonus/malus systems for EPR fees, can make a major contribution to promoting the use of recyclates.

▶ See also Factsheet 13

38. How can we increase acceptance of products made from recycled packaging?

There are a number of things we can do to increase acceptance of recycled products. Most importantly, products made from recycled packaging must fulfil the same standards as equivalent products made of virgin raw materials. Moreover, the recycled products should not be more expensive than products made of virgin raw materials. Issuing certificates, labels and other information about recycled products can also help to build trust and acceptance among consumers.

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