



Extended Producer Responsibility (EPR) Implications on Small Island Developing States (SIDS)

A guideline for implementation of EPR in SIDS to fight increasing plastic marine litter

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Abbreviations

CPCB	Central Pollution Control Board
DfE	Design for Environment
DFFE	Department of Forest Fishery and Environment
DRS	Deposit Refund Schemes
EEZ	Exclusive Economic Zone
EPR	Extended Producer Responsibility
GDP	Gross Domestic Product
MoE	Ministry of Environment
MoECCT	Ministry of Environment Climate Change and Technology
MOF	Ministry of Finance
MPR	Mandatory Packaging Reporting
NEA	National Environment Agency
PCC	Pollution Control Committee
PET	Polyethylene terephthalate
PRO	Producer Responsibility Organization
SIDS	Small Island Developing Countries
SPCB	State Pollution Control Board
SUP	Single-Use Plastic
ULB	Urban Local Bodies
WWF	World Wildlife Fund
ZWMP	Zero Waste Masterplan

1 /

Small Island Developing States Context

1.1 Waste situation

Solid Waste Management is a major challenge for many countries. These challenges get amplified for Small Island Developing Countries (SIDS) like the Maldives where the geographical distribution of the land and the population make it extremely difficult to develop a centralized waste management system. This is also fueled by dependence on imports and tourism, which leads to an increase in waste generation. Estimates show that SIDS inhabitants generate 2.3 kg of municipal solid waste per capita, which is 48% higher than the world average (UN Environment, 2021).

Although majority of the waste is collected in SIDS countries like the Maldives, some portion of the waste is directly discarded into the environment. In the Maldives in particular, the inability to transport waste from the islands to the central waste management facilities leads to the open burning of waste in the islands' waste management centers.

A large portion of the solid waste generated consists of organics and biodegradables. However, with increased use of imported products which come in single use packaging, plastics, metals and

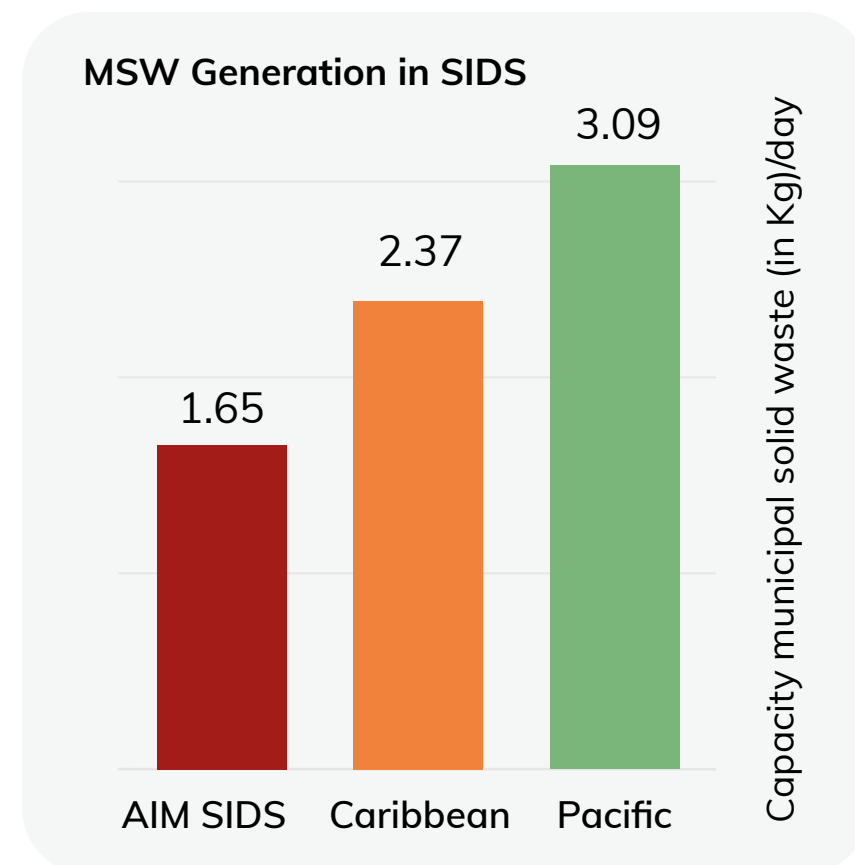


Figure 1: Solid Waste Generation in SIDS.
Source: UN Environment (2021).

other inorganics also make up a significant portion of the waste. In most cases, the percentage of these inorganic substances by volume is higher than by weight, as they are usually light but occupy a larger volume.

Despite the large portion of recyclables within the inorganics, SIDS countries lack the infrastructure needed for recycling. Collection, sorting, cleaning and sending material abroad for recycling is done in rare cases, however is not very economically feasible. The feasibility of a locally based Material Recovery Facility needs to be explored and studied.

1.2 Key players in the (Maldivian) Waste Management System

Using the Maldives as an example, this manual will list all important stakeholders in relation to waste management. The following descriptions are exemplary for one country, but can be partially transferred to the situation in other SIDS.

The Ministry of Environment, Climate Change and Technology (MoECCT) is the main actor that sets policies for waste management in the Maldives. The Ministry consults with the other key stakeholders such as the Ministry of Economic Development on the impact of the measures. The other government institutions such as the Maldives Customs Services, Maldives Ports Limited are also included in these consultations and MoECCT may have specific separate consultations with each entity based on how their roles may support or be implicated in changes to policy. As the Maldives is a highly geographically dispersed country the Local Government Authority that regulates the local councils is also included in consultations as the island and city councils usually will have some responsibility of implementation as

well as reporting. The state-owned waste management corporation (WAMCO) is the primary implementing organization for the waste management policies in the cities while the island councils implement waste management policies on the islands. These are the key stakeholders that shape the waste management policy and implement waste management in the Maldives.

The primary stakeholders are the regulatory bodies such as Environmental Protection Agency, that regulates environmental regulations in the Maldives, Utility Regulatory Authority that regulates utilities in the Maldives where waste is considered as a utility as well as the Food and Drug Authority, which has the mandate to regulate food contact materials and packaging in the Maldives.

Primary stakeholders in the Maldives include a number of FMCG manufacturers that produce single-use packaged plastic beverages. These include state-owned companies such as Maldives Water and Sewerage Company (MWSC) and its subsidiary Island Beverages

Maldives (IBM), which is one of the three largest producers of SUP bottles in the Maldives, and two other private companies, International Beverages Company (IBC) and Male' Aerated Water Company (MWAC) Two other state-owned enterprises are also poised to enter the bottled water FMCG market: Maldives Industrial Fisheries Complex (MIFCo) has produced bottled water before and has the equipment to do so; FENAKA Corporation has invested in bottled water, albeit possibly in returnable glass bottles. As these are the major producers they are regarded as the primary stakeholders for waste management in the Maldives.

Maldives as many other smaller SIDS countries primarily import other FMCG products and therefore the other primary stakeholders are the major wholesale importers and traders. Their decisions about what to offer in the Maldivian market ultimately affect what is available to the public and the waste generated by the consumption and disposal of these goods. The rest of the main players are resorts and guesthouses, as well as restaurants and cafes. Tourists are noted to contribute 3.5 kg of waste per bed night, and with arrivals of over 1.7 Million tourists in 2019 with an average stay of 9 days they contribute a significant portion of the waste generated in the Maldives (Ministry of Tourism Maldives, 2021).

Secondary stakeholders include the media, civil society, and local governments such

as island and atoll councils and women's development committees. These are the actors that are involved in stages of implementation, awareness as well as monitoring of the waste management activities in the Maldives.

The section highlights the key stakeholders in the Maldives' waste management system. However, the key takeaway is that for any waste management system in any country to be successful, all stakeholders must be involved and consulted, and their feedback must be considered and incorporated. Meaningful stakeholder consultations play a critical role in ensuring success of waste management or even other policy implementations and should not be regarded as a checkbox exercise.

The public is the largest stakeholder group, as their support and consent is necessary for effective implementation. Policy making should be robust enough to accommodate the feedback that it receives during policy formulation and even after policy implementation. This partnership and trust in the public will ensure that they are committed to the policies to be implemented.

At the end of the manual, recommendations and implications are provided on how stakeholders, who are typically present in most SIDS, can get involved in the design of a functioning waste management system.

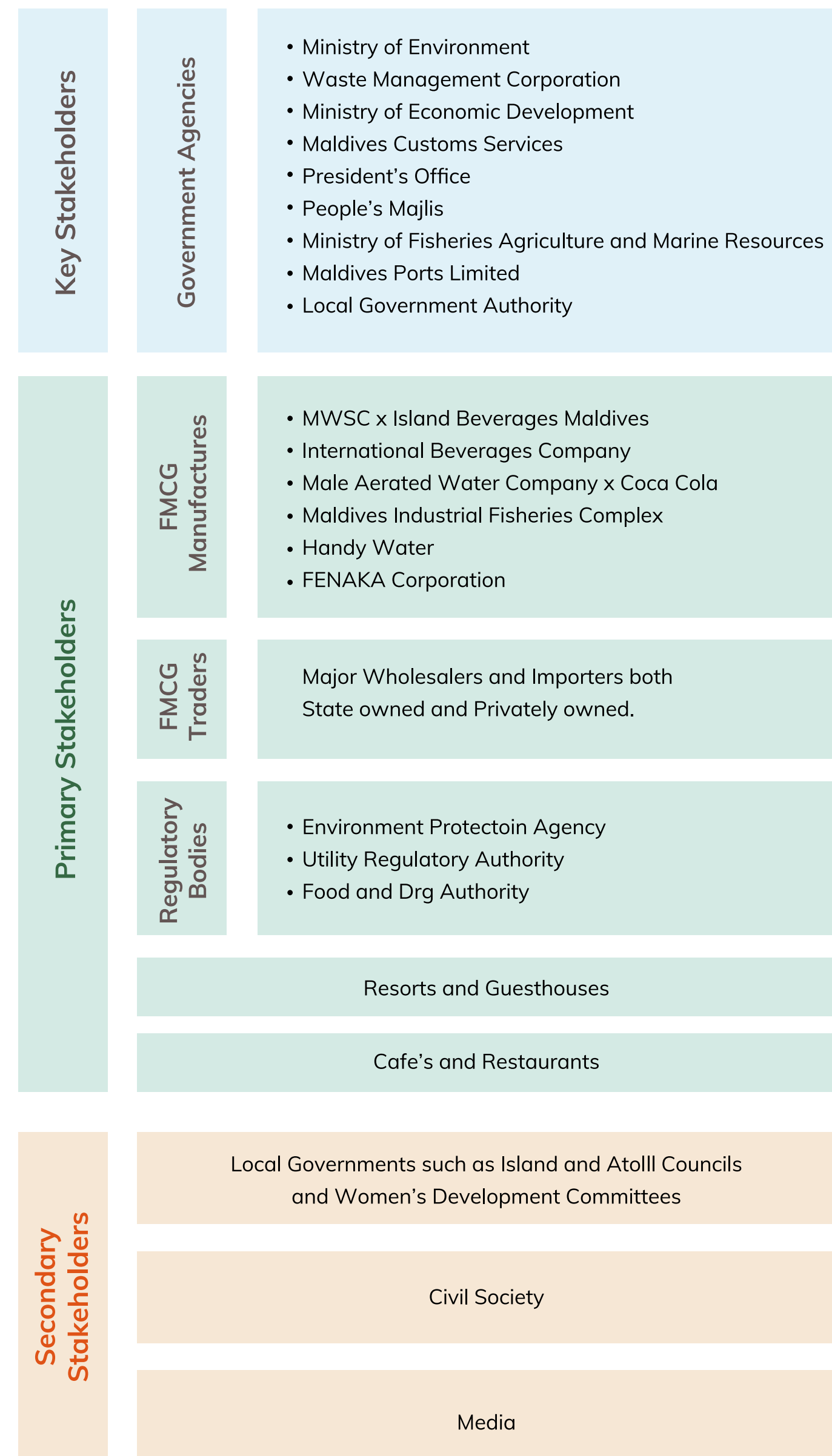


Figure 2: Maldives Key Stakeholders for waste management. Own presentation.

1.3 Challenges present in SIDS countries

SIDS are a group of developing countries with unique social, economic, and environmental vulnerabilities. The UN has identified 38 UN Member States and 20 Non-UN Members/Associate Members of United Nations regional commissions Caribbean, Pacific, Atlantic, Indian Ocean, Mediterranean, and South China Sea that fit this description.

These countries share a number of characteristics, including a small economic base, dependence on larger countries for foreign aid and investment, maritime and air transport, geographic isolation that reduces economies of scale, almost complete dependence

on imports of resources and consumer goods, vulnerability to coastal erosion, and sensitivity to traditional land rights (Periathamby & Herat, 2014).

These unique characteristics also result in a variety of challenges in the sustainable management of solid waste and plastic in SIDS countries. SIDS are particularly vulnerable to biodiversity loss and climate change due to a lack of economic alternatives and factors such as small population size, isolation from international markets, high transportation costs, vulnerability to exogenous economic shocks, and fragile land and marine ecosystems. (United Nations, 2022)

1.3.1 Geographic Challenges



The Exclusive Economic Zone (EEZ)—the area of ocean under their control—is 28 times the size of the country's land mass on average for SIDS. Especially in the Maldives, the 90,000 km² of EEZ encompasses 99.6% sea and only 298 km² of land.

As a result, many SIDS, including the Maldives, rely on the ocean for the vast majority of their natural resources. SIDS are particularly vulnerable to biodiversity loss and climate change due to a lack of economic alternatives and factors such as small population size, isolation from international markets, high transportation costs, vulnerability to exogenous economic shocks, and fragile land and marine ecosystems. (United Nations, 2022)

1.3.2 Environmental Sensitivity and Lack of Land



SIDS have a unique ecology, unfortunately accompanied with a fragile environment. The islands are geographically isolated, and being sea locked poses numerous threats to these low-lying islands. The environment is very sensitive to fluctuations in climate, which includes periods of droughts and excessive rainfall, coastal erosion due to sea-level rise, wave surges and bleaching and death of coral reefs, as well

as unpredictable and destructive natural disasters and weather events (UNDP, 2019).

The effects of climate change and global warming are intensified due to anthropogenic activities. The limited natural resources, limited land area and marine resources are overexploited, polluted or degraded increasing the vulnerabilities of the islands. In the Maldives, for example, some of the wetlands consist of mangroves, which provide important natural protection for the islands. In Thinadhoo of Gaaf Dhaalu atoll of the Maldives, due to lack of land area, the Waste Management Centre and the Wastewater treatment plant was built next to a wetland which makes the environmentally sensitive area of the island to be highly susceptible to pollution. Moreover, lack of waste management has led to illegal dumping of waste into the ocean and landfilling near the coastal areas causing beach pollution with solid waste and marine litter. Even on islands where no people live, floating plastic bottles can be seen on the coasts.



Figure 3: Waste Management center next to the ocean and a Mangrove (in red) in GDH, Thinadhoo, Maldives. Source: Wamco (2021).

1.3.3 Reliance on Imports



SIDS face certain economic vulnerabilities due to their unique geography. This includes heavy reliance on imports for basic resources such as food, fuel for energy and other raw materials for industries. In 2020, the trade balance of 24 SIDS countries was negative due to over 55% of imports. In the Maldives, imports were 91% of the national trade in 2020 (Maldives Customs Service, 2022). This is mainly due to the limited resources available in these islands. Lack of land area limits the amount of agricultural production in SIDS, and the subsistence agriculture is constrained by commercial cash crop cultivation, increasing urbanization and tourism development.

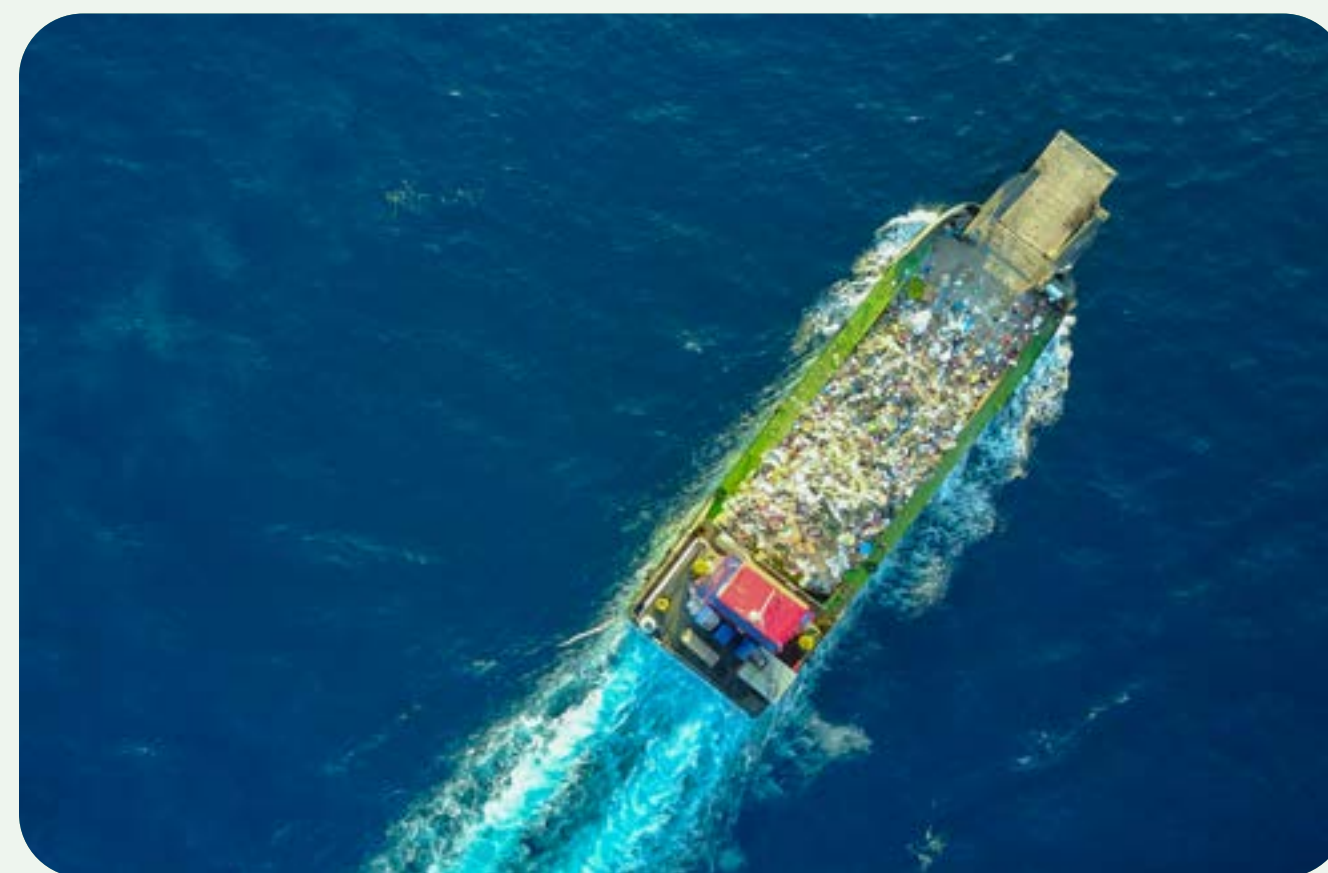
This ultimately increases the economic vulnerability further. The SIDS are more susceptible to economic shocks in the external markets. Being sea locked, SIDS face various challenges in maritime transport and logistics of trade imports and exports in terms of poor connectivity and high freight costs.

In the past SIDS like the Maldives had no imports to the islands and the islanders provided for themselves through agriculture and fishing. However, a rise in people's standard of living due to increasing imports makes such self-sufficiency impossible in SIDS like the Maldives. In particular, due to the unique geographical location and small population, economies of scale are difficult to achieve, resulting in imported goods being cheaper than anything produced locally.

1.3.4 Reliance on Tourism



Tourism is one of the major economic activities in SIDS. It is the main driver for development in these countries and contribute to a large proportion of the Gross Domestic Product (GDP). In the Maldives, 25.2% of the GDP and more than 1/3 of government tax revenue came from the tourism industry in 2019 (NBS Maldives, 2019). However, a heavy reliance on tourism also poses numerous challenges which include increased imports of goods and the subsequent increase in waste generation. In the Maldives, some of the resorts dump food waste in the ocean due to lack of enforcement of waste management regulations in the tourism sector. These ultimately threaten the unique ecosystem the tourists visit to explore. In addition, the amounts of plastic waste entering the Maldives' oceans and environment from the tourism sector have not been studied in depth, and it is not known what quantities of plastic are entering the environment.



1.3.5 Waste Management Challenges



Historically many of the SIDS managed waste by throwing waste into the sea. However, back then this was less of an issue as the waste produced in the past consisted mainly of organic and biodegradable waste which can be naturally broken down. This was practiced in the Maldives as well. In fact the word for beach in Dhivehi is "gondu dhoh" where the first word "gondu" refers to waste indicating a long historical trend of throwing waste on the beach.

However, since the rapid development of the world, including the development of shipping in the 1950s and the "Great Acceleration," the rapid importation of plastics and other non-biodegradable waste into the Maldives has led to significant pollution of beaches in the Maldives and an accumulation of non-biodegradable waste, especially plastics, on the islands (Future Earth, 2015).

Lack of awareness of the principles of reduce, reuse, recycle and repurpose along with the lack of space in household results in large amounts of recyclable and reusable items to be thrown out as waste. In addition to this waste management centres in islands lack the machinery needed to collect, manage, bale transport recyclables. Even in the islands which do have machinery, technical capacity to operate the machinery may be lacking.

Figure 4: Transporting Waste.
Source: Arushad Ahmed (Flickr).

The accumulation of waste and sometimes even recyclables on islands, without the ability to transport resources off the island, results in waste being burned or waste management outside of the assigned waste management center. In these cases, additional space must be provided for waste management on already limited land.

Currently segregation is practiced in only a few islands where the space, support and awareness among the public allows segregation to be successfully carried out. However, even though waste is segregated at a household and island level, there have been instances when the central waste management organization has merged segregated waste when they are transported out of the island resulting in the efforts of public for segregation to be wasted.

1.3.6 Institutional Challenges



Multiple government and private sector stakeholders will be required to work hand in hand with local councils, communities as well as resorts to ensure the successful implementation of an EPR system. In addition a strong technical knowledge base is required within the government to both regulate as well as monitor the implementation of such a scheme. This also means that there should be actionable data available. Though these are all challenges that are currently in the way of a successful EPR implementation.

Most SIDS countries lack the technical and financial capacity to establish a strong waste management system entirely on their own. Setting up a successful waste management system requires a significant capital expenditure and requires thorough knowledge of the local culture and experience of how locals would go about managing their waste. The indigenous knowledge goes hand in hand with technical support towards building a modern waste management facility and infrastructure that will be accepted by the locals and used to its full capacity.

Like many other nations in the World, SIDS islands are also susceptible to the corrosive effects of corruption (UNODC, 2014). This significantly affects the sustainable development of SIDS countries and addresses important issues in the country. Some of the corrosive effects of corruption result in a lack of political will on key important issues in the country and focus on other issues from which decision-makers may have ulterior motives to be benefitted from. This is further aided by a strong culture of secrecy in institutions.

Important public information and data are withheld by institutions from one another and the general public. Secrecy by government institutions also promotes poor operation and also results in key information being lost over the years.

Also, the financial systems in SIDS including the Maldives are dependent on very limited financial resources. This results in sufficient financial resources not being allocated for waste management projects. Also, the limited allocation of the budget results in limited success in the completion of projects. In most cases multiple stakeholders influence the allocation of budget, including political influence which results in non-key developments being allocated in the budget. It also results in other financial issues such as operational costs of previous capital investment projects not being allocated any budget.

All the above-mentioned issues result in the negligence of different government institutions in implementing of a successful waste management system

1.3.7 Solutions to overcome these challenges



The key to successful project and even policy implementation is openness to stakeholder consultation and feedback. Governments and implementing authorities need to conduct thorough and meaningful consultations that are not just a one-off checkbox exercise, but serve as a mechanism for continuously gathering feedback throughout the lifecycle of the activity. Some

stakeholders will only engage at the implementation stage of the project; however, the implementing authority should not be rigid in its project direction and should be able to respond to and adapt stakeholder feedback and input accordingly. This builds trust and ensures that stakeholders voice their concerns and provide meaningful feedback that will help the project succeed.

Hand in hand to stakeholder consultations there must be relevant, accurate and current data available to base decisions on. Governments should ensure that data is made available without hurdles to anyone that wants access to information and data. This will support public, researchers, consultants, and civil society to also make better informed decisions on waste management and waste management policy. Open data alongside digitization and mandatory reporting of data from different government agencies and stakeholders also ensure that there is a paper trail for the data and improves accountability and provides an avenue for scrutiny to continuously improve the system.

Based on the consultations and data, governments should be equipped with the best information to develop well-informed policies. It is also essential to consider all overlaps when developing these policies. Especially in a sector like waste management where there are several cross-cutting areas where certain policies may work against other policies.

In addition to the preceding recommendations, an **Extended Producer Responsibility (EPR)** system in particular can close the gaps in waste management, both financially, technically and operationally, by making upstream, mid-term and downstream changes that can drastically improve the waste management

system on the way to a more circular and sustainable system. The following chapters of this manual therefore focus on the implementation of EPR and its implications for individual stakeholders, especially in the SIDS context.

To learn more about the EPR system that could facilitate waste management in SIDS, click on the menu bars below. They contain the basic principles of EPR, different ways to implement the system, tools to facilitate implementation and resulting benefits.

What is EPR?

2.1 The emergence of the EPR Concept

Although the concept of EPR has received increased attention in the SIDS context only in the last year, it is by no means a new concept.

The recycling markets that existed in the 1980s, especially for high-value plastic products, could not handle the ever-increasing volumes and complexity of plastics, so local governments had to take responsibility (OECD, 2016).

To remove this burden from individual municipalities, EPR was recognized for the first time in the late 1980s as an established principle of environmental policy. The further conceptualization of EPR began in early 1990s by introducing the first five EPR policies in four states in the United States and a state in Canada (Hendro Putra et al., 2021). Although the first schemes of EPR were introduced in most EU member states and developed

countries the concept of EPR is also a potential approach for developing and emerging economies. In particular, countries facing increasing amounts of packaging waste and inadequate waste management infrastructure need to take action to prevent marine litter and other forms of plastic pollution (GIZ, 2018).

From 2001 onwards, the OECD offered a platform to exchange good practice examples and to analyse common challenges (OECD, 2016). Among other things, this platform contributed to the introduction of around 65 measures to extend producer responsibility for packaging waste (Ellen MacArthur Foundation, 2021). A study conducted by the OECD (2016) revealed that over 400 EPR schemes were already in operation worldwide, of which about 17 % were packaging related.

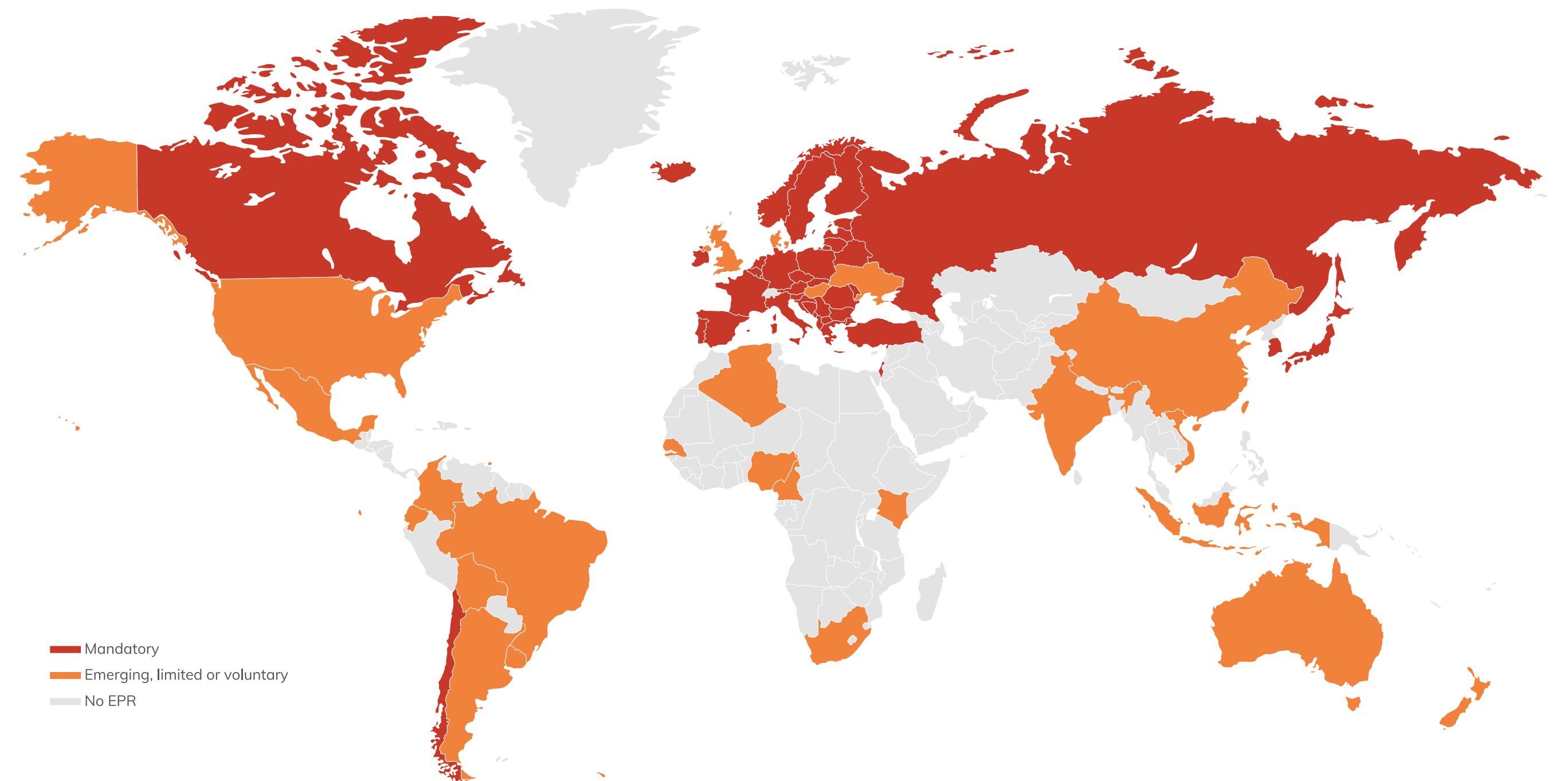


Figure 5: Overview of packaging EPR schemes implementation around the globe in 2020. Source: Ellen MacArthur Foundation (2021).

2.2 Principles of EPR

The following table describes the main functions of and materials covered by an EPR system:

Functions and scope of EPR systems	
EPR was introduced to tackle	Including
Growing volumes of waste	Packaging waste
Rising costs of waste collections for residents	Electronic waste
Loss of valuable natural resources	Portable batteries, etc.

Table 1. Functions and scope of EPR systems. Own presentation.

More precisely OECD (2016) defines EPR as an

“Environmental policy approach in which a producer’s responsibility for a product is extended to the post-consumer stage of a product’s life cycle.”

But not only the producers bear the responsibility: In SIDS markets, most plastic packaging is imported, so importers and wholesalers must also be held responsible for proper waste management. The extent to which these obligated industries play a role in an EPR system, and especially what role they play, will always depend on country-specific factors and, above all, on the chosen design of the system. It is very important to consider the different social, economic, technological and other conditions in developed and developing countries when implementing an EPR system and to provide a tailored approach that takes into account all

important features, such as inadequate or irregular waste collection services or limited recycling opportunities due to limited space on SIDS.

Also, it should be decided whether the EPR system should be mandatory or voluntary. Although voluntary initiatives by the private sector are a good way to gain initial experience in specific waste management-related topics, they are very much geared to the interests and standards of individual companies and may fail to implement a large-scale system for collection, sorting and recycling in the long term (GIZ, 2018).

Furthermore, it has to be determined whether the system is supported by individual or joint producer responsibility. In a collective system, a new third party, a Producer Responsibility Organization (PRO) must be introduced into the market to fulfil the obligations of producers in exchange for a financial or technical consideration.

The PRO is considered the most important stakeholder in a collective EPR system and manages the construction, development and maintenance of the system as well as the take-back obligations for the responsible producers and importers. PROs offer advantages to producers, such as enabling economies of scale and reduction of free riding (Dimitropoulos et al., 2021). Apart from that, a centralized organization also allows for higher transparency and verification of compliance, in particular the monitoring of industry progress towards collection and recycling targets (European Commission, 2014).

The PRO is usually responsible for collecting fees from the obligated industry and organising waste management as a central body. In order to make the functioning and financing of the PRO sustainable, fees must be set to cover all costs related to waste management, such as:

- Costs for establishing a separate waste collection system;
- Collection, transport and treatment costs for separately collected waste;
- Administrative costs, i.e. costs linked to the running of PROs;

- Costs for public communication and awareness-raising (on waste prevention, litter reduction, separate collection, etc.);
- Costs for the appropriate surveillance of the system.

There are several ways to structure PROs. Either there is only one PRO, usually owned by the obligated companies or the state, or there are several competing and privately-owned PROs from which the obligated party must choose one to meet its responsibilities. Based on an analysis of available data and stakeholder feedback, the European Commission (2014) concluded that there is no clear evidence that one model is more successful or efficient than another. It particularly emphasizes the need for fair competition within a stable and clear framework with thorough monitoring and strict rules for all, once the presence of multiple providers in the market leads to a competitive PRO system.

The interlinkage of the PRO with other stakeholders is displayed in Figure 6:

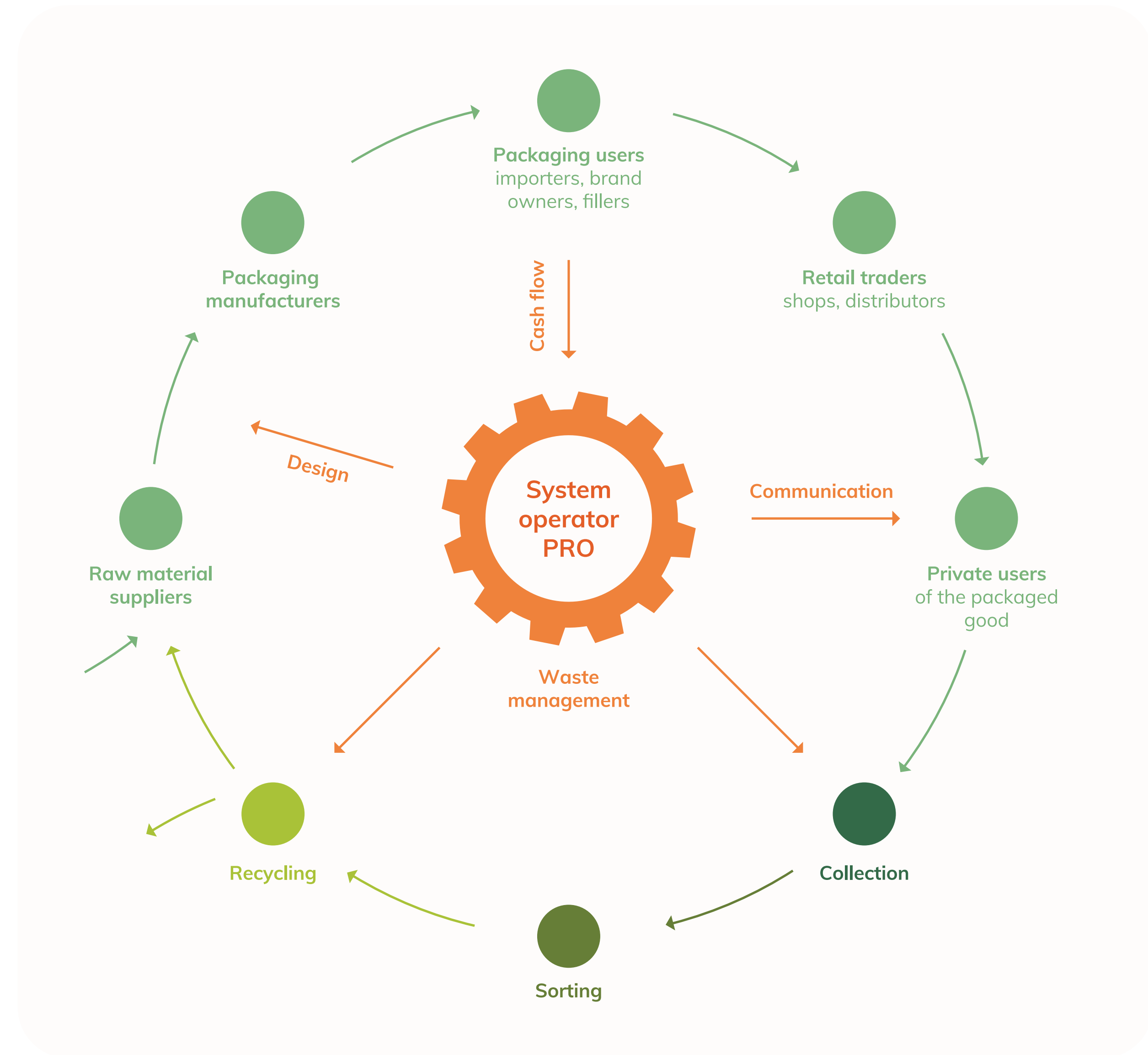


Figure 6. Activities of a PRO. Source: GIZ (2018).

After explaining the basic rationale for an EPR system and its key functions in the previous section, the following table clearly summarizes the underlying principles, including a definition of the EPR, its goals, the actors involved and their responsibilities, and design options.

EPR Principle	Explanation
Prevailing Definition	EPR can be described as an environmental policy which seeks to decrease the total impact of a product, by making the producer responsible for its entire life-cycle, including take-back, recycling and final disposal
Objectives	<ul style="list-style-type: none"> • Incentivize improvements in upstream processes by fostering design for environment • Induce changes in downstream processes by improving the waste management system
Included actors	<p>Transparent process of collaboration and open sharing among key stakeholders throughout the entire value chain of waste management is needed. Main stakeholders include:</p> <ul style="list-style-type: none"> • National government • Local authorities • Business and producers • Waste management companies • Trade unions • Informal sector • NGOs <p>Next to all these single stakeholders, a PRO, the coordinating part for operating the system should be present in most cases. Ideally the PRO is an industry-led non-profit organization. At the beginning of implementing an EPR scheme mostly a monopolistic PRO is recommended, while when further developed competitive PROs could be established throughout the respective country.</p>

Table 2. EPR Principles. Sources: Ellen MacArthur Foundation (2021); Henzler et al. (2018); WWF (2020, 2022).

EPR Principle	Explanation
Types of responsibilities	<ul style="list-style-type: none"> • Physical (material handling, logistics and collection of waste) • Financial (provision of funds for covering technical and administrative expenses) • Informative (aspects such as awareness raising, information sharing and/or monitoring and enforcement)
Design prerequisites for effectiveness	Transparency and monitoring, a data platform, as well as incentives for circular design and outcomes, material-specific quantitative targets for reduction, reuse and recycling should be included in the initial design of an EPR scheme to be effective. Also, there should be coherence between the EPR scheme and existing policy instruments developed to reduce pollution (e.g. bans, waste taxes, labelling, awareness campaigns etc.).
Financing and Controlling	<p>In comparison to tax programs the money is ring-fenced to specific investments. Money collected under an EPR system should only serve the purpose of collecting, sorting and recycling, as well as awareness raising activities and administration issues. Through the fees, in general all costs for waste management of the products and packaging should be covered.</p> <p>To have positive effects, funding should be:</p> <ul style="list-style-type: none"> • Dedicated (clearly defined scope of activities) • Ongoing (covering ongoing operating expenses) • Sufficient (net cost of establishing and operating the system)

2.3 Different models of EPR

EPR is a flexible policy instrument whose composition varies depending on the context in which it is introduced (Dimitropoulos et al., 2021). In the following table the most common different EPR set-up possibilities are displayed:

#	Different EPR set-up possibilities	
1	Mandatory The system lays down specific tasks through legislations (e.g. collection targets, recycling rates).	Voluntary The government refrains from enforcing legislation on the condition that the private actors achieve a certain goal.
2	Individual The producers take responsibility for the end-of-life management of their own products. This requires individual administrative capacities	Collective The producers work collectively to exert their responsibility. They mandate a third party, a so-called PROs, to conduct/coordinate collection on their behalf.
3	Monopolistic A single, usually non-profit, organization (PRO) is coordinating collection and recycling in a centralized fashion	Competitive Multiple, usually for-profit, organizations (PROs) compete for customers (producers). This approach may (should) be supported by coordination bodies collectively established by the PROs.
4	Industry-led The system is established by companies, associations or other organizations from the private sector and usually supervised by public authorities to ensure they fulfil their roles and responsibilities.	State-led The system is being run by a public authority, usually as part of a department within a ministry. The EPR fees are mostly collected within a central fund.

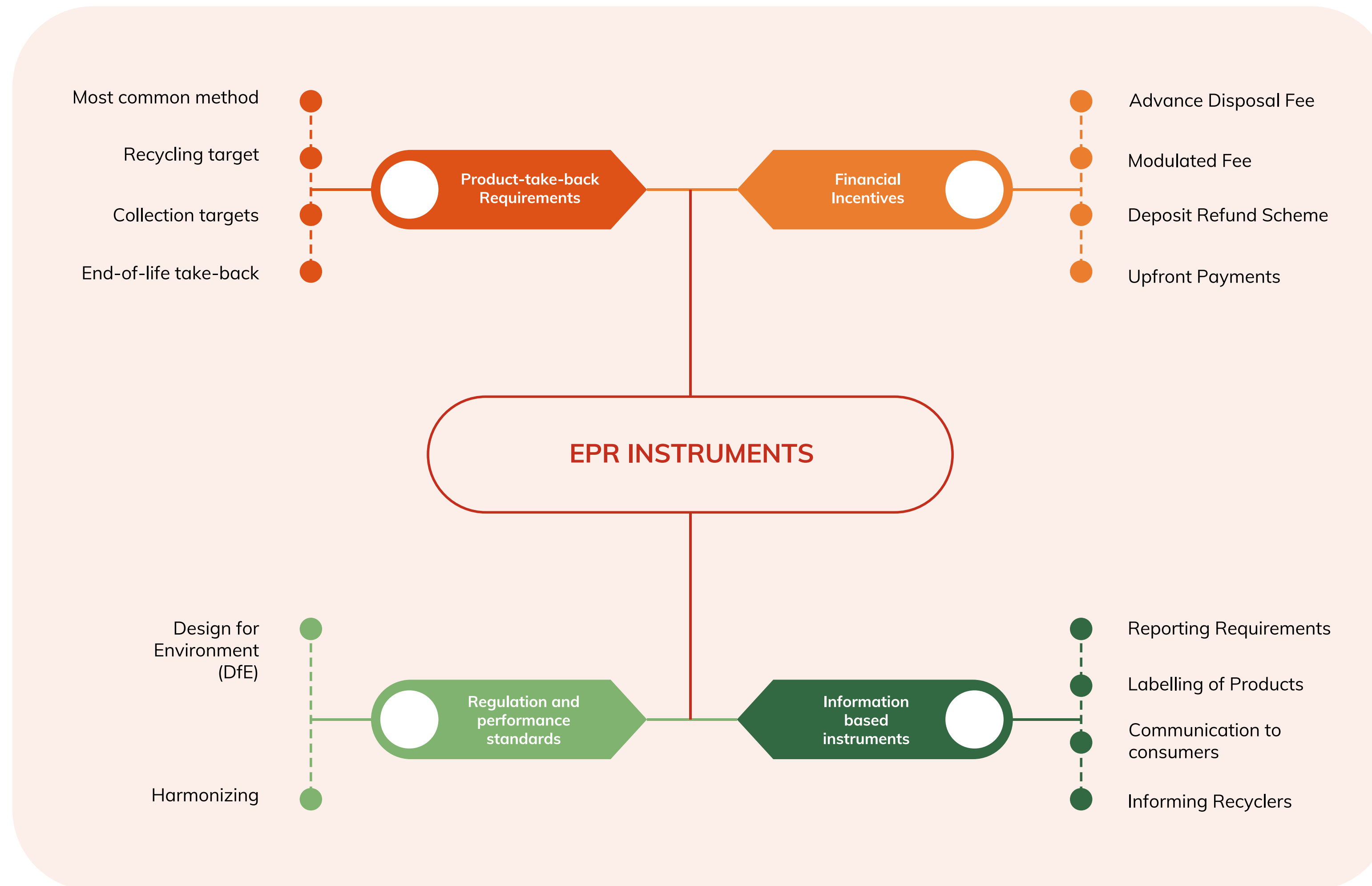
Table 3.
Different EPR set-ups.
Own presentation.

#	Different EPR set-up possibilities	
5	All packaging In the EPR scheme for all packaging all packaging material are system-relevant. Thus, the PRO has to set up and operationalize a system for all materials like plastics, paper & cartons, metals, glass, and all composites and beverage cartons	Selected Packaging in EPR for specific packaging only certain, selected packaging is system-relevant, such as only plastics, meaning that the producers and importers only need to pay an EPR fee if their packaging is made up of this specified material. This can lead to undesired substitution effects through producers and importers substituting their packaging material with materials for which they do not need to pay.
6	Full-cost principle States that all producers pay a flat fee (per ton) to cover the costs of the EPR scheme	True-cost principle Argues that producer 's levies are linked with the true cost of end-of-life management and/or eco-design efforts

2.4 EPR Instruments

While there are a number of policy tools available to implement the EPR system, the EPR concept itself offers little guidance as to which of these tools might be most appropriate. In order to select and evaluate the appropriate policy instrument, the objective of the EPR scheme must first be clearly defined (OECD, 2004). When policymakers must select specific policy instruments, trade-offs between simplicity and complexity combined with high administrative and monitoring costs arise. However, OECD (2016) notes that the appropriate functioning of an EPR system is ensured by **four broad categories of EPR policy instruments**, in addition to the responsible actors. These four categories are not mutually exclusive, but can also support each other's implementation.

Figure 7. Take-back requirements for end-of-life products. Source: Dimitropoulos et al. (2021).



2.4.1

Product-take-back requirements:

Dimitropoulos et al. (2021) emphasize that product take-back obligations are among the most common EPR instruments and are based on the idea that producers must take back a certain amount of their products at the end of their life and provide appropriate treatment. The portions to be taken back by manufacturers can be measured either in weight, volume, or units, with weight being the most common

method. The approximately 72% of EPR systems that rely on take-back requirements (OECD, 2016) use a variety of methods to meet these requirements. Some manufacturers may take back the products themselves or purchase the service, others invest the most in consumer awareness to get the products back, and still others implement a deposit refund system to meet the goals.

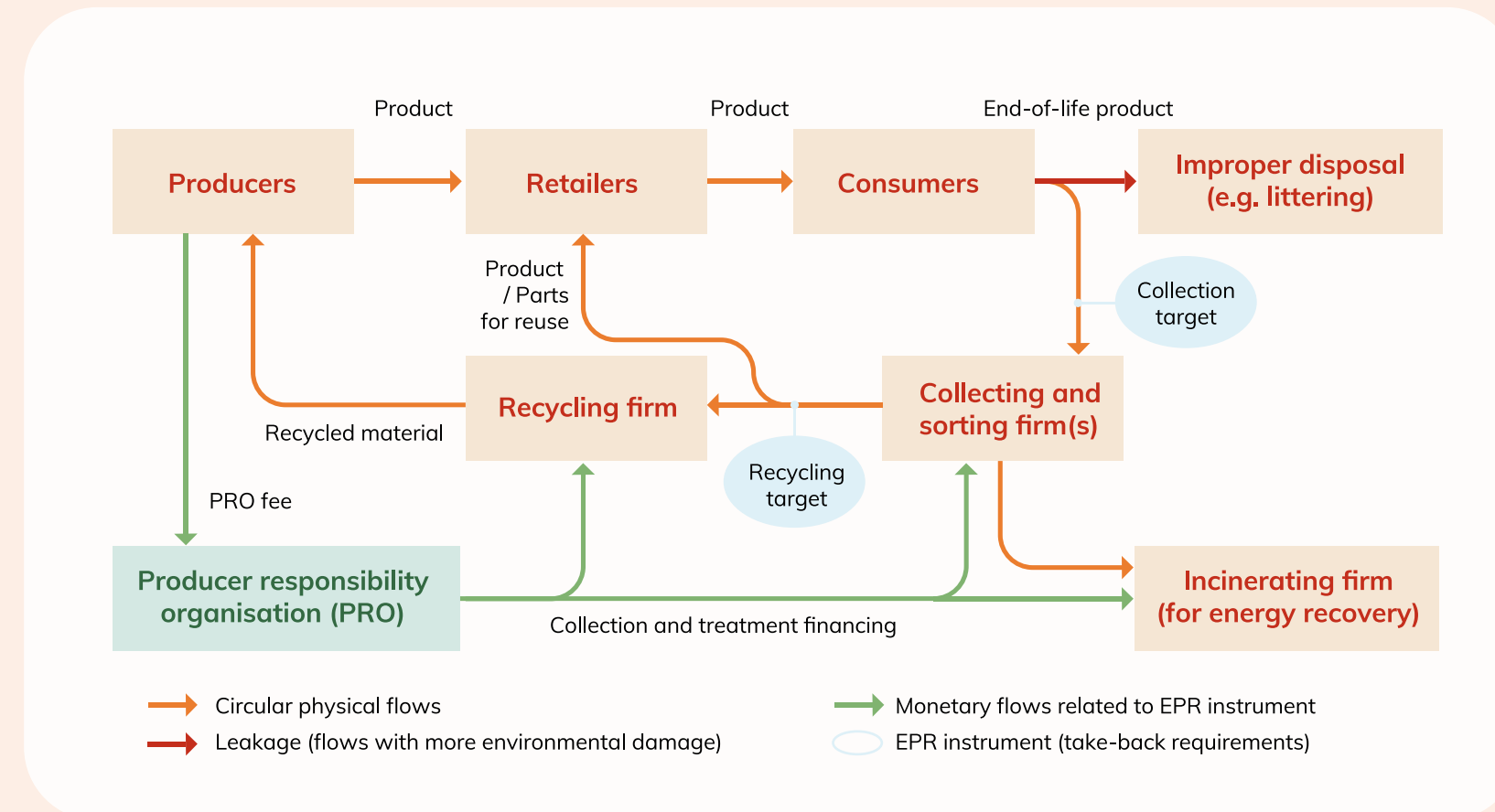


Figure 8. Take-back requirements for end-of-life products. Source: Dimitropoulos et al. (2021).

2.4.2

Financial incentives to implement EPR policy

Under the category of financial incentives there fall different methods like for example:

- **An Advance Disposal Fee (ADF):**

This is a charge levied on certain products when they are purchased by consumers. It aims to cover the operating costs of collecting and treating the end-of-life product, as well as communication and awareness-raising activities (OECD, 2021). The fee

usually depends on the aforementioned operating costs rather than on the design elements and recyclability of the products. This means that the fee in itself does not incentivize a more circular product life cycle, as it does not promote upstream solutions for better recyclability, nor does it incentivize consumers to properly dispose of products after use (Dimitropoulos et al., 2021).

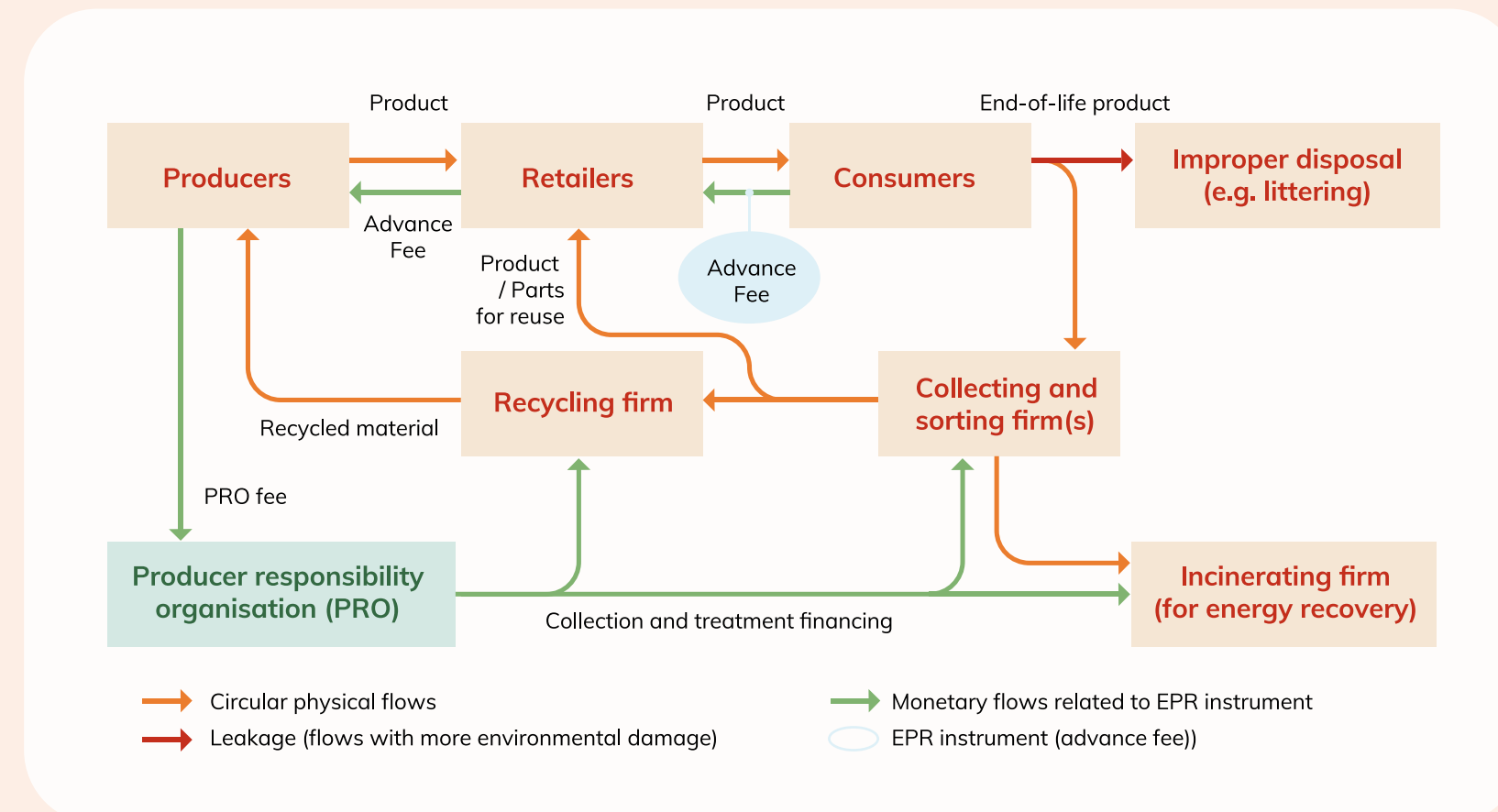


Figure 9. Financing collection and treatment through an advance fee. Source: Dimitropoulos et al. (2021).

- **A Modulated Fee:**

The problem that a regular advanced disposal fee is not able to create further incentives among producers or consumers is specifically addressed by modulated fees. Modulation of EPR fees aims to charge manufacturers differentiated fees based on a set of criteria that support product design changes for sustainability (Sachdeva et al., 2021). Examples of these criteria include a product's recyclability, actual recycling rate, presence of hazardous substances, consumer awareness, recycled content, product lifespan, and waste prevention (OECD, 2021). By modulating fees according to a clearer set of criteria and forward-looking targets, more targeted incentives can be set for the design. OECD (2016) particularly highlights the dual benefits to society associated with modulated fees:

- EPR implementation costs will decrease in the future as improved design and recyclability save costs for PROs, businesses, and ultimately consumers.
- There will be fewer environmental risks and impacts when design changes are made, such as moving toward a higher percentage of recycled material in the manufacturing of materials.

Good practice examples of the implementation of such modulated fees are visible in many European countries. In Belgium for example the EPR fee for

transparent PET is more than five times cheaper than the price of colored PET, because transparent PET is way easier to be recycled (Fost Plus, 2022). Also, in France the fee is 50% higher for some mixed-material packaging items and even 100% higher for non-recyclable material and opaque PET with >4% mineral filler (CITEO, 2021).

- **Deposit Refund Scheme (DRS):**

Another common instrument for the implementation of an effective EPR scheme is a DRS where the consumers pay a deposit to producers or retailers when buying a product and receive an equal or at least a part of the amount back when returning the product. This method has primarily been used for the take-back of beverage containers and incentivizes consumers to separate specific goods from others and return them to targeted collection stations (Dimitropoulos et al., 2021). For this specific policy instrument most responsibility is assigned to the consumer rather than to the producers and the main focus lies on reduction in material use through reuse and recycling (OECD, 2004).

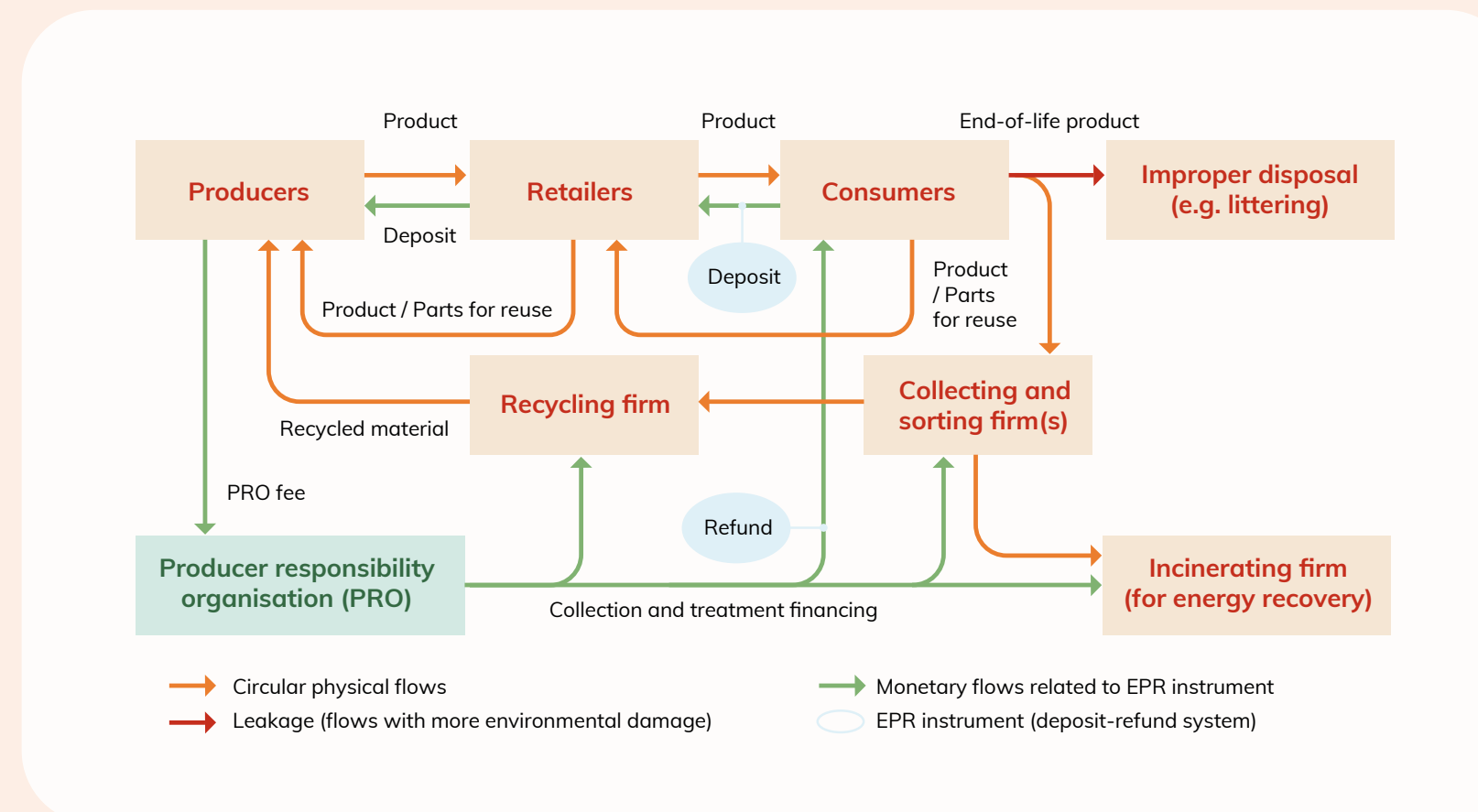


Figure 9. A DRS for end-of-life products returning to producers via retailers. Source: Dimitropoulos et al. (2021).

2.4.3 Regulation and performance standards

Design for Environment (DfE) strategies should be introduced hand in hand with the introduction of an EPR fee or awareness-raising measures. Apart from these two tools, however, they can also be promoted through regulations and performance standards. For example, specific rules for selecting environmentally friendly materials, reducing material consumption, optimizing production techniques and distribution systems, and reducing impacts during and after use can force greater attention to the DfE idea (Lindhqvist, 2000). In combination with taxes, such DfE standards can strengthen incentives for product redesign. They can be mandatory or applied by industry itself through voluntary programs. Especially for globally traded and imported products, better incentives for eco-design could also be achieved by harmonizing standards for environmentally sound design. Product standards, like the minimum recycled content, the specification of a minimum amount of secondary materials per product or determination of other materials used in production can foster upstream solutions for plastic waste recycling through innovative product design.

2.4.4 Information based instruments

As the responsibilities within an EPR scheme, do not only reflect financial and operational responsibility but also focuses on dissemination of information regarding environmental properties of products and waste management, informative policy instruments build the last pillar of enabling an effective EPR scheme (Lindhqvist, 2000). Some examples for information-based EPR instruments are listed below:

- Reporting requirements
- Labelling of products and components which transmits information about the environmental characteristics of products, their recyclability or recycled content to consumers (e.g. product durability labels)
- Communicating to consumers about producer responsibility and waste separation
- Informing recyclers about the materials used in products.

2.4.4 Summary of EPR instruments and their impact on innovation


In order to relate the implementation tools described above to the innovation and upstream effects to be achieved, the following table was designed. It shows which influences the individual instruments can have on product innovation, redesign, material use and consumer behavior and thus on long-term remodeling of the system. The table does not include all instruments related to EPR, but refers only to the above-mentioned exemplary instruments.

Table 4. Effect of specific EPR instrument on product innovation and consumer behavior. Own presentation based on OECD (2004).

	No product innovation	Product innovation	Product redesign	Modified material use	Consumer behavior change
Regulatory instruments					
Take back requirements			●	●	●
Economic instruments					
ADF	●				
Modulated fee		●	●	●	
DRS	●			●	●
Regulation and performance standards					
DfE		●	●	●	
Information based instruments					
Labelling of products		●			●
Reporting requirements	●				
Consumer communication	●				●
Others					
Voluntary schemes		●		●	●

2.5 Design of the EPR scheme

Following recommendations of the Ellen MacArthur Foundation (2021), WWF (2022) and World Bank Group, (2022) some basic design features for introducing an EPR scheme have to be kept in mind:

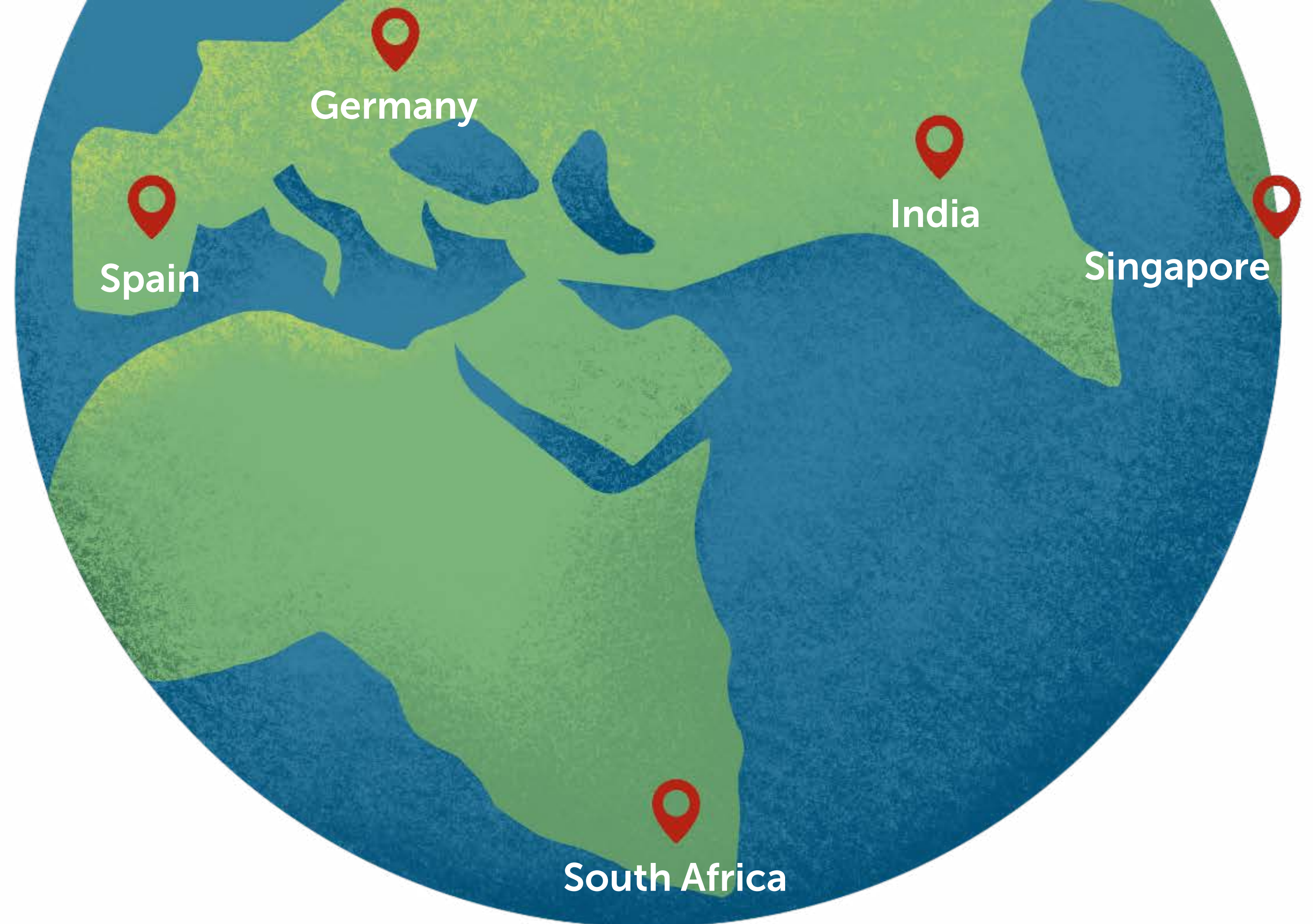
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- 1** The EPR scheme should have the core-function of steering the country of implementation from a linear to a **circular economy** and prioritizing actions according to the **waste hierarchy** (reduction, reuse, recycling).
 - 2** The specific **country context** and **coherence** between the newly introduced EPR scheme and **already existing country-wide and international policy frameworks** should be given.
 - 3** Transparent processes of **knowledge exchange** and open **sharing among key stakeholders** throughout the entire value chain of waste management in the specific country and beyond national borders. This can enrich policy formulations and can lead to lessons learnt in an international setting.
 - 4** **Targets and objectives** for the country should be precisely formulated, so for example minimum amount of sorting and collection requirements, as well as time-bound recycling targets should be set up front.
 - 5** There should be mechanisms in place for **robust and transparent reporting, monitoring and enforcement** in order to prevent unfair advantages for those not meeting their obligations (free-riders). Also, **data gathering and tracking** needs to be implemented to draw conclusions on results on decisions regarding collection and recycling rates, and if necessary adapt them.
 - 6** **The scope of covered materials**, so the packaging types and materials included in the regulations should be clearly defined, so that it does not happen that obliged industries replace one material with another just as harmful material that does not fall under the regulations.
 - 7** Targets and incentives regarding **upstream packaging solutions**, like **eco-modulated fees** and reusable packaging requirements and standards should be envisioned.
 - 8** There has to be a **clear definition of roles and responsibilities of stakeholders** involved in order to distribute financial, operational and informative tasks related to the EPR system. A **PRO** has the key responsibility of coordinating and operating the scheme and should be set up by the industry at the beginning of the EPR introduction.
 - 9** The **fees set by a PRO** should cover all net costs for waste management of the products or packaging and should be **ring-fenced** to measures exclusively related to the purpose of collecting, sorting and recycling.

3 /

EPR in practice

After highlighting the rationale, the functioning, and the prerequisites and best possible design options for implementing a successful EPR system, this chapter of the manual aims to illustrate to the reader best practice examples of EPR around the world. From already very advanced, to EPR schemes that are still in the early stages, different cases are covered and aim to provide insight into the different types, implementation methods and impacts of a single system in different countries. Especially in the SIDS context, it is important not to simply copy policies from already advanced countries, but to collect ideas for gradual implementation. The following performance evaluations for different countries illustrate the positive effects derived from the implementation of EPR. As the schemes can differ greatly from each other any real comparison between the following EPR schemes is difficult.

- Germany
- Spain
- India
- South Africa
- SIDS – Kiribati & Palau
- Singapore



3.1 Germany

3.1.1

Overview

Characteristics	Germany
EPR form	Competitive EPR system consisting of 10 PROs
Scope of material included	Glass; paper & cardboard; plastic, steel & aluminum
Costs for producers	Differing depending on material: <ul style="list-style-type: none"> • 27.33 €/ton for glass • 50.72 €/ton for paper and cardboard • 453.14 €/ton for plastics, steel and aluminum
Special Features	Grüner Punkt, Central Agency Packaging Register

Table 5. Overview German EPR characteristics. Own presentation.

3.1.2

Background: From the initial Packaging Ordinance to the Packaging Act

As waste became a real political problem in Germany in 1990, when both landfills and Germany's incinerator capacities were exhausted, the urgency to introduce an alternative waste management system was more than given (Bünemann et al., 2020). This led to Germany being one of the first countries to establish an EPR system for packaging in 1991 in form of the "Verpackungsordnung" (Packaging Ordinance) – the first mandatory legislation worldwide to include EPR for all packaging waste produced by households, commerce and industry (Ahlers et al., 2021). The mandatory system had to be met by binding targets for collection and sorting rates for the first time in 1993. Due to more ambitious targets and the implementation of the higher requirements of the EU Directive 94/62/EC on packaging and packaging waste (1994) into national law, the Packaging Ordinance has been amended several times and most recently replaced in 2019, the Packaging Act became the new standard deciding on EPR measures (Der Grüne Punkt, 2019).

3.1.3

A special feature of the EPR system in Germany

The green dot is a globally recognized symbol, first introduced in Germany, that is visible on all packaging managed by an EPR system. It is intended to show consumers that producers are fulfilling their obligations under the Packaging Ordinance, or now the Packaging Act. To be able to use the Green Dot the producers have to pay a fee based on the weight of each item and the materials used to make it. However, it is not only a symbol, but also a guarantee that packaging producers comply with the European Directive 94/62/EC on packaging and packaging waste, which establishes the EPR as a mandatory measure. Over the last few years, 33 European countries have adopted the Green Dot as a funding and participation symbol for collection, sorting and recycling (Deutsch-Schwedische Handelskammer, n.a.).

3.1.4

From a single non-profit PRO to a competing for-profit PRO with a central register

In the beginning, the system consisted of a non-profit PRO, the ubiquitously known Dual System Germany, which collected the necessary funds for the effective running of a waste management system. From 2003, the system changed to a competitive one consisting of several for-profit PROs (Ahlers et al., 2021; Bünemann et al., 2020). Until today, the system works in such a way that the total volume of packaging under the EPR system is divided among different PROs and that in each area a packaging collection system is predominant. As of now 9 PROs are active in Germany's EPR system, which have to conduct more competitive tendering procedures for the employment of waste management companies. As a result, the cost of collection and recovery in the German EPR system has fallen significantly, which is also reflected in lower participation fees for generators (Ahlers et al., 2021).

Since the introduction of several competing PROs meant that the transparency of the system and the identification of free riders could no longer be guaranteed, the Central Agency Packaging Register (the Central Agency) was established to minimize distortions of competition and strengthen recycling quotas (Ahlers et al., 2021). The Central Agency, as a private non-profit foundation, is responsible for registering manufacturers and importers, receiving and verifying the data reported by obligated companies and public institutions, and performing

administrative tasks such as consulting and informing the state regulatory authorities (Lizenzero, n.d.).

Following points have to be ensured by the Central Agency (GIZ, 2018):

1. Obligated Companies must register with the Central Office before they may commercially market packaging materials.
2. Obligated companies must register their commercial-consumer packaging materials with an EPR system before commercially marketing them.
3. At least once a year, obligated companies must report the mass (total weight) of the packaging materials they market, along with information about the materials they contain. The reports must be submitted simultaneously to their chosen system and to the central office.

3.1.5

Scope

In most parts of Germany, packaging waste was collected in three different fractions from 1993 onwards (GIZ, 2018):

- Paper, cartons and cardboard collected at central collection points
- Glass collected at central collection points
- Lightweight packaging collected from households in yellow bags or bins

Now the packaging covered by the EPR scheme includes all types of retail packaging or outer-packaging ending as

waste at the level of private households or comparable sources (private end-consumers). Also included is packaging intended for the handover (service packaging) and shipment of goods (shipping packaging), as well as secondary packaging offered to the end consumer and packaging that facilitates the handling and transport of goods (transport packaging) but is not generally intended to be passed on to the end consumer.

3.1.6

Involved Producers

Under the German Packaging Act from 2019 all producers, i.e. domestic producers or importers introducing packaged products to the German market (or other initial distributors of packaging subject to participation in the EPR system) have to assign a PRO for collection, sorting and disposal of all packaging put on the market.

3.1.7

Costs

Contributions charged by PROs comprise of their administrative costs, individual costs for waste management operations (collection, sorting and recycling/recovery), the common fees paid to the municipalities for the rental and cleaning of container locations and for their waste consultation services (municipal communication to citizen). Additional costs include the cost connected to running the central agency, legally required joint communication and awareness raising campaigns (Ahlers et al., 2021).

3.1.8 Costs over time

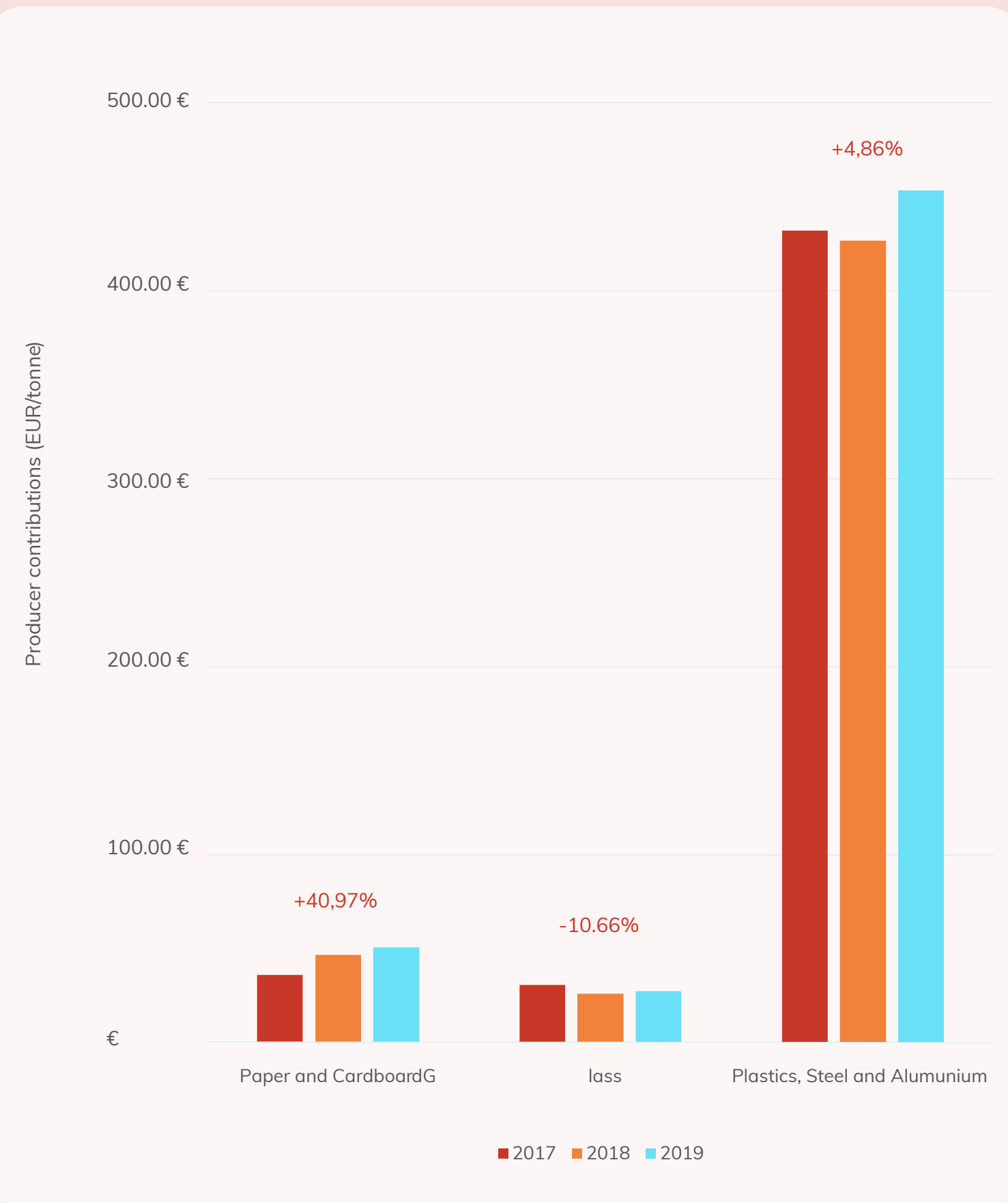


Figure 11. EPR fees over time in Germany. Source: Ahlers et al. (2021).

3.1.9 Improvements of the system in terms of collection rate:

An impression of how the recovery rate has changed from the time the EPR system was introduced in Germany is reflected in the figures of the Gesellschaft für Verpackungsmarktforschung (2020) or Society for Packaging Market Research. Their analysis shows that the recycling of packages in private final consumption has increased from 37.3% in 1991 (the year the EPR system was introduced) to 94% in 2019.

These figures give an indication of how well the recovery system is now working in Germany, but say little about whether this is due to the responsibility of the PROs or not. Precisely because these figures, which show the collection rates on the basis of the total quantity introduced to the market, are rather inaccurate and difficult to calculate, it was decided that the collection rates would be calculated in relation to the quantity of packaging introduced to the German market by the companies participating in the EPR system. Taking this approach yields the following results: Recovery volumes in Germany based on the system participation volume rather than on the market volume go from over 100% in 2014 to 84% in 2018 (Ahlers et al., 2021).

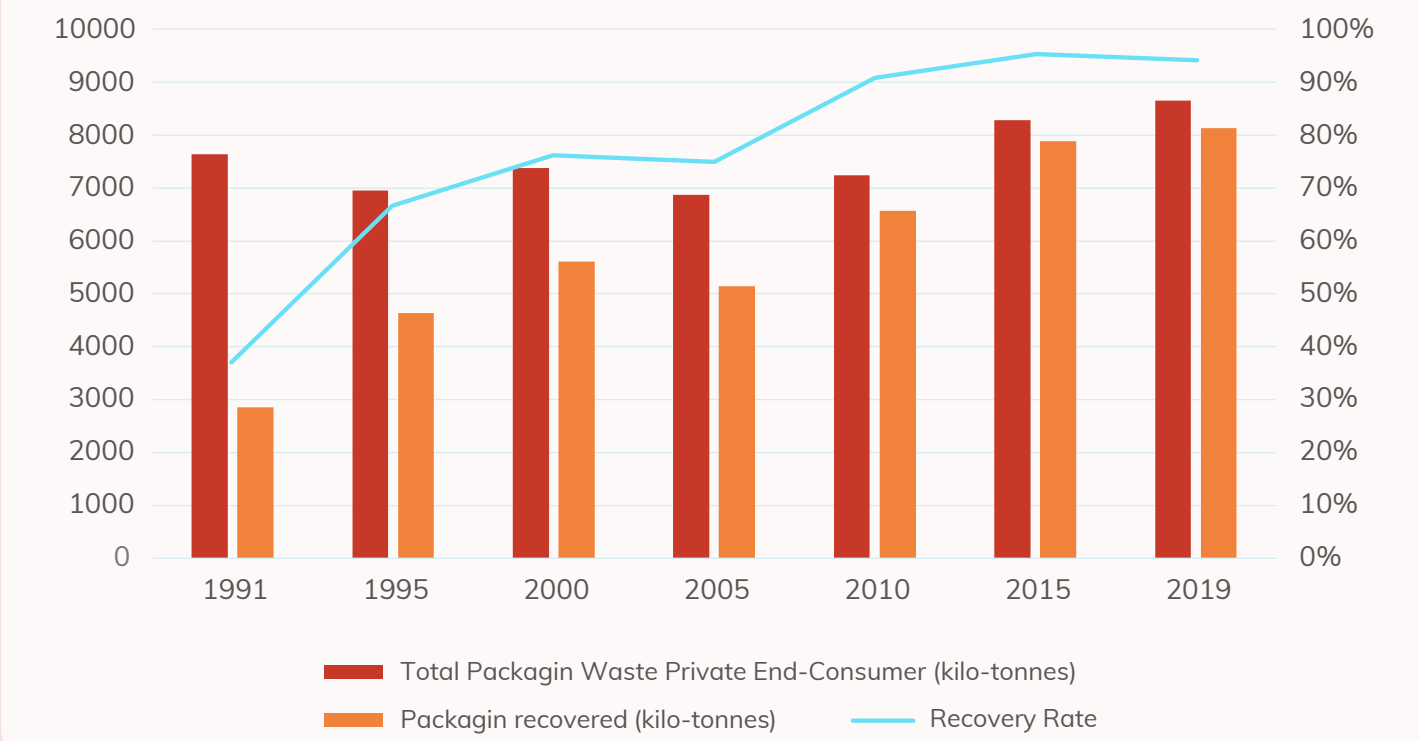


Figure 12. Recycling Rates over time in Germany. Source: Gesellschaft für Verpackungsmarktforschung (2020).

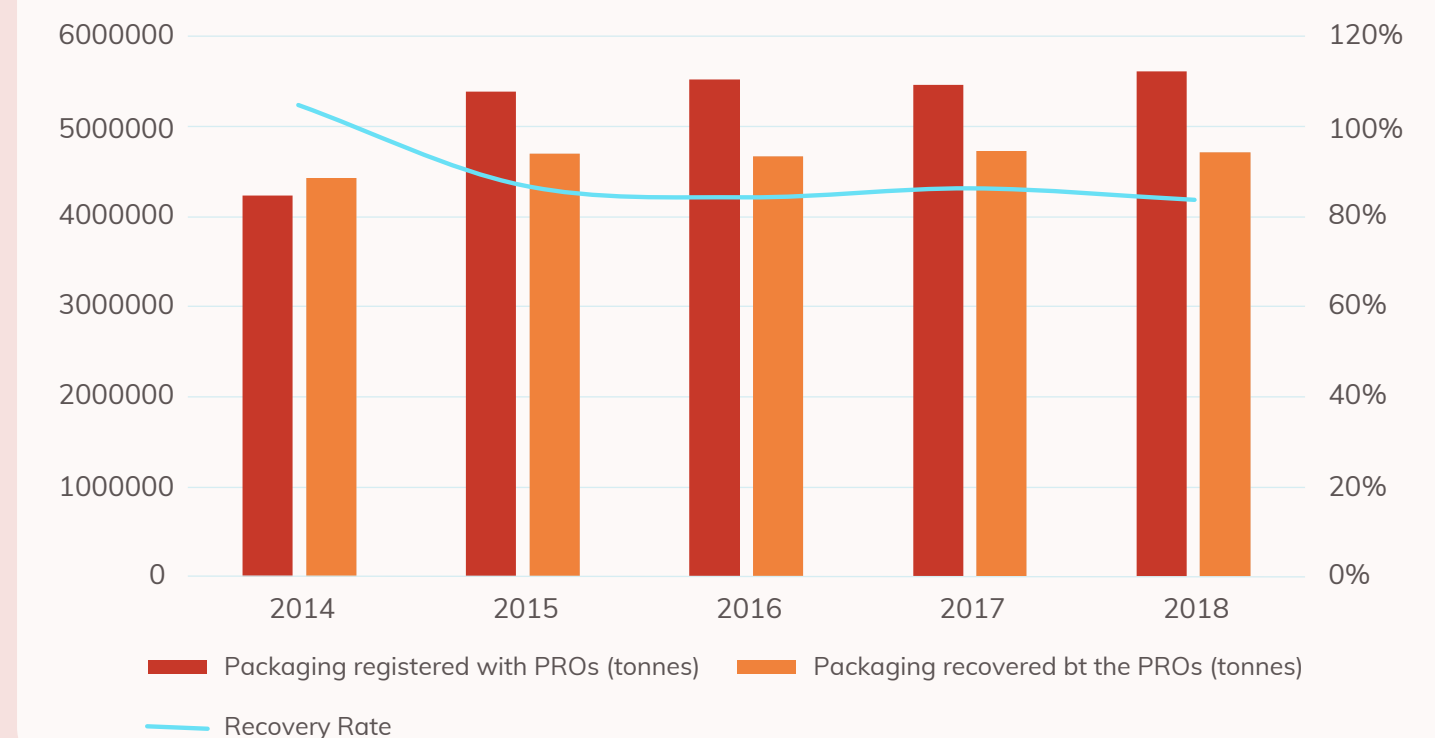


Figure 13. Recovery Rate Germany over time. Source: Ahlers et al. (2021).

3.2 Spain

3.2.1

Overview

Characteristics	Spain
EPR form	Monopolistic system
Scope of material included	Packaging
Costs for producers	Differing depending on material: <ul style="list-style-type: none"> • 440 €/ton for PET • 367 €/ton for HDPE • 960 €/ton for flexible HDPE, LDPE and other materials • 514 €/ton for food and drink cartons • 91 €/ton for paper and cardboard • 146 €/ton for steel, • 113 €/ton for aluminum • 20 €/ton for ceramics • 11 €/ton for wood and cork
Special Features	Ecoembes' Circular Lab as technological knowledge hub for circular waste solutions

Table 6. Overview EPR characteristics Spain. Own presentation.

3.2.2

Background

Spain has a comprehensive waste management legislation in place including all types of waste, whereby the strictest regulations are in place for hazardous wastes. It implemented the European Packing Directive and the scope of the national EPR scheme includes packaging waste and glass, each managed by a separate PRO. These two PROs, called Ecoembes (founded in 1996 for management of packaging waste) and Ecovidrio (founded 1997 for management of glass waste), take care of managing the collection, sorting, recovery and recycling of the household packaging waste all over Spain and are financed by packaging producers through a 'Green dot' scheme (Rubio et al., 2019). The EPR principle is specifically included in Law 22/2011 on waste and contaminated soil. Through this law obligations for producers in terms of product design, manufacturing and management of end-of-use products and waste are laid out (Rubio et al., 2019). In addition, a new model and normative framework is defined under the EPR Collective Systems (Rubio et al., 2019). The two key legal instruments for reaching national EPR targets are two national plans derived from the process of transposition of the European Community Directive 2008/98 EC (Waste Framework Directive, WFD) in Spanish legislation (Rubio et al., 2019):

- The National Plan for Waste Management 2016-2022 (PEMAR, in the Spanish acronym)
- The National Program for Waste Prevention 2014-2020

While Spain nowadays has one of the world's most advanced EPR scheme in place and could achieve noteworthy advancements in this field (e.g. the achievement of an increasing collection rate over the years, with a 80,2% collection rate in 2019), certain enforcement challenges remain which can be traced back to a number of factors: a geographically dispersed population distribution, unique climatic conditions and the dominance of international brands. With large parts of the population living in very different types of settings; either in the greater Madrid area, in coastal towns and on islands, the collection rates differ vastly as well. Moreover, Spain is affected by heat much more than comparable European countries (such as Germany, Belgium or Sweden) making a frequent collection crucial to avoid malodorous. Some of the efforts undertaken by political authorities have been undermined by the competitive settings of international markets that major producers take part in. These issues need to be addressed by further advancements in the European legislation.

3.2.3

Scope

The responsibility to manage packaging waste lies with the local authorities. They collaborate with the PRO who implements the entire collection and recycling process. Packaging waste is legally defined as household packaging waste, thus excluding commercial and industrial packaging producers from EPR obligations. The packaging waste gets sorted in metals, (steel and aluminum), plastics (PET, HDPE, Film and Plastic Mix) and used beverage cartons (brick packaging) (Ahlers et al., 2021).

Ecoembes (n.d.) categorizes the type of packaging that must be reported as Integrated Management System packaging. This category includes, for example, packaging consumed by private individuals, packaging for household use, or bags used in stores to transport purchased goods. Products that must be declared voluntarily are referred to as non-SIG packaging and include, for example, commercial packaging and non-household packaging as well as industrial packaging.

3.2.4

Involved Producers

Obligated to pay EPR fees are all household packaging producers and additionally producers that put at least 350 tonnes of packaging on the market are required by law to establish a waste-prevention plan (Ahlers et al., 2021). These prevention plans must be developed with respect to the quantity (the amount of material used) and the quality (e.g. toxicity) of the waste to be avoided by the respective generators.

It is important to not only include producers into the obliged group but also incorporate packers, traders and importers (Rubio et al., 2019).

The obligated parties are either forced to establish their own Deposit and Return System, or join a PRO. Producers of commercial and industrial packaging are exempt from this obligation as they may transfer the responsibility for the waste to the final waste-holder (Ahlers et al., 2021):

3.2.5

Costs

Costs are defined by the operating PROs Ecoembes and Ecovidrio. At Ecoembes for example in 2016, the cost related to selective collection, sorting and treatment represented 87% of total cost; meanwhile R&D activities and internal cost summed up 8%, leaving 5% of costs for marketing campaigns.

Based on these cost distributions the obliged industries have to pay a specific fee to the PRO. But the contribution to the PROs income is not only done by the obliged industry. The income structure is based on two main pillars (Ecoembes, n.d.):

- The contribution made by companies joining the system and the Green Dot fee make up for 87% of the income.
- The collected packaging sales make up for 13% of the income.

3.2.6 Costs over time

Through the webpages and reports of Ecoembes and Ecovidrio the EPR fees to be charged over the last couple of years could be assessed and summarized in figure 13.

While according to the PROs the increase in EPR fees for the producers is mainly related to higher volumes of packaging waste collected and sorted by local authorities, it can be assumed that existing financial

reserves have been largely depleted and thus higher costs can no longer be offset (Ahlers et al., 2021). Additional factors influencing the fee levels are believed to be the strong bargaining position of local authorities which have cooperation agreements with Ecoembes and Ecovidrio. Because of their outstanding and powerful position they may be able to charge comparatively high fees for their collection and sorting services (Ahlers et al., 2021).

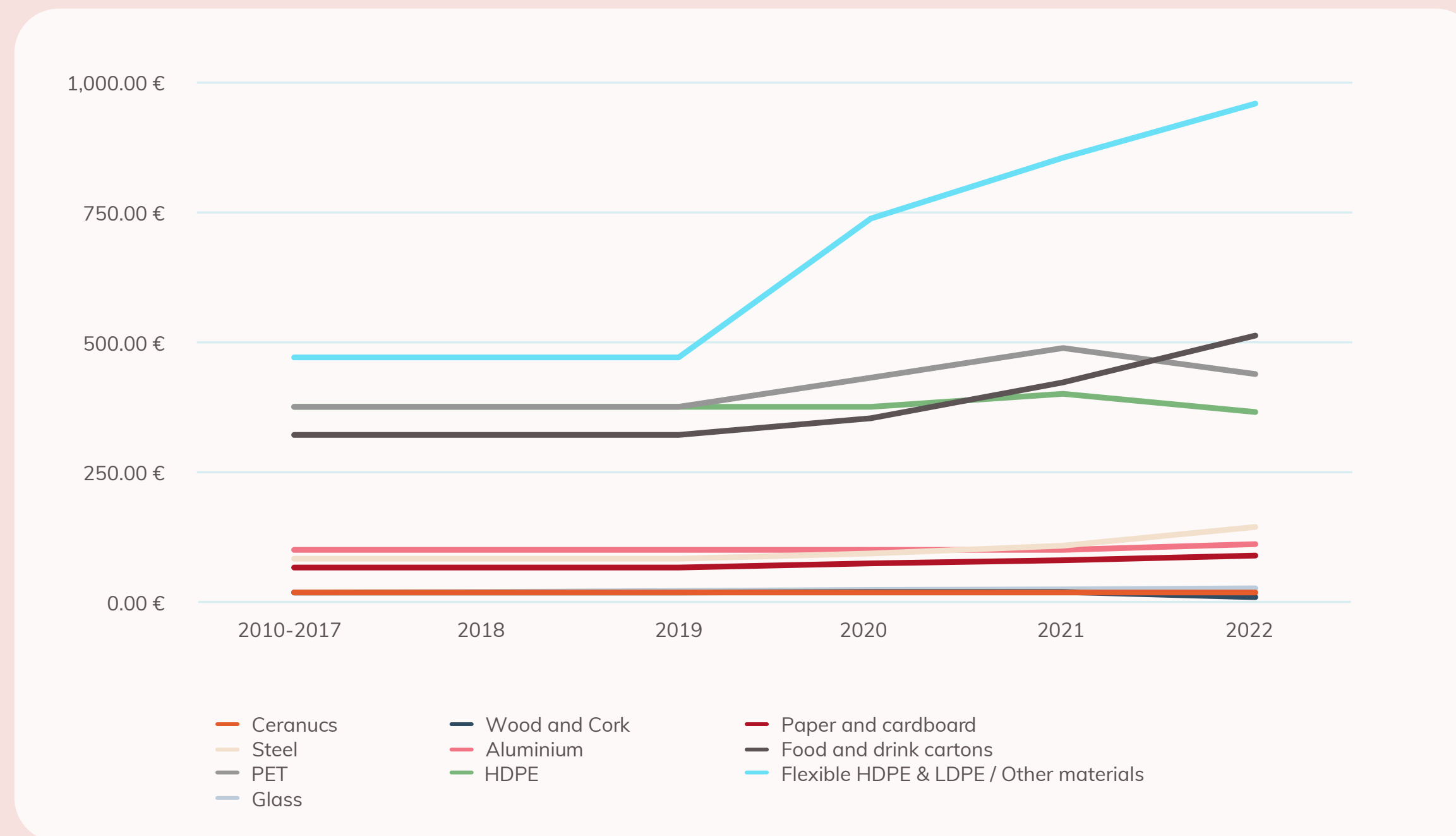


Figure 14. EPR fees over time. Sources: Ahlers et al. (2021); Ecoembes (2022); PRO Europe (2021).

3.2.7 Improvements of the system in terms of collection rate

The collection of household packaging waste in Spain is carried out via yellow (plastic and metal) and blue containers (paper and cardboard) to which citizens can deposit their household packaging waste (bring system). The number of these collection containers increased steadily from 2015 to 2019 (Ahlers et al., 2021). To have these containers is essential for the whole process of waste management as the right sorting is key for a viable and functioning waste management structure. For this reason, Ecoembes has ensured that 98% of Spanish cities have access to the separate collection of plastic packaging, cans and boxes and 99% to the separate collection of paper and cardboard (Rubio et al., 2019). Additionally it is ensured that 53% of the Spanish population has a green container less than 50 meters away from their home (Rubio et al., 2019).

Through these measures and strong corporations with local authorities Spain became one of the 18 EU Member states that surpassed the 45% collection rate and accounted for a 80.7% collection rate in 2020 (Ecoembes, 2021). Despite the growing volumes of packaging put on the market, Ecoembes has achieved a steady improvement in the collection rate over the last 18 years (Ahlers et al., 2021). Data on the amount of packaging waste collected, sorted and recycled, as well as the amount of waste collected from yellow and blue containers and sorted fractions delivered to recyclers, must be reported by local authorities to Ecoembes on a monthly basis via a web application to ensure continuous updating and collection of data (Ahlers et al., 2021).

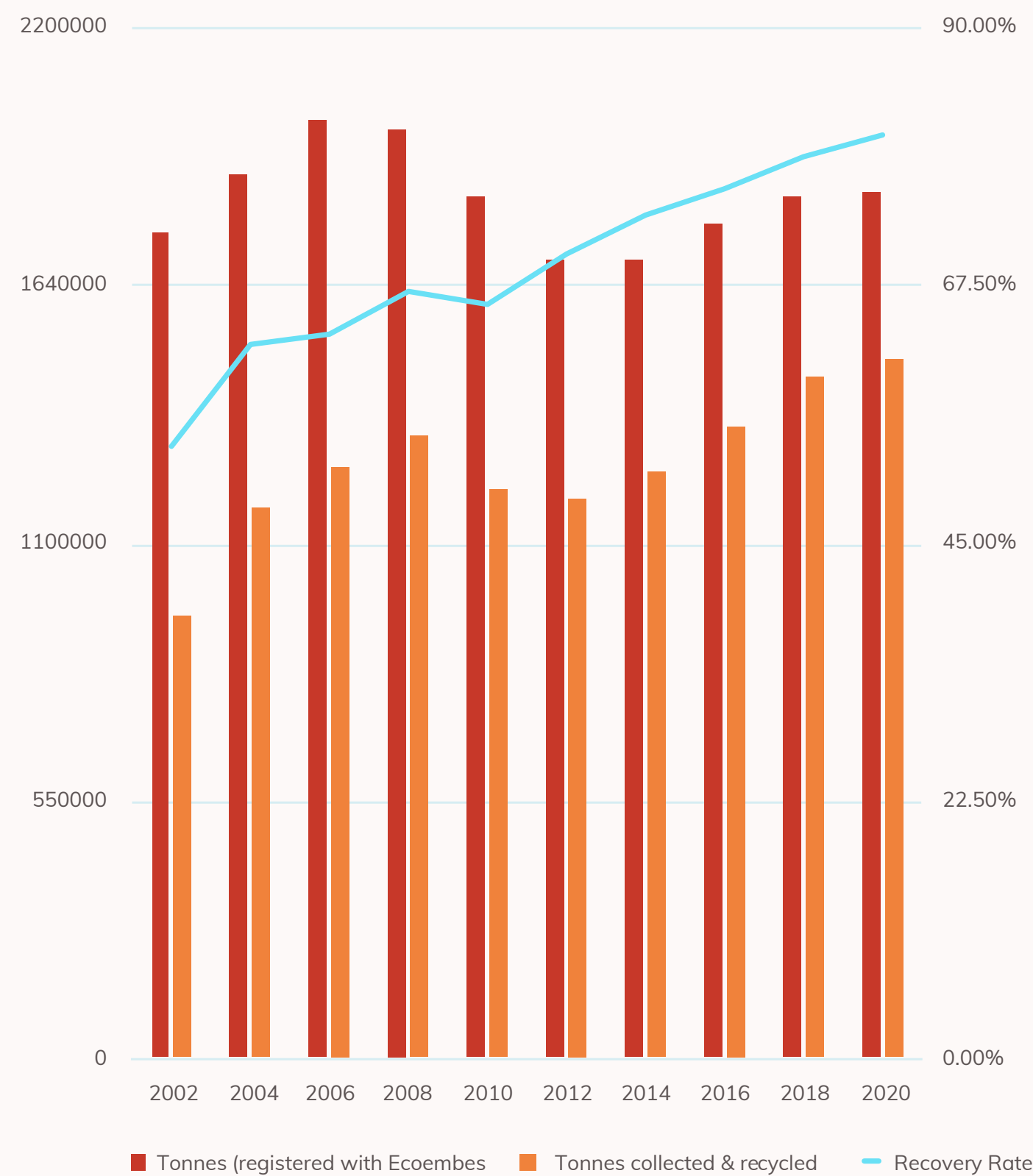


Figure 15: Development of collection/recycling rates of household packaging waste in Spain. Source: Ecoembes (2021).

3.2.8 Challenges

Although the EPR system in Spain already seems to be very well established, some challenges remain. Firstly, the distances between some cities is large, collection often takes long and service not frequent enough, resulting in bad odor due to the heat.

Another problem lies within the data reporting. Although it seems well described and structured Ecoembes is the only institution involved in the verification and compilation of statistical data of waste management in Spain. As no third party is validating the process it can lead to problems regarding the validity and veracity of the data (Talking Trash, 2020).

3.2.9 Extra-efforts for a better waste management in Spain

Not only does the collection, sorting, and recycling of waste play a role for PROs, but environmental improvements in packaging and behavioral changes of the society are also promoted in several other ways. For example, Ecoembes promotes eco-design avoidance plans and training focused on eco-design and selective collection and recycling systems (Rubio et al., 2019). Specific recommendations to achieve the first point are:

- Reduce packaging weight
- Inclusion of recycled materials in the production process
- Simplifying the composition thus increasing the recyclability of the material

Another innovative tool to promote ecological waste management in Spain is the so-called Circular Lab by Ecoembes. This is an open innovation center founded in 2017 with the aim of promoting sustainability in packaging design and efficiency improvements in collection, sorting and recycling. It serves to exchange knowledge and innovations with regard to circular waste management. To this end, it carries out activities in four innovation areas: Packaging of the Future, Awareness, Smart Waste and Entrepreneurship (Ahlers et al., 2021). An example of impact is the “Pack CD”, which as an innovative tool helps companies to predict and modify the impact of their packaging before it is produced and gives advices to potential design improvements (The Circular Lab, 2022a). The lab is also involved in an innovative project called “RECICLOS” that aims to reward sustainable behavior and environmental commitment of citizens through sustainable and social incentives using mobile technology. An application transforms the habit of recycling into local, sustainable and inventive reward points. The mission is to improve their local environment through conscious actions. In particular, it is about your neighborhood, your city or the quality of life of your neighbors. Incentives are delivered through the app in the form of public transportation discounts, low-emission mobility, donations to NGOs or development projects in your community (The Circular Lab, 2022b)

3.3 India

3.3.1 Overview

Characteristics	India
EPR form	Competitive EPR system
Scope of material included	E-Waste and Plastic Packaging
Costs for producers	Differing depending on state, chosen model and PRO
Special Features	Three different EPR models suggested: <ul style="list-style-type: none"> • Model 1: Fee-based • Model 2: PRO • Model 3: Plastic credits

Table 7. Overview EPR characteristics India. Own presentation.

3.3.2 Background

The creation of waste management legislation for plastics and e-waste began in 2011 and was transformed into general waste management legislation in 2016. After this legislation was amended again in 2018 to include guidance and registration options for PROs, the creation of a single framework for EPRs followed in 2020 (GIZ, 2021). The most recent amendment for the guidelines on EPR in India were published in February 2022, defining even more specifically the responsibilities of the obliged industries, the included material scope and future EPR, recovery and recycling targets (Ministry of Environment, Forest and Climate Change, 2022). With the introduction of EPR, producers are given responsibility for implementing waste collection systems, either individually through their own distribution channels or collectively through the representative local body in their territory (Ministry of Environment, Forest and Climate Change, 2020). In contrast to European countries, the proposed EPR concept, although mandatory, offers a great deal of leeway. This may be due to the different waste management structures that prevail from state to state in India.

Model 1 - Fee-based system:

A central EPR fund will be established, depending on contributions from manufacturers, importers and brand owners, and supervised by the central government. The amount of financial contributions will depend on the amount of plastic put on the market by the participants (Hossain et al., 2022). The resources from this central fund will be made available for three purposes, namely, to finance the Urban Local Bodies (ULB) and the recycling entities and to carry out information, education and communication (IEC) activities. (Ministry of Environment, Forest and Climate Change, 2020).

Model 2 - PRO:

Producers funded, industry-self-managed PROs will be set up and made responsible for their member-producers' waste management obligations (Pani & Pathak, 2021). Although there is an option to partner with a PRO, large generators can also establish their own waste management projects under the EPR guidelines. Producers can therefore decide for themselves whether they want to participate in the establishment of a PRO or support a PRO by paying

fees, or whether they want to take the management of the plastic they produce into their own hands (Ministry of Environment, Forest and Climate Change, 2020). There will be different PRO groups based on their level of experience. For example, Group 1 should already have ten years of experience in waste management, while Group 2 might only have five years of experience. This allows smaller startups to get involved in waste management and reach far-flung places where large, experienced PROs would not venture. PROs must calculate the fee per kg to be paid by producers, considering the full range of costs to be paid for the disposal of plastics. In a non-monopolistic system, costs will vary from PRO to PRO and a competitive market will emerge. For this reason, there is no accurate estimate of the cost yet, as it varies across the states and across the different waste management infrastructures in the country.

Model 3 - Plastic credits:

The third model is very similar to the second model but instead of each individual producer meeting their target, tradeable credits are issued and firms are allowed to trade them among themselves. This mechanism ensures that an equivalent quantity of plastic to what a manufacturer produces is recovered and recycled. This

could be done by buying plastic credits from or trading them with waste processors at market-determined variable prices (Pani & Pathak, 2021). With this method an industry wide recycling target would be met, but there is risk of freeriding.

In summary the **guiding principles of the EPR framework** are the following (Ministry of Environment, Forest and Climate Change, 2020):

- Producers/importers/brand owners are by their own or through a PRO required to ensure an equivalent amount of collected and processed plastic.
- Inclusion of informal waste pickers should help improving their working condition and traceability of data.
- The obliged industries can obtain certificates from accredited processors in exchange of an evidence of recycling or recovery which will then act as EPR compliance.
- The obliged industries can decide themselves if they want to engage individually (through buy-back or deposit refund schemes) or collectively (through a PRO) with the ULB, processors and the informal sector.

3.3.3

Scope

The Ministry of Environment, Forest and Climate Change (2022) defined four categories to be understood by plastic packaging. These categories are listed in the table below. Future recycling targets have been established by the Ministry for these four different categories (see chapter 6.3.4). In the legislation it is stated that only those plastics, which cannot be recycled should be sent for end of life disposal such as waste to energy, road construction, waste to oil or cement kilns.

These categories will also be used to set mandatory proportions of plastic content in products manufactured in the future. For example, the annual share of recycled rigid plastics is to increase from 30% in 2025/26 to 60% in 2028/29. Since rigid plastics are easier to recycle, their recyclable share in the future is significantly higher than the recyclable share of multilayered packaging, where the share is expected to increase to only 10-20% by 2029/29 (Ministry of Environment, Forest and Climate Change, 2022).

Category Number	Type of plastic
Category 1	Rigid plastic packaging
Category 2	Flexible plastic packaging of single layer or multilayer, plastic sheets and covers made of plastic sheet, carry bags, plastic sachet or pouches.
Category 3	Multilayered plastic packaging
Category 4	Plastic sheet or like used for packaging as well as carry bags made of compostable plastics.

Table 8. Plastic packaging categories under an EPR system. Source: Ministry of Environment, Forest and Climate Change (2022).

3.3.4 Obligated Industry

As obliged entities the (Ministry of Environment, Forest and Climate Change, 2022) has identified four different types:

- Producers of plastic packaging;
- Importers of all imported plastic packaging or plastic packaging of imported goods;
- Brand owners including online platforms and marketplaces and supermarkets and retail chains. Additionally, all micro and small enterprises as per criteria of Ministry of Micro, Small and Medium Enterprises will be held accountable;
- Plastic waste processors.

The first three groups (producers, importers and brand owners) have to register themselves through an online centralized portal developed by the Central Pollution Control Board (CPCB) in order to get a certificate. Annual reports of plastic packaging waste collected and processed under the EPR must be submitted to the CPCB or the respective State Pollution Control Board (SPCB) or Pollution Control Committee (PCC), as appropriate, by June 30 of the next fiscal year by these three stakeholders. Furthermore, they have to provide an action plan

which contains category-specific information on their EPR targets and details of the registered recyclers from whom they obtained recycled plastics for new products. In addition, a cross-checking of data is necessary, which will take place through the provision of data by brand owners as well as producers and importers. The brand owners provide details about the plastic packaging provided by the producers/importers, while the latter also provide the quantity of plastic packaging material they have provided to the brand owners. An online platform will help to verify and control this data recording.

Also, the waste processors must register with the corresponding SPCB or PCC on the centralized portal and after the end of every financial year by 30th of April provide information about the different waste categories they processed. The total quantity of processed plastic waste is allocated to producers, importers and brand owners on a percentage basis and published on the CPCB's centralized portal. Certificates are issued for all waste processing strategies that do not relate to plastic in road construction.

3.3.5

Recycling targets

In India, evidence of improvement in recycling rates associated with the implementation of an EPR system is difficult to assess because the system is so new and data collection/tracking has not really been implemented. However, there is some information on the success of the informal sector in terms of recycling. In India, recycling rates achieved by the informal sector range from 50 to 70% (Nandy et al., 2015).

Despite the fact that no improvement rates in recovery and recycling rates have yet been observed, the Ministry of Environment, Forest and Climate Change (2022) has set requirements for future recycling rates.

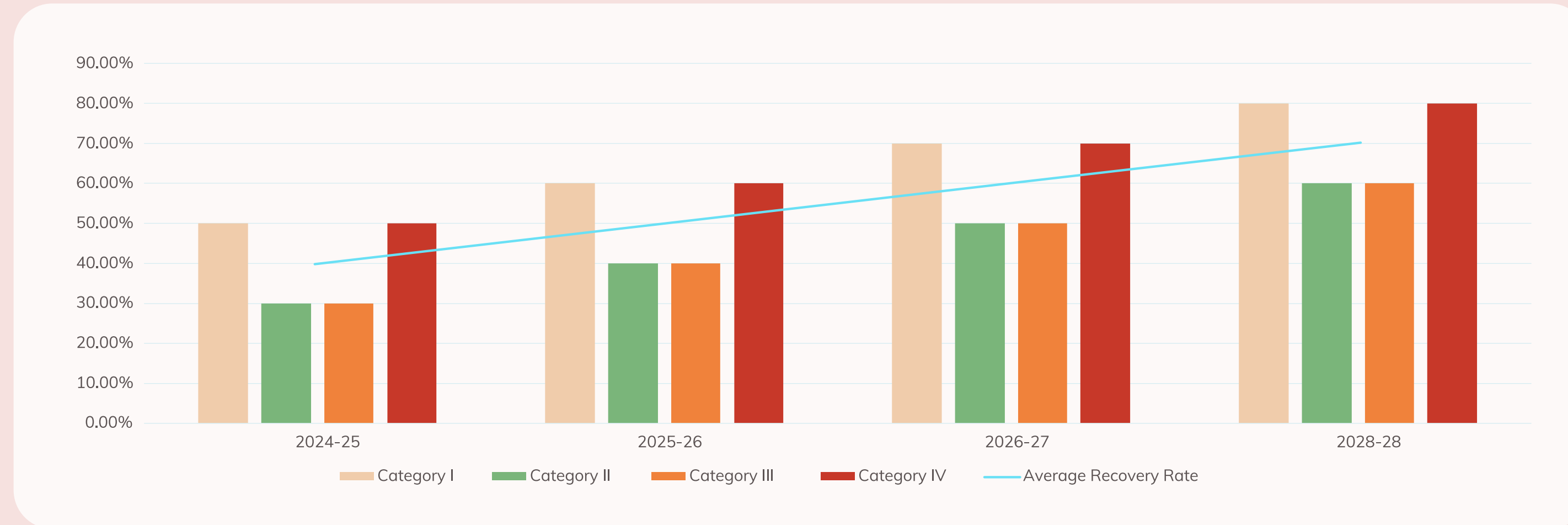


Figure 16. Future recovery rate targets India. Source: Ministry of Environment, Forest and Climate Change (2022).

3.3.6

Registration Rates

The EPR system in India follows a decentralized approach, where the producer has to register with the corresponding SPCB. Only if the producer is active in more than one state, he has to register centrally with the CPCB. The figures show that this process is improving year by year and the reporting is becoming more reliable: In 2011-12, the CPCB still stated that only 20 of 35 SPCBs and PCCs submitted data per reporting requirement. In 2019-20, however, all 35 states submitted their reports (Central Pollution Control Board Delhi, 2020).

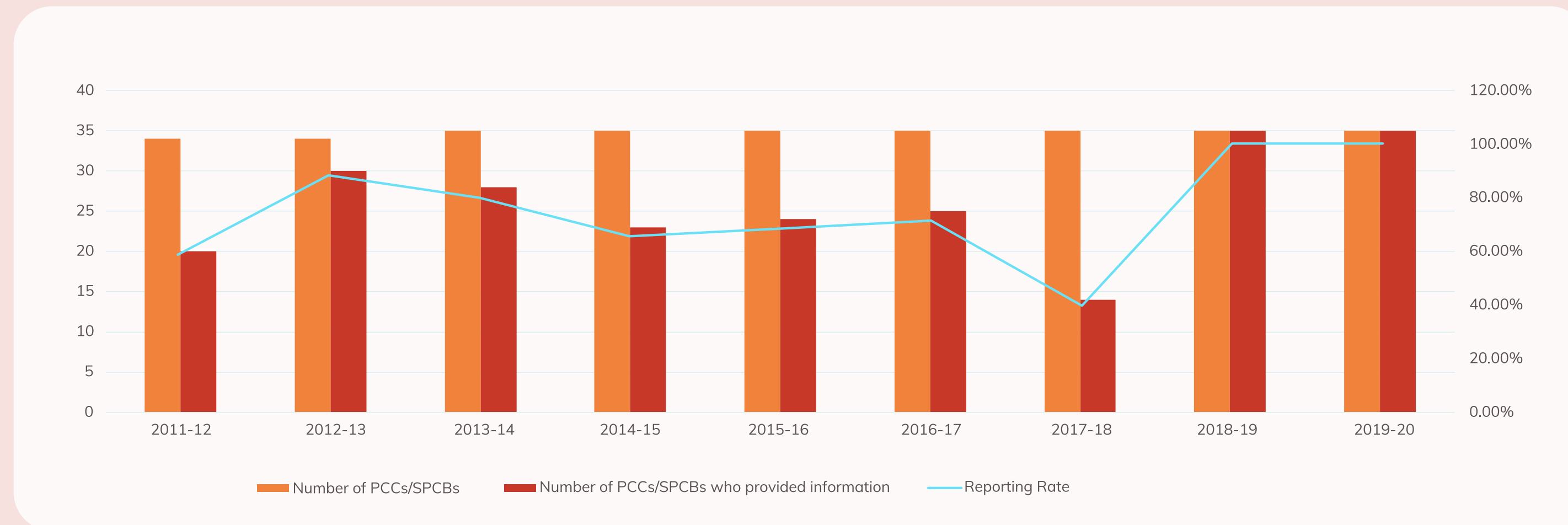


Figure 17. Registration rates with the CPCB 2011 - 2019. Source: Central Pollution Control Board Delhi (2020).

3.3.7

Case Study



3.3.7.1

Background

Recykal is a technology-driven cloud-based waste management company operating in Hyderabad. It helps to bring clarity, monitoring, formalization, coordination and accountability into waste management in India and helps individual players to fulfill their EPR targets. The firm was launched in 2017 and operates in Pune, Delhi, Chennai and Bangalore with more than 500 businesses. Its main focus is to connect multiple stakeholders including waste generators, namely businesses and households, waste aggregators and recyclers. Their strategy proved to be successful as they increased their volumes of waste collection from 20/30 kg per day to about 10,000 to 15,000 kg per day.

3.3.7.2

Recykal products

Recykal developed different, mostly technology-based, products to support reaching the obliged industry's EPR targets in accordance with rules put forth by the government of India. Apart from cloud-based technologies aiming to connect different actors in the waste management field, Recykal also offers awareness programs and workshops for firms, educational institutes and schools, as well as sustainability consulting for corporates to help them reduce their environmental impact and fulfill the government's requests and legislations.



Market Place

Online platform for connection of bulk waste generators, aggregators and recyclers for plastics, paper and electronics.



Smart Centre Solution

Online tool for waste aggregators and MRFs helping to keep track of amount of waste coming in and out.



Awareness Programs

Workshops at corporations, large firms, educational institutes and schools.



DRS

Mobile app with information of nearest collection center, online payment methods, data collection.



Informal Sector App

Information for waste pickers regarding buyers, nearby generators and waste aggregators/recyclers and access to banking, insurance and health care schemes.



Used App

Scheduled and "on demand" waste pickups from individual households

Figure 18. Recykal Products. Source: Bhadra and Mishra (2021).

3.3.7.3

Recykal and EPR

Apart from the products mentioned above, Recykal also developed an EPR platform for managing EPR operations by two different ways:

1. Recykal helps to set up take-back programs or Deposit Refund Schemes (DRS) when firms already have their individual EPR programs in place. It's duty then is just to improve the management of these operations through a cloud-based, more efficient system which aims to connect customers, waste aggregators and recyclers.

2. Recykal helps to set up EPR programs by obtaining the recycling targets from clients and managing respective amounts of waste until recycling and certification in the name of the firm. By this way, EPR obligations are going to be outsourced to Recykal and the firm just pays a fee for the service. Following this strategy, Recykal can make use of economies of scale and it gets much cheaper than every firm having to individually fulfill their targets. Also, Recykal would take charge of reporting the amounts of EPR targets already met to the CPCB through EPR reports, disposal certificates and real time tracking of waste.

Therefore, the firm helps their clients reaching EPR objectives by making sure that a particular quantity of plastic depending on the amount of plastic they produce is recycled on the market. Here it is important to note, that the recycled plastic has not to belong to the products of the respective firms, but that general industry-wide recycling goals are met. To reach this goal Recykal collects waste through own operations or the help of ULB and provides recycling certifications to firms once an equivalent amount of their target was recycled.

Own operations for recycling work as follow:

1. Pick up waste demand from household through Uzed App and from bulk generators through Recykal App and inform brand stores
2. Waste gets collected by brand stores and is sent to material recovery facilities (MRFs)
3. A Recycler puts demand for waste on Recykal marketplace
4. Brand stores delivers waste to recycler
5. Objectives of EPR to be undertaken are sent to Recykal by individual producers
6. Recykal sends documentation of EPR objectives having been met after getting disposal certificate from recycler.

3.4 South Africa

3.4.1 Overview

Characteristics	South Africa
EPR form	Mandatory monopolistic EPR scheme
Scope of material included	PET, polyolefins (PP, HDPE, LDPE and LLDPE), polystyrene, vinyl, glass, paper and metals
Costs for producers	Differing depending waste stream and PRO
Special Features	Transition from a voluntary industry-led EPR scheme to a mandatory scheme in 2021

Table 9. Overview EPR characteristics South Africa. Own presentation.

3.4.2 Background

The EPR system in its current form is based on several waste laws and related amendments that have been implemented in South Africa since 2008 (South African Government, 2008). The main core of today's EPR concept goes back to the 2008 Waste Act (GIZ, 2018) More specifically, Section 28 of the Waste Act focused on EPR and required the paper and packaging, electrical and electronic and lightning industries to submit Industry Waste Management Plans for government review. Producers should then register with the national system and join an approved waste management plan (Arp, 2021). With this approach funds were to be collected through the fiscus and then disbursed via the Waste Bureau. But as the industry was not in favor of this approach and insisted on collecting

the funds themselves and distribute them through PROs the section 28 Notice was withdrawn and all Industry Waste Management Plans were dismissed by the Minister (Sadan & Kock, 2020). Section 28 was henceforth replaced by Section 18 and further developed in subsequent years with the help of comments and additions from industry to achieve a more collaborative approach and cooperation between industry and government (Bühnemann et al., 2021). The las amendment of section 18 was published on 5th of May 2021 (Department of Forestry, Fisheries and the Environment, 2021b) and requires full EPR implementation for the sectors paper and packaging and some single-use products, electrical and electronic equipment and lightning by 5th of November 2021.

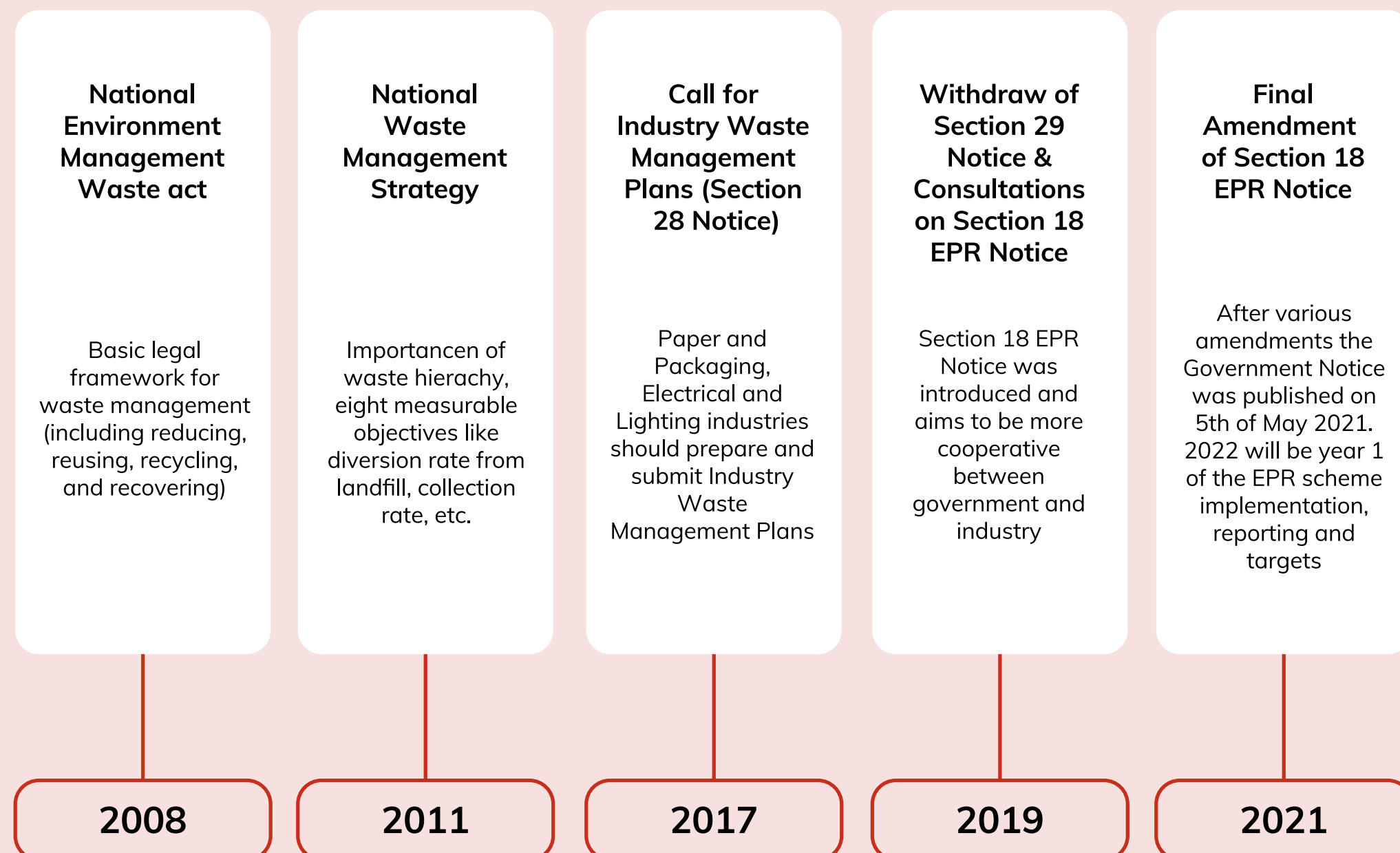


Figure 19. Waste legislations in South Africa over the last years. Own presentation.

3.4.3

Transition from a Voluntary to a Mandatory Scheme

In the early years of the South African EPR scheme, it was characterized as a voluntary industry-led scheme. PROs were established by industry representatives and often managed in cooperation with other stakeholders. It was not until 2017 that consultations began on a mandatory scheme, calling on all the Paper and Packaging, Electrical and Electronic and Lighting industries to prepare and submit Industry Waste Management Plans for government review and approval through the Section 28 Notice (Arp, 2021). This approach tended to collect EPR fees through the fiscus and disburse them through the Waste Bureau (Sadan & Kock, 2020) However, because industry wanted to collect the funds themselves and make the relevant PROs responsible for the disbursement, Section 28 was withdrawn in 2018. A new approach was eventually introduced via Section 18 of the Waste Act. This newly introduced section was intended to provide

for a more cooperative relationship between industry and government. There was even a desire for industry representatives to participate in developing the content of the proposed Section 18 policy framework. The final amendments to the Section 18 Notice were published on May 5, 2021, and required the paper, packaging, and electronics industries to register with the Department of Forest Fishery and Environment (DFFE) and the relevant DFFE-recognized PROs by November 5, 2021 (6 months after the official publication of the mandatory EPR system). If obligated industry stakeholders did not wish to register with one of the already existing PROs (see table 8) , they can either form a new PRO or develop and submit their own EPR plan to implement the EPR regulation by November 05, 2021. These schemes submitted by individual producers can also be understood as Individual Compliance Schemes (ICS).

Catergory Number	Type of plastic	Type of plastic
Plastic	Rigid plastic packaging	PETCO represents the South African PET plastic industry's joint effort to self-regulate post-consumer polyethylene terephthalate (PET) recycling, promotes recyclable design through guidelines and funds consumer education and empowerment initiatives.
	Polyco	Polyco is promoting the recycling of these kinds of plastics that include polyethylene, namely low-density polyethylene (LDPE), linear low-density polyethylene (LLDPE), high-density polyethylene (HDPE) and polypropylene (PP). Mixed plastics (7) also currently fall under Polyco's mandate.
	The Polystyrene Association of South Africa	A PRO focusing on Expanded Polysterene (ESP) and High Impact Polysterene (HIPS) and funded by converters of polystyrene, raw material suppliers, recyclers and retailers.
	The SA Vinyl Association	A PRO focusing on the recycling of Polyvinyl Chloride (PVC) constituted by 21 members.
Paper	Fibre Circle	A PRO for the paper and paper packaging sector that facilitates an EPR programme among paper manufacturer and importers as well as brand owners and retailers and supports awareness-raising and job-creation in collection and recycling of paper.
	RecyclePaperZA	A PRO with focus on newspaper, magazines and mixed paper, constituted by 10 members.
Metals	MetPac-SA	An industry body with 17 members that represents the various role-players in the metal packaging sector in South Africa.
Glass	The Glass Recycling Company	South Africa's official organisation for promoting glass recycling and funding for glass banks, constituted of 18 members.

Table 10. Existing PROs for different types of packaging in South Africa. Sources: GIZ (2018); Petco (2021b).

3.4.4 Scope

Until now, the South African EPR scheme had covered PET, polyolefins (PP, HDPE, LDPE and LLDPE), polystyrene, vinyl, glass, paper and metals (Bühnemann et al., 2021). A detailed overview of the identified products with a subdivision into paper and packaging materials, plastic packaging, biodegradable and compostable packaging, compostable disposable products, biodegradable disposable products, glass packaging, and metal packaging is provided in the latest amendment to the Section 28 Notice (Department of Forestry, Fisheries and the Environment, 2021a).

Packaging exported with finished goods is not subject to the regulations. However, any packaging that is used within the supply chain, during the production of such goods (e.g. packaging for ingredients and packaging for the packaging itself) is subject to the regulations (Petco, 2021b).

3.4.5 Obligated Industry

In general ‘producers that place more than 10 tons/per year of identified products on a market have to belong to a PRO or implement an ICS for each of the packaging materials produced that DFFE has identified as being subject to the regulations. (Petco, 2021b)

The Section 28 Notice (Department of Forestry, Fisheries and the Environment, 2021a)states that a producer in the South African Case is any person or category of persons, including a Brand Owner, who is engaged in the:

- commercial manufacture
- conversion, refurbishment (where applicable)
- or import of new or used identified products.

Obligations of the producer include (Petco, 2021a):

- Registration on DFFE South African Waste Information Centre (SAWIC) by the 5th of November 2021
- Establishment an EPR scheme or joining of an existing PRO where producers will be accountable for the performance of the scheme
- Conduction of a life cycle assessment in relation to the identified product by the November 2026
 - Development a broad-based black economic empowerment charter by May 2023.
 - Implementation of a mandatory take back of identified products where relevant as well as implement environmental labels for identified products by November 2024.

3.4.6 Costs

According to the Section 28 Notice, the EPR fee must be based on net cost recovery. This includes a differentiated rate per item category, of each product or class of product, which must be paid by a Producer to fund the EPR schemes and be dependent on the following;

- Weight of product
- Ease of recyclability
- Current demand for the material for recycling purposes
- Costs for establishing a collection system for the identified products
- Collection, transport, storage, and treatment costs for separately collected waste,
- Administrative costs
- Costs for public communication (raising awareness of waste prevention, litter reduction separate collection, and other important issues)
- Costs for the appropriate surveillance of the system (including auditing)
- And the deduction of revenues generated from recycled material sales

The fee is always calculated by the PRO in cooperation with the respective members. The fee calculated on the basis of the above bullet points must be submitted to the Minister, including the motivation, justification and other relevant information for the price setting mechanism. In addition, the fee must be publicly available on the PRO website and an annual financial plan and budget must be submitted to the DFFE (Petco, 2021a).

Examples of product-specific costs of various PROs are listed in tables below:

Type of Waste	PETCO EPR Fee per tonne 2022
Different types of PET bottles, thermoform PET, HDPE closures, PP closures, Polyolefins flexibles & other self-adhesive labels	R620 (~40 USD)
PET shrink sleeves/plastic PET flexibles	R1000 (~65 USD)
PET flexibles – closed loop	R350 (~22 USD)

Table 11. EPR fees for specific waste types at PETCO. Source: Petco (n.a.).

Type of Waste	PETCO EPR Fee per tonne 2022
Rigids	R620 (~40 USD)
Flexibles	R450 (~29 USD)
PET	R400 (~25 USD)
Multilayer	R750 (~48 USD)
Polystyrene	R250 (~16 USD)

Table 12. EPR fees for specific waste types at Polyco. Source: Polyco (2021).

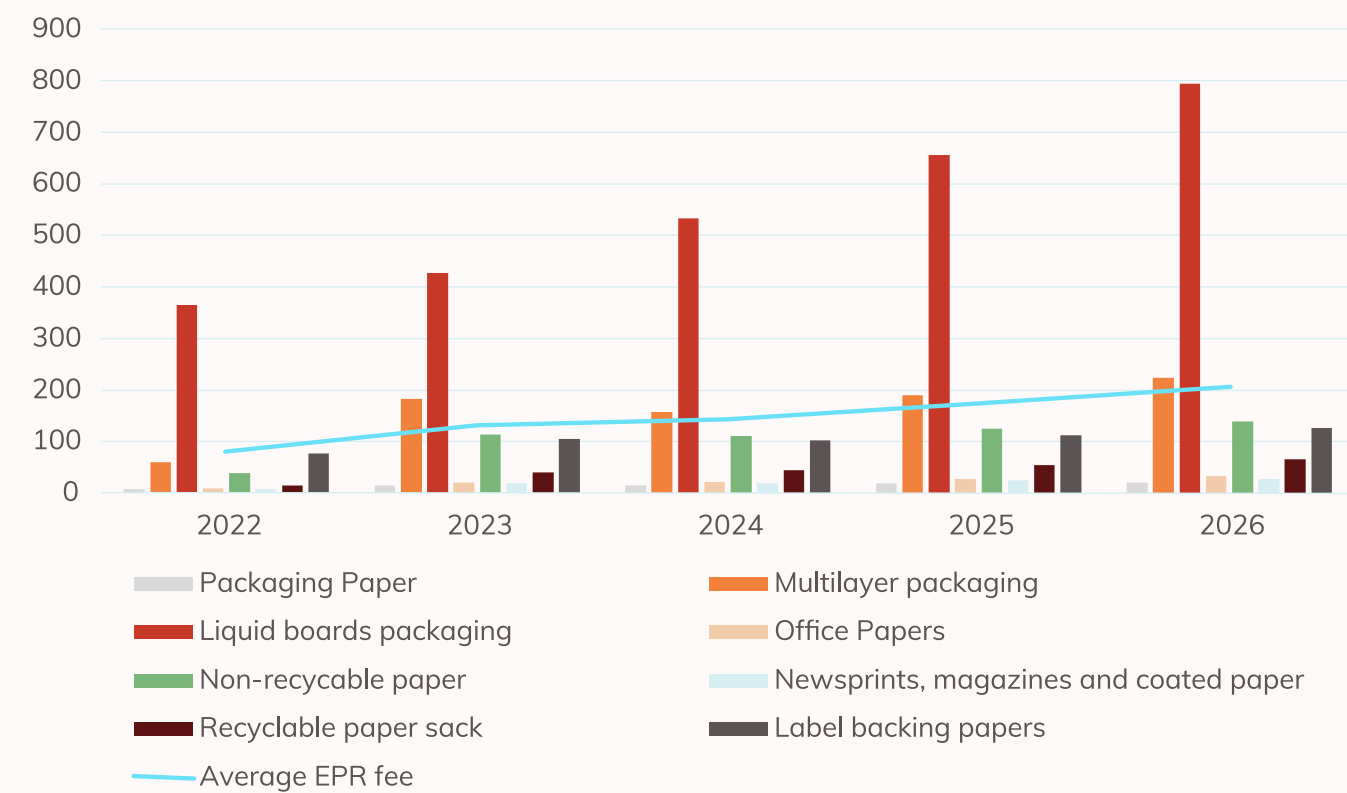


Figure 20. Future EPR targets Fibre-Circle in South African Rand. Source: Fibre Circle (2022).

3.4.7

Recycling Rates and Targets

Due to insufficient and inconsistent data collection, there are no uniform values for the collection and recycling rates of the different waste streams in South Africa. Often the main PRO publishes information on the collection and recycling rate for the respective product, but so far, no uniform standard for documentation has been established (see Table 14).

Type of Waste	Metpac-SA EPR Fee per tonne 2022		
	Converters	Brand Owners of local (imported) products	Retailers
Steel or tinplate	R16	R135 (R151)	R151
Aluminum	R12	R105 (R117)	R117

Table 13. EPR fees for specific waste types at Metpac-SA. Source: Metpac-SA (2021).

Packaging Material	Collection Rate	Recycling/ Recovery Rate	Year
Metal	76%	n.a.	2017
Paper (Packaging)	72%	69%	2020
Glass	80%	44%	2021
Plastics	27%	43%	2020

Table 14. Most recent collection and recycling rates for different materials in South Africa. Sources: Fibre Circle (2020); Plastics SA (2021); TGRC (2021); WWF Malaysia & Jeffrey Sachs Centre on Sustainable Development (2021). Fibre Circle (2020); Plastics SA (2021); TGRC (2021); WWF Malaysia & Jeffrey Sachs Centre on Sustainable Development (2021).

Precisely because of this insufficient data basis and inconsistent reporting by the individual PROs, recycling, collection and recycling content targets were set for specific products for the next five years in the amendment to Section 18. The overarching categories are glass, metal, plastic and paper. Under each category there are many specific sub-products for which individual targets are set for the future. Four of those specific sub-categories are listed in the table below. The subsequent figure shows an average recycling target for those identified sub-categories for the next five years.

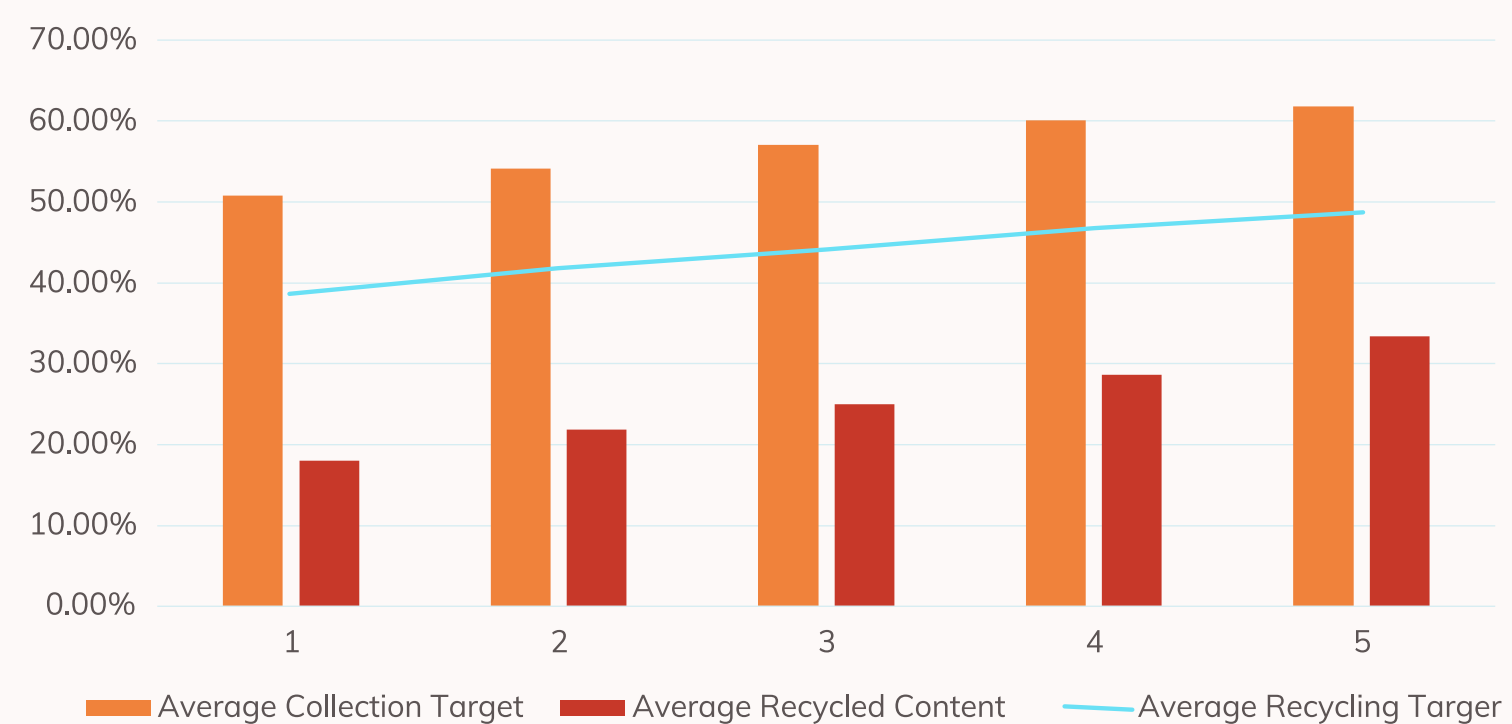


Figure 21. Average collection, recycling and recycled content targets for the four waste categories above. Own presentation.

Product or class of Product	Year	Recycled Content	Collection Target	Recycling Target
Glass				
Non-alcoholic beverage (soft-drinks)	1	20%	46%	38%
	2	25%	53%	43%
	3	30%	58%	48%
	4	35%	65%	53%
	5	40%	65%	54%
Metal				
Aluminum (non-Ferrous/Used Beverage Cans)	1	24%	62%	30%
	2	28%	64%	32%
	3	32%	66%	33%
	4	36%	68%	34%
	5	40%	70%	35%
Plastics				
Plastic PET Beverage bottles	1	10%	60%	54%
	2	12.50%	64%	58%
	3	13%	66%	59%
	4	15%	68%	61%
	5	20%	70%	65%
Paper				
Magazine	1	n.a.	35%	33%
	2	n.a.	36%	34%
	3	n.a.	38%	36%
	4	n.a.	40%	38%
	5	n.a.	42%	40%

Table 15. Collection and Recycling targets for different product categories. Source: Department of Forestry, Fisheries and the Environment (2021a).

3.5 SIDS – Kiribati & Palau



3.5.1 Background

As SIDS distinguish from other countries by small size, exposedness, isolated location and limited resources they are exposed to concentrations of plastic debris being often disproportionate to their own consumption (Lachmann et al., 2017). A high dependency on tourism and fishing industries for economic development make these countries additionally very vulnerable to impacts of marine plastic litter. This litter comes either from land-based activities on the islands itself or is washed ashore from countries.

Increased marine litter can be explained by rapid population growth, a better socioeconomic standing as well as higher integration into the world markets and consequent demand for imported goods (Hawwa, 2016).

EPR can be helpful in reducing this challenges and especially a DRS can be an effective economic instrument to effectuate EPR policies and to foster reuse, reduction of material input and provision of a reliable flow of materials for recycling and recovery options (OECD, 2001). DSR, as a market-based instrument and a means or variant of EPR, uses economic incentives to alter consumer behavior and improves the design of the collection system (Hawwa, 2016).

Although the concept of DRS is quite common and spread over various countries there exist various differences between the set-up of the scheme. Hawwa (2016) pointed out some main differences between DRS in SIDS and more developed countries:

- In SIDS deposits are also imposed on importers and not only on the end-consumers of the product (deposit per container at customs)
- Refund does not happen directly through the retailer, but money is collected via a “special fund” from which the financial transactions are handled
- Instead of 100% sometimes only 50% of the deposit value is refunded and the rest is used as a handling fee, to cover operational costs
- The collection Centers are either run by a State Agency or a private contractor hired by the government. So, the state plays a crucial role for running and monitoring the system and less responsibility lies with the actual producers and importers
- Collected goods are not recycled on the SIDS, but are mostly exported to other countries as there typically is lacking infrastructure and space

Different types of responsibilities for main activities of a DRS in SIDS is depicted in the table below:

Main Activities of a Deposit Refund System in SIDS								
	Payment of Deposit		Collection of Deposit		Collection and returning of bottles	Receiving bottles and issuing refunds	Exporting	
	Upon Import	Upon Purchase	Upon Import	Upon Purchase				
Type of Responsibilities	Economic	Identifies the actor economically responsible for paying the deposit upon import or purchase of the PET bottles		Identifies the actor economically responsible for collection of the deposit upon import or purchase of the PET bottles		Identifies the actor economically responsible for the collection bottles and returning of bottles	Identifies the actor economically responsible for receiving bottles and issuing refunds	Identifies the actor economically responsible for exporting the bottles for recycling
	Physical	Identifies the actor responsible for physically paying the deposit		Identifies the actor responsible for physically collecting the deposit fee upon import or purchase of the PET bottles		Identifies the actor responsible for physically collecting PET bottles and returning them to a redemption Centre	Identifies the actor responsible for physically receiving bottles and issuing refunds	Identifies the actor physically responsible for exporting the bottles for recycling
	Informative	Identifies the actor responsible for the creation of awareness and providing information relevant to all activities of the deposit refund system						
	Monitoring & Enforcement	Identifies the actor relevant to the monitoring and enforcement aspects of all the activities in the deposit refund system						

Table 16. Responsibilities for different main activities of a DRS in SIDS. Source: Hawwa (2016).

3.5.2 Kiribati

The following two specific case studies, which Hawwa (2016) explored as part of her exploration of a potential DRS for the Maldives by reviewing existing systems in SIDS, take a closer look at how two exemplary DRSs operate in Kiribati and Palau.

3.5.2.1 System Details

The case of Kiribati was chosen by Hawwa (2016) as it was the first Pacific island nation to implement a DRS. Legal background for the system is the Special Act fund which was set up in 2005 and delivered a framework for the MoE to charge a deposit on imported materials and determine regulations on how the deposits are to be paid back to people when they are returned.

3.5.2.2 Responsibilities

The deposits charged at customs when products are imported go to a Special Fund which is supervised by the Ministry of Finance. Importers of PET pay a 5 cents deposit for every bottle imported which goes to the Special Fund for further disbursement. These 5 cents are passed on to the stores and come on to the original price of the bottle for the consumer. A part of these deposits will be returned to the consumers when materials are returned and a part is used for other recycling and waste management activities. For example, in the Kiribati case only 4 cents are refunded to the consumer when giving the bottle back and 1 cent per item is used to help finance the preparation of export for recycling.

3.5.2.3 Post collection challenges

Compared to DRS in developed countries, a high level of government involvement is observed in Kiribati, as the economic and physical responsibility of manufacturers and importers is very low and the main burden is shifted to public authorities. The importer is only responsible for paying a deposit when the product arrives at Kiribati Customs, but is then relieved of any direct physical and economic responsibility as the bottles are returned by consumers to the recycling operator One Stop Tarawa, a private company that has contracted with the government on a tender basis. The government bears all expenses and provides the infrastructure for the system. Indirect responsibility is imposed on importers and consumers only by charging each a fee of 5 cents for each PET bottle. Like most SIDS, Kiribati does not have sufficient capacity to operate a recycling plant locally and therefore has to export the bottles for recycling. Not only the high transportation costs, but also the unfavorable market for PET, whose prices are linked to oil prices, and the fact that Kiribati is not located on a major maritime trade route, pose some end-of-life challenges for the recovered products. This problem is exacerbated when the bottles are stored and lose more and more of their value due to the accumulation of dirt and dust, or consume valuable space that is not available in most SIDS.

Table 17. Allocation of roles and responsibilities in the Kiribati DRS. Source: Hawwa (2016).

Main Activities of the Deposit Refund System in Kiribati							
Responsibilities	Payment of Deposit		Collection of Deposit		Collection and returning of bottles	Receiving bottles and issuing refunds	Exporting
	Upon Import	Upon Purchase	Upon Import	Upon Purchase			
Economic	Importers pay 5 cents per bottle	Consumer pays 5 cents extra per PET bottle	Kiribati Customs	Retailers	N/A	Importer via Special Fund	Importer and Consumer
Physical	N/A	Consumer	Kiribati Customs	Retailers	Consumer	Recycling Operator	Recycling Operator crushes and exports PET
Informative	Ministry of Environment Land and Agricultural Development MELAD						
Monitoring & Enforcement	Kiribati Customs	MFED monitors the Special Fund and MELAD	MFED	MFED	N/A	MELAD	MELAD

3.5.3 Palau

The case of Palau was chosen by Hawwa (2016) due to the striking similarities of its economy to the Maldivian economy, which very much depends on revenues from the tourist industry. This industry on hand helps to fosters the countries’ growth but on the other hand is also one of the main causes of marine litter.

3.5.3.1 System Details

The legal background for the scheme lies within the “Republic of Palau Public Law (RPPL No. 7.24) which 2006 set ground for a DRS for beverage containers, the creation of a recycling fund and the allocation of responsibilities for the operation of the DRS. More specific rules for beverage container recycling were passed in 2009, assigning the main responsibilities for the functioning of the DRS to the Ministry of Public Infrastructure, Industries and Commerce (MPIIC), the Ministry of Finance (MOF) and the Koror State Government (KSG).

For every PET bottles the importers have to pay a 10-cent disposal fee which is transferred into the Recycling Fund, managed and monitored by the MOF. Simultaneously, the consumer of the product has to pay 10 cent disposals when purchasing the bottle. When returning the bottle to the KSG redemption center which exists under the directives of MPIIC consumers receive a receipt which must be presented to the Ministry of Finance (MOF) in order to be refunded with \$ 0.05. The leftover 5 cents are kept by the MOF for administrative compensation and for coverage of operation costs at the redemption center. Additionally, products that are collected are being exported to Taiwan by the Palau Waste Collection Company.

3.5.3.2 Responsibilities

Similar to the Kiribati case the importers of beverage containers bear minimal direct physical, economic, and informative responsibility in the organization of all waste management related activities. Actually, the importer’s direct economic and physical responsibility ends after the payment of the 10 cents at Customs and the government takes up a large part of responsibilities.

Specific differences to the Karabati case are (Hawwa, 2016):

- In Palau, the recycling company has the economic and physical responsibility for exporting the bottles and is not funded through the deposit fund as in Kiribati.
- In Palau, consumers must submit their receipt to the MOF in order to receive a refund. This can be inconvenient for users of such a system, as it creates additional work for consumers.

3.5.3.3 Post collection challenges

Like in Kiribati there are some issues with finding buyers of recycled material, highlighting post-collection issues related to exporting for recycling. Observing this, it can be stated that in general in SIDS only with high collection and recovery rates the problem is not yet solved, as the collected material has to be brought somewhere where it can be recycled. Anyhow, the Palau system has a slight advantage as it collects more money through high deposit rates which allows the government to refund, operate and save extra money at the Recycling Fund, to cover the expenses of waste management activities. This leverages the economic viability of the Palau DRS.

Responsibilities	Main Activities of the Deposit Refund System in Palau						
	Payment of Deposit		Collection of Deposit		Collection and returning of bottles	Receiving bottles and issuing refunds	Exporting
	Upon Import	Upon Purchase	Upon Import	Upon Purchase			
Economic	Importer pays \$0.05 per bottle	Consumer pays \$0.10 extra per PET bottle	Customs	Retailers	N/A	Importer & Consumer via deposits	Palau Waste Collection Company gets redeemed containers from the government & exports
Physical	N/A	Consumer	Customs	Retailers	Consumer	Financial State of Koror claims money from the Fund and issues refunds	Recycling Operator crushes and exports PET
Informative	Koror State Solid Waste Management Office						MPIIC export or find ways to export redeemed containers
Monitoring & Enforcement	Customs	Ministry of Public Infrastructure, Industries & Commerce (MPIIC)	Ministry of Finance monitors the collection fee and the deposit fund		Koror State Redemption Centre receives and monitors rate of bottles	MPIIC monitors redemption Centre	Ministry of Finance monitors the sales proceeds from exporting

Table 18. Roles of Responsibilities in Palau’s DRS. Source: Hawwa, (2016).

3.6 Singapore

3.6.1

Background

The National Environment Agency (NEA) (2022) in Singapore acknowledges that packaging waste, and especially plastic waste in a key priority to tackle environmental threat. Therefore, Singapore with the introduction of the Resource Sustainability Act (RSA) on 5 August 2019, has set a necessary precondition towards building a circular economy. Another framework fostering circularity was launched in 2019 under the Zero Waste Masterplan (ZWMP). Under this plan, EPR will be implemented on packaging waste in Singapore until 2025 (Bea & Low, 2019). Initiative apart, like the Singapore “Packaging Agreement” or the “Year Towards Zero Waste” entail the topic of circularity even more to the Singaporean strategy of waste reduction.

To pave the future of an EPR scheme to be implemented by 2025 the government of Singapore introduced the Mandatory Packaging Reporting (MPR) which will lay the foundation in terms of data and stakeholder interactions. Basic information for the MPR are summarized in the info box below:

Functioning of the MPR system in Singapore:

Under the MPR scheme, producers, such as brand owners, manufacturers and retailers have to submit **packaging data** and so-called **3R plans** to the NEA. Information to be provided by the industry is the packaging placed on the market, broken down to type of packaging material, packaging form and the corresponding weight. Apart from that the firms should develop plans regarding plastic reduction, reuse or recycling, consumer or industry outreach related to the beforementioned point, use of recycled content and innovations for more recyclable design.

The handing in of this data and plans for each company is expected via official NEA templates in an annual and digital manner on the [NEA official platform](#) which provides e-service for the submission.

Within the framework all brand owners, manufacturers, importers as well as supermarkets with an annual turnover of more than \$10 million had to register with the NEA in 2020 and submit their first reports in 2021.

It is not only aimed to reach a more reliable data base and background information for the implementation of a future EPR scheme for packaging but also to raise greater awareness among companies on the benefits of packaging waste reduction and a more circular design.

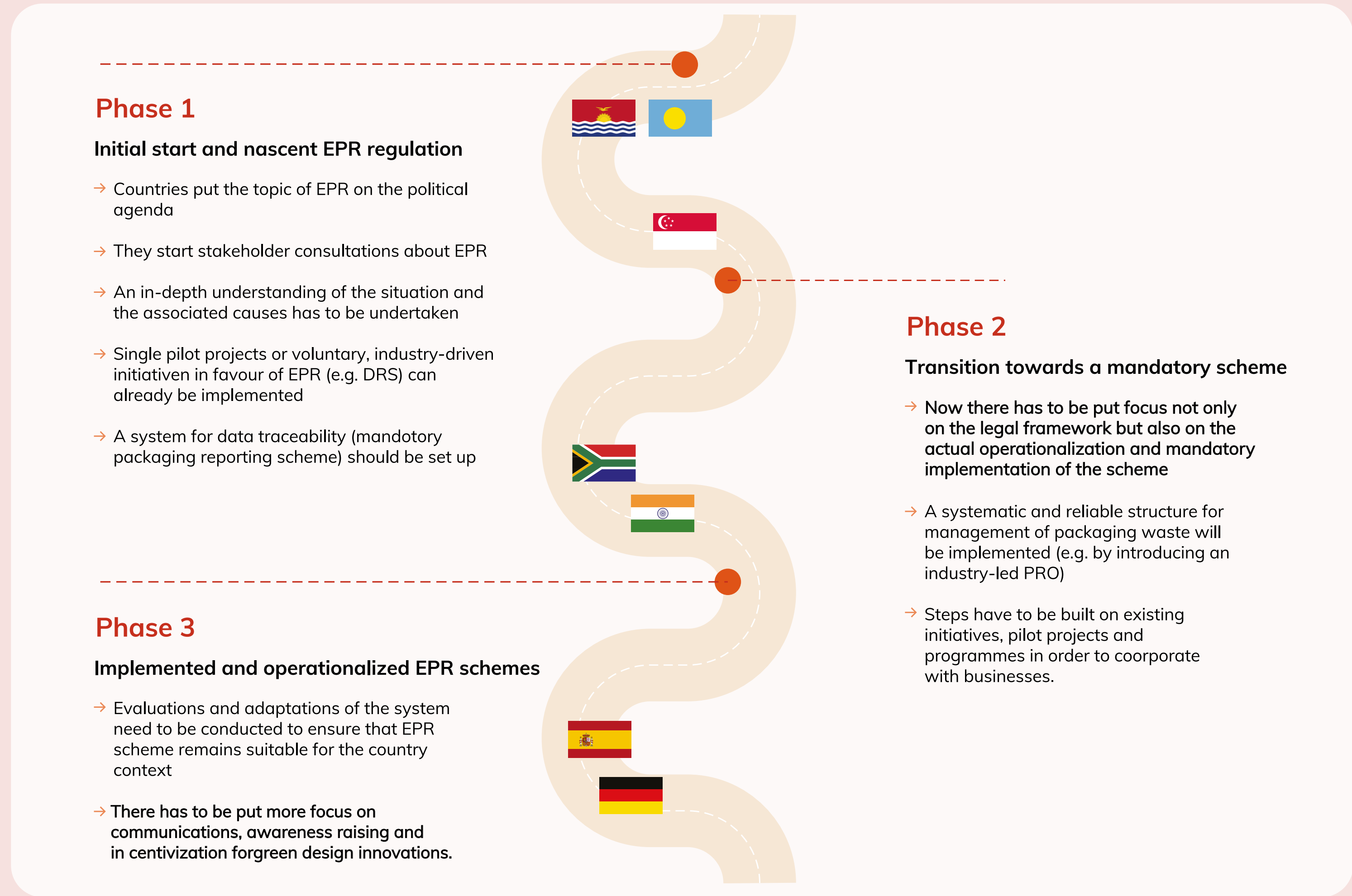
Packaging covered under the MPR include primary, service, secondary and tertiary packaging of different types like glass, plastic, paper and carton, aluminum, etc.

Figure 21. Information box on the MPR system in Singapore. Sources: Bea & Low (2019); NEA Singapore (2022).

3.7 Different phases of developing and implementing an EPR scheme

The previous country case studies revealed clear differences in the implementation status and degree of progress of the individual systems. The fact that a sophisticated, functioning system cannot be created overnight, but requires years of preparation and improvements or adjustments, became clear in the country studies. The roadmap for successful and efficient implementation of a system is not always the same, but includes similar elements, such as preparation through stakeholder consultations, data collection, and innovative pilots as well as the release of several competing PROs to make the system more cost-effective after some years. It is important to not underestimate the preparatory steps and to make the implementation of an EPR system sustainable and impactful. Suggestions for different steps for a successful implementation are depicted below and are put into specific country contexts.

Figure 23. Different phases of EPR scheme development and implementation. Own presentation based on World Bank Group (2022).



In the context of SIDS and the Maldives in particular, a roadmap scenario could be developed that shows how internalising environmental costs and promoting innovative design as opposed to business-as-usual practices could pave the way for a circular transformation and prevent further environmental degradation.

For example, it is planned to publish a roadmap with three different scenarios for the Maldivian case in order to give policy makers, the industry and civil society an image of how the situation could change with accurate measures in the waste management sector. The three different scenarios to be studied and published by “Zero Waste Maldives” and “adelphi” in the next half year are going to be the following:



1 Business-as-usual scenario: In the business-as-usual scenario, the future path of the country is shown with the status quo of previous waste management alternatives, namely landfill and incineration. Here it is important to show that environmental costs would not be internalized in the respective activities and thus there would be significant economic as well as ecological costs for the country in the long run.



2 Modernized waste-management: The second highlighted scenario should include more advanced waste management techniques, such as material processing and recycling. These practices could at least partially relieve the precarious situation in the Maldives and through cooperation with various NGOs and the government, a step in the right direction could be taken. However, if there is still no organized waste management, there is no guarantee that sorting and recycling initiatives lead to sustainable success.



3 Innovative transformation: The final scenario addresses the implementation of sustainable waste management practices, such as sorting and recycling, and how such a system could best be organized. It shows how the future path of the Maldives would be fundamentally changed if an EPR system is implemented and a PRO is made responsible for the smooth operation of the system. Roles and financial as well as operational responsibilities will be clearly defined, and a shift towards sustainable and expandable efficient waste management will occur. This step will also include a feasibility study and policy prototype for an incentive scheme (public-private partnership - PPP) to enable innovative approaches to reduce, redesign and recycle packaging and plastic waste in collaboration between entrepreneurs and commercial producers and importers.

Implications to stakeholders

4.1 Government

- (Environmental) objectives have to be clearly defined in order to choose the right economic/ financial instruments for EPR scheme implementation.
 - This helps to clearly communicate the benefits and the implications of the scheme to both policy makers and the public.
- Clear rules and obligations for data monitoring and tracking must be put in place to track the amount of products imported, placed on the market and disposed of.
 - Without the clear rules data will not be available for the government to be able to make data-backed decisions on packaging that EPR should be applied to.
- Lead time, during which data is already being collected from importers and producers as well as measures should be used to enable infrastructure measures for the appropriate disposal of waste in the future and to prepare for the actual implementation of the EPR scheme.
 - This allows for the implementation to be more well thought out and the waste management infrastructure to be aligned to the packaging that the EPR scheme would encompass.
- To be informed about the EPR scheme an appropriate amount of time is provided to the public and to the producers to get accustomed to the change.
 - All stakeholders are aware of the potential changes, provided with enough time to raise their concerns and less likely to push back on the implementation.
- Until the transition to a mandatory EPR scheme, obliged industries should be encouraged by the government to take voluntary initiatives to support the improvement of the waste management infrastructure and report on the work they are already doing.
 - Encourages competition between producers, knowledge exchange and replication of successful initiatives will help to support and scale the EPR implementation.
- Specify deadline for actual implementation of the EPR scheme.
 - Without a deadline there is a risk that the EPR scheme will not be implemented in the short term.
- Set recovery and recycling targets for the country.
 - Setting targets helps to get stakeholders focused towards a common goal.
- Implement comprehensive waste segregation standards from generation to final disposal.
 - Allows recycling partners to get more value from the recyclables.
- Range of policy mixes for implementation of EPR should be defined depending on economic efficiency and environmental effectiveness.
 - It allows policy makers to make decisions for low-capital investments as well as high-capital investments without the EPR scheme implementation being delayed.
- To be able to meet the EPR goal of incentivizing innovative and environmentally more efficient production methods the government needs to make sure to set rules for Design for Environment (DfE).
 - Without incentives for environmentally friendly product design upstream solutions for waste management would be neglected in the future. There would be more knowledge transfer on innovations regarding packaging.

- There should be an exchange of knowledge with countries with similar geographic and waste management infrastructures in order to accelerate implementation and draw conclusions from lessons learned.

Different countries are at different states of implementation, so policy makers won't have to repeat the same mistakes of neighboring countries.

- Starting off with specific scope (in Maldives case plastic) but having in mind the expansion of the scheme to other materials in order to cover the whole waste stream of a country.

Plastic packaging waste are the most important to start with. However, other waste streams, such as aluminum tin, glass, e-waste can provide additional revenue and infrastructure to the EPR supported waste management system. While the appropriate management of plastic packaging already is thought to be the most impactful, environmental hazards of the other waste streams should not be neglected.

- Standardize and regularize eco labeling so that greenwashing can be avoided alongside mandatory reporting on use of the labels.

This will foster public trust on environmentally friendly products and promote circular products to be put on the market.

4.2 Consumers

- Separate your waste at household level.

This facilitates waste management operators as well as recyclers work and increases the quality of recyclables (reducing contamination from other waste).

- Look out for products with eco-design labels. Those products are designed to be reused, repaired, or recycled at end of life.

With being conscious about the demand of products consumers can influence decisions of producers and therefore change supply.

- Demand products with higher life-cycles.

There will be more reuse of products in line with a circular approach.

- Repair your products whenever possible.

Longer life-spans of the products are going to be assured.

- Try to demand zero-waste products without any packaging waste.

This will foster the direction into a more circular way of production, especially focusing on the aim of reducing plastics.

4.3 Industry

- Implement actions for improving the circularity of their product's packaging.
 - This fosters reduction of raw material usage, the introduction of recycled content in packaging products, making packaging more recyclable.
- Join or co-create a PRO to fulfil the EPR obligations.
 - Economies of scale and better knowledge exchange on circular product design and EPR will be enhanced.
 - Waste collection of materials put on the market will be done by the PRO.
- Contribute a fee to the PRO to cover the net costs related to the end of life of products.
 - This will ensure additional funding for proper waste management
- Ensure that the PRO invests an adequate amount into communication and awareness
 - The public will be more aware about initiatives of producers and there will be more willingness to participate from the public.

4.4 Tourism Industry

- Operationalize waste management facilities at resorts where they process the waste to a set standard before sending it out to regional waste management facilities.
 - All the waste generated at resorts will be received at regional facilities at a certain standard therefore processing will be more straight forward.
- Contribute to neighboring island communities financially, technically or by providing human resources towards sustainable waste management.
 - This would help to fill the financial, technical and human resource gaps towards sustainable waste management on island communities.
- Support island communities in their waste to wealth operations by providing shelf space for recyclable products at resort souvenir shops or via local island tours.
 - This provides a close community link and incentivizes waste to wealth enterprises to flourish at the island level.
- Purchase eco-designed, durable, and easily recyclable products as the request of large resorts significantly determines the supply and import of (packaging) products.
 - Makes bulk purchase of goods possible (over individually packed products in significantly smaller quantities) as well as more environmentally conscious products.

4.5 Recyclers/Waste management operators

- Conduct awareness raising sessions with households, island councils/mayors and tourism agencies about proper waste separation at source to facilitate subsequent treatment of different waste streams.
 - Consumers and decision makers are more aware and accepting of the changes to waste management policies and how they are implemented.
- Implement national scheme for data collection on waste generation.
 - Makes data available on waste generation so that management operators can work towards national reduction and recycling targets.
- Submit and publish waste audit data every month as well as data and information on how waste is managed.
 - Stakeholders and public can contribute to improving the waste management system and will support advocacy work on waste reduction.

- Provide incentives, guidance, and materials towards waste to wealth SMEs, and innovation in waste to wealth.
 - Consumers and decision makers are more aware and accepting of the changes to waste management policies and how they are implemented.
- Implement national scheme for data collection on waste generation.
 - Will reduce waste accumulation in landfill and increase diversion from incineration.
- Ensure that waste management operators adhere to nationally set waste management regulations and standards and apply adaptive management approaches to enhance the performance of the waste management operation.
 - This ensures sound management of waste and prevents leakage of waste into the environment.

Additional information

5.1 Contacts for support



Ocean Innovation Challenge (OIC) by UNDP

With funding support from SIDA and NORAD, UNDP OIC is a unique mechanism designed to accelerate progress on SDG14 by identifying, financing, advising and mentoring truly innovative, entrepreneurial and creative approaches to ocean and coastal restoration and protection that sustains livelihoods and advances the Blue Economy. UNDP aims to support 100 ocean innovations by 2030 through the UNDP Ocean Promise which was launched at the UN Ocean Conference in Lisbon.

UNDP OIC's first challenge launched in 2020 on SDG 14.1 emphasizes the prevention and significant reduction of marine pollution and has a strong focus on nutrients and plastics from land-based sources. The second OIC challenge focuses on sustainable fisheries and aquaculture while the third call, on marine protected areas and the topic of Blue Economy.



Zero Waste Maldives (ZWM)

ZWM is a national organization that promotes the circular economy and is based in Maldives. Its focus is on raising awareness of waste as a resource and applying approaches such as waste to wealth and resource optimization. The organization coordinates circular economy and marine litter projects with the aim of promoting low-waste lifestyles in the Maldives and enabling individuals, businesses, communities and the government to avoid sending waste to the seas, landfills or incinerators. ZWM's work aims to change people's perceptions of waste and view waste much less as disposable material and more as a resource. ZWM believes that in a country with limited natural resources, the greatest value is derived from materials, services and goods.



adelphi

Adelphi is a leading independent think tank and public policy consultancy on climate, environment and development. Its mission is to improve global governance through research, dialogue and consultation. adelphi offers demand-driven, tailor-made services for sustainable development, supporting governments, international organizations, businesses and non-profits design strategies for addressing global challenges. adelphi facilitates policy dialogue and provides training for public institutions and businesses worldwide, helping to build capacity for transformative change. Since 2001, it has successfully completed over 1000 projects worldwide. A core focus of adelphi lies on accelerating the transition to a Circular Economy by promoting the implementation of waste management systems and designing Extended Producer Responsibility (EPR) schemes.

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