Extended Producer Responsibility schemes in Small Island Developing States

Challenges and opportunities of EPR schemes in SIDS in the combat of plastic pollution

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Acronyms

ADF	Advance disposal fee
ARF	Advance recycling fee
ARDF	Advance Recovery and Disposal Fee
DRS	Deposit-refund schemes
EPR	Extended Producer Responsibility
FAO	Food and Agriculture Organization of the United Nations
FSM	Federated States of Micronesia
GDP	Gross Domestic Product
PET	Polyethylene terephthalate
PRO	Producer Responsibility Organisation
SIDS	Small Island Developing States
SPREP	Secretariat of the Pacific Regional Environment Programme (SPREP)
UN	United Nations
UNEA	United Nations Environment Assembly
UNEP	United Nations Environment Programme
WIEGO	Women in Informal Employment: Globalizing and Organizing

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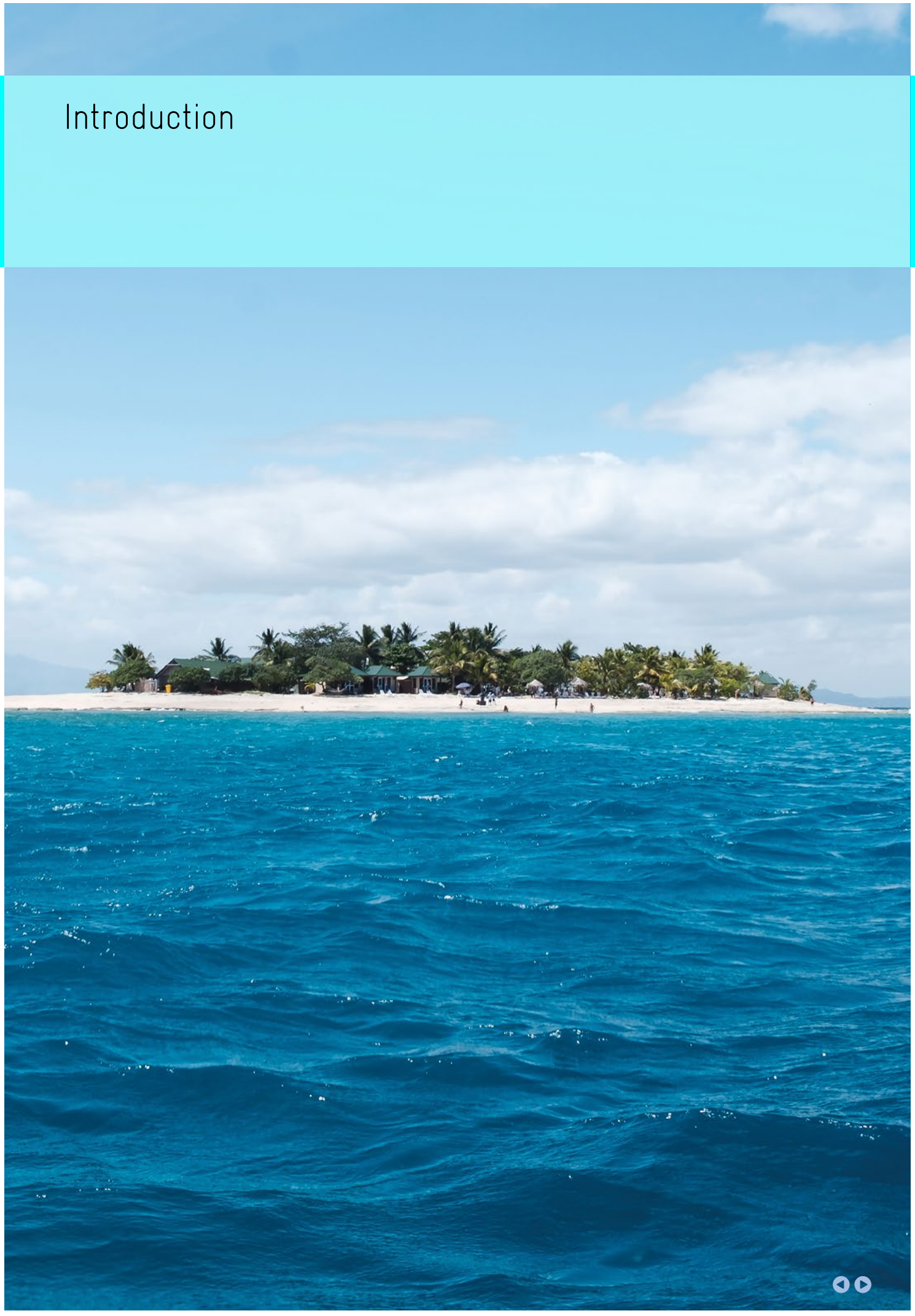
Introduction



Plastic pollution is a global challenge. It requires international measures like a global agreement to end plastic pollution. Negotiations on such an agreement started in 2022. As important as international measures are, managing plastic pollution also requires ambitious measures at the national level. Many countries have already developed, adopted and implemented policies targeting plastic pollution, including most Small Island Developing States (SIDS).

One of the most ambitious and promising policies to reduce plastic pollution are Extended Producer Responsibility (EPR) schemes. They put into practice the prominent, yet often neglected 'polluter pays' principle. They have the potential to promote the transition towards a more circular plastics economy that many experts see as indispensable to effectively respond to the plastic pollution crisis. So far, EPR schemes have been implemented mainly in developed countries, with developing countries increasingly introducing EPR schemes as well. In SIDS they have not been adopted yet.

This study explores the potential of EPR schemes to reduce plastic pollution in SIDS. To this end, it briefly summarises sources, impacts and governance of plastic pollution in SIDS in order to identify the key needs in this group of countries (chapter 1). It then introduces the main aspects and overall potential of EPR schemes to reduce plastic pollution and promote the transition to a more circular plastics economy (chapter 2). The main part of the analysis outlines core elements and complementary measures of EPR schemes and, where possible and necessary, derives implications for an appropriate design of EPR schemes in SIDS (chapter 3). Against the background of the preceding analysis, the key challenges of SIDS in developing and effectively implementing EPR schemes are identified (chapter 4) before a roadmap for the preparation and development of EPR schemes is introduced (chapter 5). Finally, the key findings, conclusions and recommendations are summarised.

Plastic pollution in SIDS

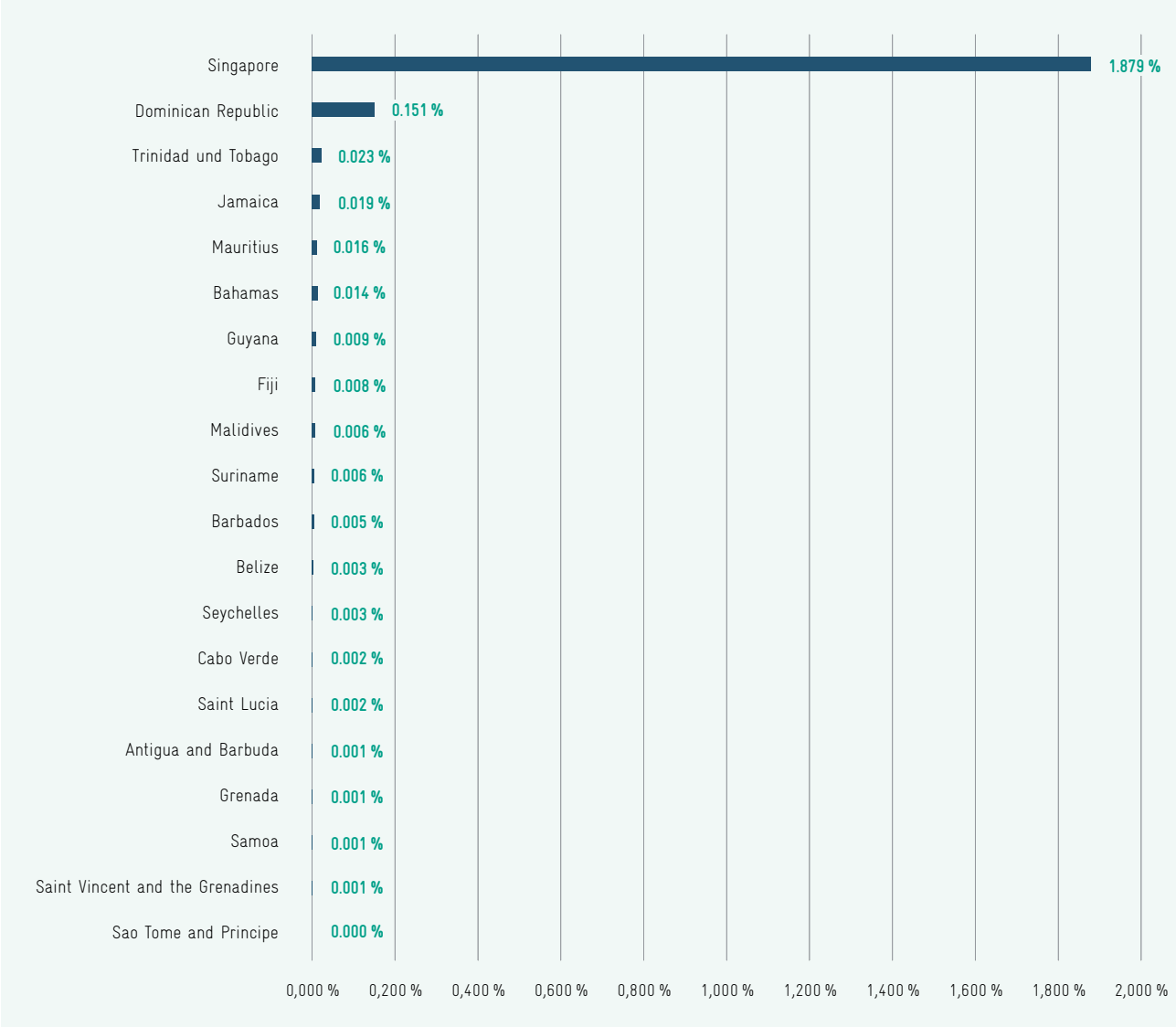
1

1.1 Sources and impacts of plastic pollution

SIDS hardly contribute to plastic pollution but are substantially affected by it

Sources: SIDS' contribution to global plastic pollution is extremely small1. Apart from a few exceptions, **SIDS hardly produce any plastics** [18]. Neither is their share in the global trade of plastics and plastic products noteworthy (see Figure 1) [45]. According to data from the United Nations (UN) Comtrade Database, the share of SIDS in global plastic trade ranged between 0.001 percent of total value (in 2019 in US$), e.g. in Samoa, to 0.02 percent in Trinidad and Tobago.

Figure 1: Share of SIDS in global plastic trade (2019 in percent of global trade volume)



Source: UN Comtrade, https://comtradeplus.un.org.

1 There are very few studies on the extent of plastic pollution in SIDS. Lachmann et al. [24] provide an overview on such studies. Instead of exact data they provide estimates. Jambeck et al. [22] provide the most comprehensive and most cited estimates on plastic waste by country, including SIDS.

Likewise, and in global comparison, **SIDS hardly contribute to *plastic waste* generation in general and *mismanaged plastic waste or plastic waste in the oceans* in particular** (see Table 1) [4]. The respective share in global plastic waste generation lies below 0.1 percent. In only two SIDS the share lies above 0.4 percent, namely Singapore and Trinidad and Tobago [22]. The share in mismanaged global plastic waste lies below 0.1 percent in 29 SIDS. Only five SIDS feature a share higher than 0.2 percent [22].

Table 1: Share of SIDS in plastic waste (2010 in percent of global sum)

Share in global plastic waste generation	
Trinidad and Tobago	1,790 %
Dominican Republic	0,433 %
Cuba	0,369 %
Singapore	0,318 %
Haiti	0,301 %
Guyana	0,110 %
Mauritius	0,105 %
Papua New Guinea	0,103 %
Comoros	0,069 %
Fiji	0,062 %
Barbados	0,058 %
Bahamas	0,049 %
Maldives	0,046 %
Jamaica	0,035 %
Saint Lucia	0,031 %
Vanuatu	0,027 %
Suriname	0,024 %
Guinea-Bissau	0,024 %
Solomon Islands	0,023 %
Antigua & Barbuda	0,016 %
Belize	0,013 %
Cape Verde	0,012 %
Seychelles	0,012 %
Grenada	0,011 %
Saint Vincent and the Grenadines	0,010 %
Saint Kitts and Nevis	0,009 %
Tonga	0,008 %
Samoa	0,006 %
Sao Tome and Principe	0,006 %
Micronesia	0,006 %
Marshall Islands	0,004 %
Dominica	0,004 %

Share in mismanaged global plastic waste	
Haiti	0,463 %
Dominican Republic	0,371 %
Trinidad and Tobago	0,295 %
Cuba	0,284 %
Papua New Guinea	0,282 %
Comoros	0,182 %
Mauritius	0,176 %
Fiji	0,155 %
Guyana	0,132 %
Maldives	0,099 %
Vanuatu	0,071 %
Solomon Islands	0,064 %
Guinea-Bissau	0,064 %
Jamaica	0,031 %
Cape Verde	0,029 %
Saint Lucia	0,021 %
Tonga	0,021 %
Singapore	0,020 %
Samoa	0,016 %
Sao Tome and Principe	0,016 %
Micronesia	0,015 %
Seychelles	0,014 %
Suriname	0,012 %
Belize	0,012 %
Barbados	0,011 %
Marshall Islands	0,010 %
Kiribati	0,010 %
Grenada	0,007 %
Saint Vincent and the Grenadines	0,007 %
Bahamas	0,004 %
Antigua & Barbuda	0,004 %
Dominica	0,002 %

Share in global plastic waste generation	
Kiribati	0,004 %
Palau	0,001 %
Cook Islands	0,001 %
Nauru	0,001 %
Tuvalu	0,001 %
Niue	0,000 %

Share in mismanaged global plastic waste	
Palau	0,002 %
Saint Kitts and Nevis	0,002 %
Nauru	0,002 %
Tuvalu	0,001 %
Cook Islands	0,001 %
Niue	0,000 %

Source [22].

Nevertheless, **domestic plastic pollution in SIDS is not negligible and causes problems. The plastic waste generation per capita is higher than the global average**, although there is variation among SIDS [22]. In nearly half of SIDS the per capita generation of plastic waste is higher than the global average, and in some cases, such as Antigua and Barbuda, Guyana and the Bahamas, it is even three times higher than the global average [22]. Overall, in Pacific SIDS plastic waste is the third-largest source of solid waste after organic and paper / cardboard waste [41].

Moreover, **in many SIDS the per capita rate of mismanaged plastic waste is often far above the global average** (see Table 2). This is due to insufficient waste management capacities and infrastructure that cannot prevent significant amounts of plastic waste leaking into the environment [48]. In nearly half of SIDS the per capita rate of mismanaged plastic waste is higher than the global average. In seven SIDS, the per capita rate is at least more than twice the global average, including SIDS with four times the global average like Guyana or even eight times the global average like Comoros [22]. In rural areas of the Solomon Islands, for example, all waste is burned, buried or dumped on land or in waterways [43].

Table 2: Overall plastic waste and mismanaged plastic waste in SIDS and global average (2010 in kilograms per capita per year)

Overall plastic waste	
Trinidad and Tobago	1311
Antigua & Barbuda	240
Saint Kitts and Nevis	238
Guyana	213
Barbados	207
Saint Lucia	190
Bahamas	142
Seychelles	130
Grenada	118
Maldives	117
Vanuatu	107
Mauritius	84
Tonga	81
Saint Vincent and the Grenadines	80
Comoros	73

Mismanaged plastic waste	
Vanuatu	89
Guyana	82
Maldives	80
Trinidad and Tobago	69
Tonga	64
Comoros	62
Fiji	55
Marshall Islands	55
Seychelles	51
Mauritius	45
Saint Lucia	41
Tuvalu	40
Nauru	36
Solomon Islands	33
Papua New Guinea	33

Overall plastic waste	
Global average	72
Singapore	70
Marshall Islands	70
Fiji	69
Belize	62
Suriname	59
Dominica	54
Dominican Republic	52
Nauru	52
Palau	52
Tuvalu	52
Bahrain	48
Kiribati	37
Micronesia	37
Papua New Guinea	37
Samoa	37
Sao Tome and Principe	37
Solomon Islands	37
Haiti	33
Cuba	32
Cape Verde	24
Guinea-Bissau	20
Jamaica	12

Mismanaged plastic waste	
Kiribati	32
Sao Tome and Principe	31
Micronesia	31
Palau	31
Samoa	30
Grenada	23
Saint Kitts and Nevis	20
Belize	19
Antigua & Barbuda	19
Saint Vincent and the Grenadines	19
Cape Verde	18
Guinea-Bissau	17
Global average	16
Haiti	16
Dominican Republic	14
Barbados	13
Dominica	11
Suriname	10
Cuba	8
Bahrain	6
Bahamas	4
Jamaica	4
Singapore	1

Source [22].

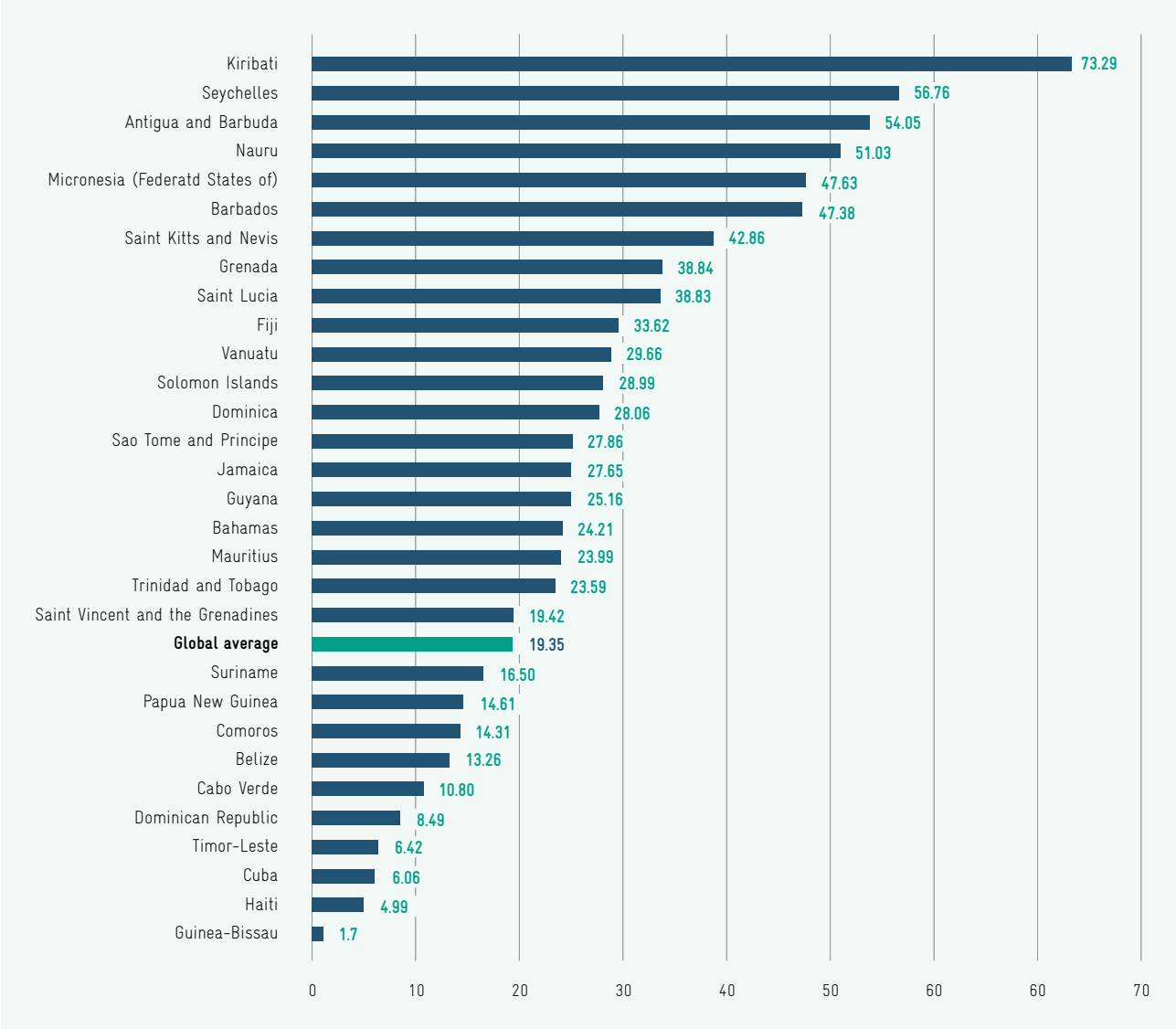
However, existing estimates suggest **that the most significant share of plastic pollution still originates from other countries and is washed ashore on SIDS** [47]. Overall, SIDS are disproportionately affected by plastic pollution from other countries, in particular when considering the absolute amounts of their domestic plastic waste generation and their size [13, 36].

Impacts: In SIDS, **plastic pollution has significant environmental and health impacts and threatens essential livelihoods and sources of income.** SIDS suffer considerably from the impacts of plastic pollution that have already been identified in global and overarching assessments. These include negative impacts on the marine and terrestrial environment, potential risks to human health, and economic and social costs, in particular to coastal communities, tourism, fisheries and aquaculture [46, 51]. Due to their specific circumstances, SIDS probably suffer even more from the effects of plastic pollution than many other states.

First, **SIDS experience considerable negative impacts on marine and coastal ecosystems as well as on land areas and waterways**, as many landfills in SIDS are open and uncontrolled. This leads to more mismanaged plastic waste leaking into the environment [36, 48].

Second, **SIDS experience high risks to human health.** Plastic waste is often incinerated in open pits, resulting in the release of toxic, hazardous and carcinogenic pollutants into the air and the contamination of water and soil with ash residue [10]. In addition, plastic pollution threatens the food supplies in SIDS, as a large portion of the daily diet of many SIDS residents depends on seafood (see Figure 2) [24]. This also results in higher uptakes of plastics from marine species

Figure 2: Consumption of fish and seafood in SIDS (2020 in kilograms per capita per year)

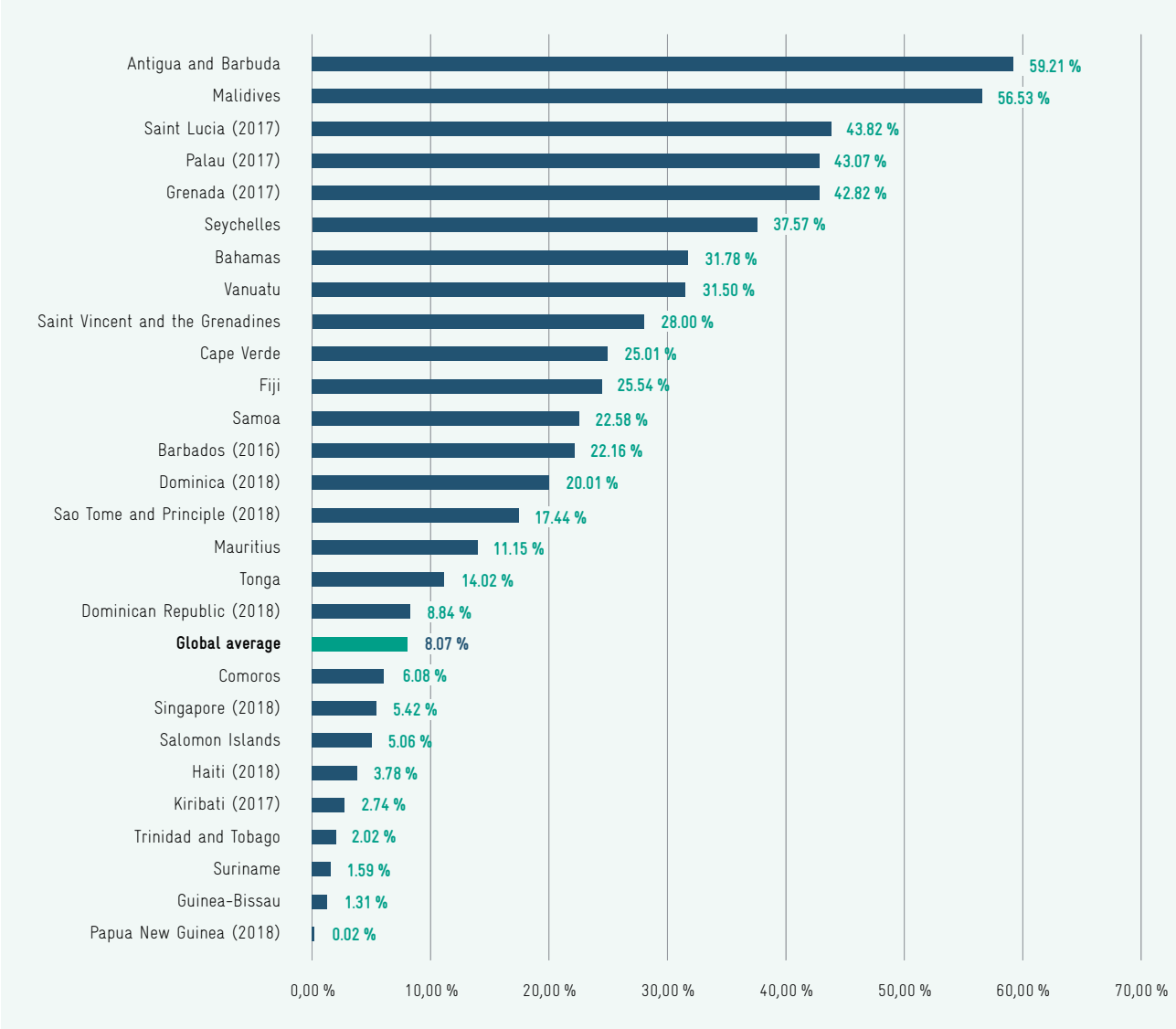


Source: FAO, www.fao.org/faostat/en/#home.

than in other countries [50]. According to data from the UN Food and Agriculture Organization (FAO), in a considerable majority of SIDS, the annual per capita consumption of fish and seafood lies above the global average. In nine SIDS, it is even more than twice the global average, namely in the Maldives (83 kg / capita / year), Kiribati (73), the Seychelles (57), Antigua and Barbuda, Nauru, Samoa, Micronesia, Barbados, and St. Kitts and Nevis.

Third, **plastic pollution endangers important livelihoods and sources of income in SIDS, namely through negative impacts on tourism, fisheries and food supply.** In terms of tourism, plastic waste reduces the attractiveness of SIDS as tourist destinations [24]. This is expected to lead to a decline in tourism revenues [48], on which the economies and labour markets of SIDS often rely to a considerable extent [52]. According to numbers of the World Tourism Organization, in 2019, and thus before the Covid-19 pandemic, seven SIDS were among the top-ten countries in terms of international tourism's contribution to Gross Domestic Product (GDP), with numbers ranging from 28 percent in St. Vincent and the Grenadines to 37 percent in the Seychelles, 56 percent in the Maldives and 59 percent in Antigua and Barbuda (see Figure 3).

Figure 3: Contribution of tourism to GDP in SIDS and global average (2019 in percent of GDP)



Source: UN World Tourism Organization, https://www.unwto.org/tourism-data/unwto-tourism-dashboard.

Plastic pollution also negatively impacts fisheries [48]. This reduces the important economic contribution of the fisheries sector to SIDS economies [21].

Overall, these observations suggest that **plastic pollution is already having or will have significant impacts on the environment, human health and income sources in SIDS**, ultimately deteriorating the livelihoods of their populations.

1.2 Governance of plastic pollution: achievements, best practices, shortcomings and constraints

In most SIDS, there is an increasing number of national policies and regulations, but their implementation and enforcement are often inadequate and gaps remain

As of 2022, there are 46 national policies and regulations in SIDS[2] related to plastic pollution.

Almost all SIDS ban certain plastic products. In 2014, the first ban on plastic products was introduced in the Seychelles (on plastic bags and certain products with polyvinyl chloride). Since then altogether 29 SIDS have adopted bans on plastic products, prohibiting the import, distribution, sale and use of single-use plastic products, plastic bags, food containers and packaging, beverage containers, cutlery, straws and / or non-biodegradable plastic products [4].

In addition, **many SIDS**, such as Barbados, Fiji, Kiribati, Marshall Islands, Micronesia, Palau, Seychelles and Tuvalu, **already have Deposit-Refund Schemes (DRS) in place** [4, 12, 26]. These typically apply to different types of beverage containers, e.g. made from aluminium, glass and, in the case of plastic: polyethylene terephthalate (PET) bottles. The scheme in Palau is often described as a success story. With a recovery rate of more than 90 percent, the scheme resulted in beverage containers almost disappearing from the environment and landfills, as most beverage containers are now recycled. The high recovery rates were possible because a well-developed road network in Palau eased collection. With the establishment of a dedicated fund, the government also made the scheme financially sustainable [10, 13].

Generally, DRS in SIDS differ in some aspects from DRS in developed countries. In the case of the DRS for PET bottles in Kiribati, the Marshall Islands and Palau, importers (not retailers) pay the deposit upon import of plastic products and pass it on to the consumer. The deposit is then only partially refunded to the consumer: the consumer receives one part (the refund) while the other part is used to finance the collection, transport and export of plastic waste for recycling (the handling fee). Finally, the schemes feature a relatively higher involvement of government or public authorities than in developed countries. On Pacific SIDS, for example, the government or a public agency collects and pays out the refunds through a special fund [12, 26].

Furthermore, **many SIDS have also adopted and implemented other pricing instruments. Several SIDS impose taxes, levies, fees or tariffs on (the import of) specific plastic products**, increasing the prices for single-use plastic products, non-recyclable plastic products, plastic bags, food and beverage containers, and / or plastic bottles. These include Fiji, Kiribati, Marshall Islands, Saint Lucia, Tonga and Tuvalu [4]. In Tuvalu the levy is used to finance the collection, sorting, treatment and export of plastic waste [4]. In Niue, the government plans to introduce an Advanced Recovery Fee and Deposit for certain products, including PET bottles, to fund waste management and recycling [42]. The government of Cook Islands plans to introduce an Advanced Recovery and Disposal Fee [43]. In addition, many Caribbean SIDS, Fiji, Niue and Palau impose taxes or fees on tourists, who significantly contribute to plastic pollution on the islands [48], and use the revenues to improve their waste management. Palau imposes the highest such fee among SIDS (US$30 per tourist), while the Caribbean SIDS impose smaller levies (up to US$1.50 per tourist).The revenues are used to finance measures that aim at reducing the environmental impacts of tourism, including improved waste management [10].

2 Busch 2022 [5] provides an overview of policies SIDS have introduced to reduce plastic pollution and includes an annex listing all known policies, on which this section is based.

Finally, **Pacific SIDS have already adopted several targets for waste management** in the context of the Pacific Regional Waste and Pollution Management Strategy 2016-2025. By 2025, the overall average waste collection coverage should lie at 75 percent, the waste recycling rate at 75 percent, and the waste capture rate at 50 percent [39].

Thus, while a considerable number of plastic pollution policies and regulations exists in SIDS, **EPR schemes for plastic and plastic products do not exist yet.**[3] So far, the DRS in some SIDS feature elements that overlap with characteristics of EPR schemes. In Palau, parts of the revenues from the DRS were invested in improvements of the waste management infrastructure and capacity so that the scheme actually comes close to what a basic EPR scheme accomplishes [26]. Likewise, Tuvalu uses parts of the revenues from its DRS for investments into waste management infrastructure and capacities, including recycling [17].

A challenge for many SIDS is the effective implementation and enforcement of policies and regulations [50]. This is often due to limited governance capacities [32], inadequate or lack of control and monitoring mechanisms, insufficient financial resources [32], low coordination among responsible actors and across different governance levels [10] and / or competing priorities among government officials [48]. In Tonga, for example, various ministries, authorities and agencies have overlapping competencies in waste policy [10]. Moreover, most policies and regulations do not address plastic waste management [48]. For example, short-, medium- or long-term waste management strategies, e.g. national waste action plans, are missing in most SIDS [34]. Also, many SIDS lack policies and regulations that target plastic waste prevention through reuse, recycling, recovery and return schemes, and keep plastic waste away from landfills [10, 13, 32].

Overall, the policy and regulatory framework remains insufficient [13].

In some SIDS, waste management systems have improved, but in many SIDS they are often still overburdened by the amounts of plastic waste

In addition to policies and regulations, **some SIDS have adopted and implemented measures to improve their waste management systems, in particular by expanding waste collection, sorting and recycling capacities.**

- The Trinidad and Tobago Solid Waste Management Company established waste transfer stations, recovery facilities and a recycling plant for beverage containers, which also recycles PET bottles [48].
- In Barbados, an integrated transfer centre was built, consisting of a materials recovery facility as well as composting and chemical waste storage. It separates and recycles different waste streams and reduces waste, including plastic waste, that is being disposed of in landfills by 70 percent [48].
- In Tonga, more than 150 collection points for recyclable materials were installed by municipalities and a private company was commissioned to collect and recycle the waste. However, recyclable materials are still disposed of in landfills due to a lack of recycling licenses and supporting policies [10].

Despite these best practice examples, existing waste management systems in many SIDS are often still unable to cope with the growing volume of plastic waste in a sustainable and environmentally sound manner [20]. Even the collection of plastic waste is difficult in many SIDS since their waste collection services are often inadequate and cover only shares of the population, e.g. only those living on the main island and urban areas while sidelining remote islands and rural areas [36]. The coverage of waste collection systems varies from very high to low, if related data is available at all [36]. In the Cook Islands and Marshall Islands, for example, waste collection services cover a large share of the population (74 and 75 percent respectively), while in the FSM or Solomon Islands only a small share is covered (8 and 12 percent respectively) [32]. Across all Pacific SIDS, the waste collection rate was estimated at 46 percent in 2020 with low confidence in the data [39]. The coverage of waste collection also varies within single SIDS, like in Kiribati, the Marshall Islands or Tonga where at best minimal

3 In 2021 and in Pacific SIDS, there were, however, three EPR schemes for used oil (Tuvalu, Samoa and Palau) and one for e-waste (Samoa) in place (39).

services are operated on the outer islands [40]. On the remote islands of Tonga communities therefore started to organise the waste collection themselves. Such community-based collection services are run by private persons and funded through donations and fundraising activities (without any government support). They offer a limited solution to relieve the waste burden in those areas not covered or even not coverable by regular waste collection services [34].

If waste is collected, its further **treatment poses another challenge since many SIDS lack appropriate technologies for waste treatment** [48]. As result, separation, sorting and recycling of waste streams is neither well developed nor widely used [10, 36]. Many Pacific SIDS, for example, do not even have recycling facilities [40]. Even when waste treatment technologies are available, their effective operation and maintenance are often difficult because they require a relatively high level of technical expertise that is, however, often missing in SIDS [1, 53]. Moreover, some technologies are simply not suitable for SIDS due to their specific and often demanding requirements, e.g. in terms of waste quantity and composition, energy and water availability, or technological and engineering capacity and skills for operation and maintenance [38]. Finally, the availability and capacities of adequate and controlled landfills is severely limited in many SIDS [48]. They often lack appropriate and sufficiently large areas for the establishment of proper landfills [1]. Even if such land is available, plans to build landfills often meet resistance from affected local communities and customary landowners [48].

Overall, these conditions result in substantial amounts of mismanaged plastic (waste) leaking into the environment.

> In many SIDS, an unfortunate combination of limited financial capacities with considerable investment needs, high costs of operating waste management systems and unfavorable market conditions constrain addressing plastic pollution effectively

SIDS themselves often cite **insufficient and limited financial resources** as one of the main reasons for the inadequate state and development of their waste management systems [10]. Most SIDS struggle with a poor financial and economic situation that often severely limits their ability and options to fund efforts that make their waste management systems more sustainable and environmentally sound [53]. In particular, SIDS classified as least developed economies by the UN or as highly indebted poor countries by the World Bank and the International Monetary Fund are more than likely to face significant financial constraints that might even be impossible to overcome without additional sources of funding [15]. Overall, this applies to 15 or nearly half of all SIDS.

Aggravating these general financial constraints is the fact that any **improvement in waste management systems in SIDS requires substantial investments**. According to UNEP's estimates, expenditures on waste management would have to at least double if more sustainable and environmentally sound waste management systems are to be developed in SIDS, for example by improving and expanding waste collection, sorting and recycling [48]. Likewise, the continuous operation of more sustainable and environmentally friendly waste management systems is associated with high costs in SIDS. Taken together, this exacerbates the two constraints mentioned above.

The reasons for the high investment and operating costs are simple. First, due to **long distances between SIDS and other non-SIDS countries** (and thus markets, economic centres and international maritime routes), the **investment and operating costs for SIDS are often substantially higher than in other countries**, for example, when building recycling facilities or transporting necessary spare parts [24]. According to the Remoteness Index, 9 of the 10 or 13 of the 20 most remote countries in the world are SIDS [6]. This remoteness makes transport of the necessary waste management equipment and technologies to SIDS more expensive than to other countries [1, 48]. Given the overall economic situation in many SIDS, the required increase in expenditures will likely exceed their financial capacities. Second, the costs are higher because of the **wide geographical dispersion of the individual islands of many SIDS** and the associated long distances between them [13]. For example, the Maldives, which is the most geographically dispersed country in the world, covers a territory of 90.000 square kilometres of which only roughly 300 square kilometres are land area. As a result,

the collection and end-of-life treatment of plastic waste is logistically very complex and ultimately also very costly [10].

Finally, current conditions in the global plastics market, combined with the demographic features of SIDS and the characteristics of their plastics economy, further deteriorate the cost-benefit ratio of setting up and operating waste management systems and in particular recycling facilities in many SIDS, often to the extent that they are barely economically viable. First, cost-reducing **economies of scale in collecting, sorting, treating and recycling plastic waste can hardly be realised** because the populations of many SIDS and their individual islands are too small and population density is too low [13, 24]. Second, there are not many buyers for recycled plastics in SIDS since there are hardly any plastic producers or manufactures in SIDS, if there are any at all (with the exception of Singapore) [4]. Manufacture of plastic products from recycled material only takes place in nine SIDS [18]. Both limitations significantly reduce prospects for competitive domestic markets for recycling and recyclable materials [48].

Against this background, **exporting recyclable plastic waste to neighbouring countries that have recycling capacities is often the only alternative for SIDS** [36]. In the case of Pacific SIDS, exports go for example to Australia, China, New Zealand or South Korea [40]. Yet, exports are often not an economically viable alternative [36, 48]. The remoteness of SIDS leads to relatively, sometimes prohibitively high and non-competitive transport costs of such materials from SIDS, especially given the current very low prices for recyclable and recycled materials on world markets [48]. For example, while the Marshall Islands, Kiribati and Palau have an effective DRS for the collection of PET bottles in place, there is no export market for the collected bottles as the shipping costs are too high and the quantities too low [26]. This applies to all recyclable plastic waste from Pacific SIDS. In fact, exports of recyclable plastic waste would incur negative costs since its value lies well below the costs for shipping it to and processing it in other countries [37]. As result, recyclable plastic waste is often stockpiled.

1.3 Summary: key needs

Three main needs of SIDS in their fight against plastic pollution emerge from the preceding analysis. They urgently need solutions and corresponding financial resources that will

1. help to minimise plastic waste that is disposed of in (controlled or uncontrolled) landfills by
   - **a.** preventing, reducing and eliminating unnecessary and avoidable plastic and plastic products;
   - **b.** increasing reuse, repair and recycling of plastic and plastic products; and
   - **c.** adopting circular economy approaches;

2. enhance capacities for sustainable and environmentally sound management of plastic waste by
   - **a.** establishing new or expanding, upgrading and improving existing collection, sorting and recycling systems,
   - **b.** making appropriate technologies available and affordable;
   - **c.** strengthening capacities to clean-up and cope with plastic waste that is washed ashore their coasts from other countries and to deal with legacy plastic pollution; and
   - **d.** increasing the available financial resources for such waste management;

3. support the effective implementation and enforcement of existing policies and regulations and strengthen governance capacities, including monitoring and control mechanisms.

Essentials and potentials of Extended Producer Responsibility schemes

2

An EPR scheme gives producers full responsibility for the entire life cycle of their products, i.e. during their lifetime and once they become waste [28, 49, 57]. The former includes responsibilities for environmental, health and safety issues during production, transport, distribution, sale and use of products in order to improve their environmental footprint and shift towards a more circular economy. The latter includes responsibilities for the collection, sorting, recycling, recovery and only as last resort, disposal of waste. Here, an EPR scheme thus ultimately shifts the responsibilities and costs away from public authorities, thereby implementing the 'polluter pays' principle [28]. The producers' responsibility under an EPR scheme essentially boils down to the mobilisation and distribution of funds in order to reduce or even eliminate the negative health and environmental impacts of their products during their lifetime and after their end-of-life [55]. Some experts see EPR as the only instrument that ensures such funding in a dedicated, ongoing and sufficient manner, at least more effective than funding through public budgets or voluntary contributions [15, 11].

The core objective and key activity of any EPR scheme is to provide the financial resources for the operation and continuous improvement of adequate waste management systems and, if necessary, their establishment or expansion. In fact, "EPR systems are primarily intended to close any gaps in funding for waste management" [3]. Typically, this also includes financial resources for the logistical and administrative organisation of the waste management systems. By shifting the financial responsibility to producers, the EPR also relieves public budgets [27], in particular for local public authorities that bear the lion's share of costs for waste management in most countries around the world [15].

In addition, **a well-designed EPR scheme also has the potential to facilitate the transition to a circular economy**, in which circular value chains and efficient resource use prevail [9, 57]. In the case of plastics, experts see such a shift to a more circular economy as the urgent and best solution to the plastic pollution crisis. Even if it is hardly possible to create perfectly closed circular value chains, ambitious steps in this direction would significantly reduce plastic pollution [30] and provide substantial economic opportunities [5].

Essentially, EPR schemes serve to

- develop and ensure nationwide waste collection, including clean-ups of legacy plastic pollution;
- develop and ensure a sustainable waste management infrastructure with adequate capacities and technologies for sorting, reuse, recycling, recovery and, as last resort, disposal of waste, enabling an overall high-quality and environmentally sound waste management;
- create reliable and profitable markets for recyclable and recycled products;
- reduce the health and environmental footprint of products throughout their lifetime through incentives for more environmentally friendly product designs, like increasing reusability, reparability, recyclability and resource efficiency; and
- generate funds to finance awareness campaigns [3, 9, 55].

In principle, **EPR schemes thus also have the potential to address most of the key needs of SIDS in combating plastic pollution** that were identified in the previous section. Above all, they have the potential to raise the necessary funds that SIDS need in order to improve the provision and access to regular and comprehensive waste collection and enhance capacities for treatment of plastic waste by establishing, expanding or upgrading facilities for sorting and recycling of plastic waste. An EPR scheme would then ultimately foster an effective and sustainable management of domestic plastic waste in SIDS, minimising the plastic waste that is disposed of in (controlled or uncontrolled) landfills to the best extent possible or at least ensuring its environmental sound disposal in controlled landfills that meet environmental standards [3]. **However, an EPR scheme does not help SIDS to meet all their key needs**, such as managing the plastic waste that originates from other countries and is washed ashore their coasts. Nor can it improve the effective implementation and enforcement of existing policies and regulations or strengthen governance capacities of public authorities.

In order to realise the potential of an EPR scheme, it needs to be designed, set up and implemented in several ways, which are outlined in the following section, taking into account the unique characteristics of SIDS. The following section covers the core elements of an EPR scheme, its advantages and disadvantages and related needs for SIDS.

Extended Producer Responsibility schemes in SIDS: outline of core elements and complementary measures

3

3.1 General considerations and overarching principles

There is no general template for the design of an EPR scheme [15, 49]. While every EPR features core elements, each element can be designed in several ways [9]. Any preparation, development, design and implementation of an EPR scheme therefore requires a number of decisions on each element and its different options [9, 11].

In order to ensure the effectiveness and success of the EPR scheme, these decisions need to be adapted to the domestic context, in particular to the existing waste management systems and domestic market conditions for the regulated products but also to the broader political, socio-economic, demographic and geographic context in which it is applied [12, 28, 49]. In developing countries, like SIDS, this means that the design of an EPR scheme must take into account, for example, the level of economic development, the existing environmental policies, the governance capacities, the structure of primary and secondary markets for plastic and plastic products, consumer awareness and relations among stakeholders [2, 19]. In general, the effectiveness of an EPR scheme depends on the appropriate mix of choices with respect to the different elements, their stringency and their suitability for the specific context to which the EPR is applied [9, 28, 11]. This also includes complementary measures that range from economic and market-based instruments (taxes, fees, levies, etc.) over regulatory policies (bans, standards, labels, etc.) to information and communication campaigns or education programmes as well as measures for the integration of the informal sector (see section 3.3) [15]. Although this varies across countries, some basic and overarching guiding principles for the design and development of EPR schemes have been identified that go beyond the general recommendation to adapt the EPR scheme to the domestic context.

Guiding principles in the design and development of EPR schemes

Adapted from OECD 2016, Akenji 2012 and WWF 2020

1. **Identify all relevant stakeholders** across the value chain, including national government, local authorities, business and producers, waste management companies, trade unions, informal waste sector and civil society.
2. **Provide incentives for producers** to adopt changes across the entire life cycle of products.
3. **Stimulate innovation** by defining outcomes and leaving the means to arrive there to the producers.
4. **Take a life cycle approach** and consider possible negative side and substitution effects.
5. Start by **improving waste management systems** through the EPR and then move on to the internalisation of external environmental costs and improvements of product design.
6. **Cleary define the responsibilities and duties** of actors across the value chain.
7. **Factor in the unique characteristics and properties** of products, product categories and waste streams.
8. **Select a mix of different and flexible policy instruments** tailored to different products and waste streams and ensure their coherence with already existing policies.
9. **Increase communication** between actors across the value chain.
10. **Develop a communication strategy** to inform all actors in the value chain.
11. **Consult stakeholders** to discuss goals, objectives, costs and benefits (including experts, national and local policymakers, researchers, relevant business and industry associations, and consumer groups).
12. Consult **local authorities** to clarify their role and receive their advice.
13. Consider **voluntary and mandatory approaches.**
14. **Conduct a preparatory comprehensive analysis** on products, product categories and waste streams to be covered.
15. Develop the EPR in a **transparent manner.**

3.2 Core elements: basic design of EPR schemes

Typically, the necessary framework for an EPR scheme requires several decisions on the core elements and their different options [3, 28, 57]. Each option for a core element comes with different advantages, disadvantages and prerequisites. The specific core elements are discussed in more detail in this section and include:

1. Basic institutional set-up
2. Objectives, targets and minimum requirements
3. Scope and coverage
4. Financial flows
5. Organisation of waste management
6. Supervision, monitoring and enforcement

In most cases, national governments and relevant public authorities prepare and take the decisions on most of the core elements and lay them down them in a legal framework. Overall, an active role of government and a supportive regulatory framework contributes to the effectiveness of EPR schemes [28, 55]. Yet, some decisions might also be delegated to other actors [28]. In practice, governments often delegate decisions on financial contributions, the organisation of waste management, and financial flows [28].

3.2.1 Basic institutional set-up

The design of the basic institutional set-up requires several decisions. One fundamental decision on the institutional set-up, however, precedes any other decision—**whether the EPR scheme is mandatory or voluntary** [14, 49]. The former is based on a legally binding framework that essentially obliges producers to assume responsibility for the life-cycle of their products and in addition defines the design of its core elements. Voluntary schemes are based on non-binding business initiatives in which producers are free to join an EPR scheme and decide themselves and independently on the design of its core elements [3]. Mandatory EPR schemes are most common in practice [28] and feature a number of advantages that are particularly relevant and important in the context of SIDS.

Above all, **mandatory schemes are usually considered to be more suitable to set up and gradually develop or expand and upgrade comprehensive, nationwide waste management system than voluntary EPR schemes** [3]. This is the case because mandatory EPR schemes typically cover all relevant companies, maximising the number of actors that fund the schemes' activities and services. As a result, they often mobilise considerable financial resources and do so in a dedicated, ongoing and sufficient manner, which is indispensable for their effectiveness [12, 11]. By legally obliging the companies to make financial contributions, they also increase the reliability and predictability of funds [3]. Moreover, mandatory EPR schemes typically use the market shares of the companies to calculate their financial contributions, creating a level playing field between these companies [49] and not distorting competition. Mandatory EPR schemes thus usually provide a fair, reliable and predictable basis for estimating the available financial resources, creating a relatively stable and favourable environment for necessary investments. Because of these advantages, mandatory EPR schemes usually lead to higher waste collection rates [11] and are also more likely to successfully advance the transition to a more circular economy.

By contrast, under voluntary schemes relevant companies can independently decide whether or not to join the scheme and, if they do, how much financial resources they contribute, how often and when [3]. As a result, and compared to mandatory EPR schemes, voluntary schemes typically suffer from a significantly lower and fluctuating number of participating companies, much less financial resources and poorer reliability and predictability of available funds [15]. In addition, they often struggle with regulatory capture, weak monitoring and enforcement, free riding, distorted competition and transaction costs [3, 28]. Moreover, they have been shown to be less ambitious in scope and targets, covering only certain products (e.g. highly visible ones) [28]. Overall, this makes the establishment and operation of comprehensive, nationwide waste management systems very unlikely. Because of these disadvantages, voluntary EPR schemes are often less effective and the progress they might achieve towards a more circular economy can also be expected to be much less than in the case of mandatory EPR schemes. In a nutshell, their potential to produce significant impacts is cast into doubt [15]. Yet, voluntary initiatives might gather valuable experiences on specific issues and challenges during the operation of EPR schemes. They can thus serve as a first and preliminary step in the preparation of a mandatory EPR scheme [15, 12, 19]. Moreover, they are suitable for products that are durable and still have a positive market value after use [28, 49].

Implication for SIDS

A mandatory EPR scheme is most suitable

Against this background and given the specific context and challenges of SIDS in waste management, the development, adoption and implementation of mandatory EPR schemes are certainly the preferred option for SIDS. Such schemes are more likely to help SIDS in establishing new or expanding, upgrading and improving existing waste management systems by creating favourable conditions for the necessary investments. Mandatory schemes usually mobilise considerably more financial resources than voluntary ones and do so on a more consistent, reliable and predictable basis. Moreover, the existing DRS in SIDS are usually mandatory. Voluntary EPR schemes might be applied if the market for the targeted plastic or plastic product is highly concentrated and affects only a few and economically powerful companies.

nce the mandatory or voluntary form of the EPR is decided, **any framework needs to clearly define other elements of the basic institutional set-up, including roles and responsibilities of different stakeholders** [12, 28, 11]. This requires several more specific decisions [14].

First, the legal framework needs to **define whether the EPR scheme is based on the principle of collective or individual responsibility** [28]. In the case of collective responsibility, companies that participate in the EPR scheme transfer and delegate the full responsibility for carrying out the necessary activities and services to a third body, typically referred to as the Producer Responsibility Organisation (PRO). In the case of individual responsibility, single producers take responsibility for their products.

EPR schemes with collective responsibility are considered the most suitable scheme if a large and diverse number of individual sources of waste need to be covered, like in the case of plastic waste. In practice, PROs are often the preferred option [9, 28, 11], as they are better able to significantly reduce costs of managing plastic waste, e.g. by enabling economies of scale and reducing administrative burden. They are also suitable to cope with the related, complex logistical challenges, to ensure transparency and verification of compliance, and to reduce free-riding [14, 28, 57]. In addition, collective EPR schemes feature an advantage that is particularly important for SIDS: companies are more likely to opt for such a scheme since they then share the risks associated with the necessary and substantial investments for the establishment of new or the expansion and upgrade of existing waste management systems, thereby reducing each company's individual risks [28].

By contrast, **EPR schemes with individual responsibility are usually considered to be a suitable option if the product market is concentrated, producers know exactly where the waste is generated, and the waste is easy to collect, sort and process** [9]. They also provide the strongest incentive for producers to develop more sustainable and environmentally friendly product designs since they directly benefit from improvements through reduced costs for their waste management [28]. Collective EPR schemes can achieve similar effects only with the modulation of fees according to certain sustainability and environmental criteria. One risk of individual EPR schemes, however, is that they distort competition in product markets. They create barriers for new companies to enter markets and come with disadvantages for small companies as these struggle with setting up the necessary independent waste management system on their own [28].

Second, **if the EPR scheme is run by a PRO, the legal framework needs to define, whether the PRO is run by private actors or public authorities** [3]. Neither option can be considered to be more successful than the other [12]. Rather, factors such as efficiency and effectiveness of the structure, management and administration are organisational key factors to the success of EPR schemes. However, most EPR schemes are operated by private actors, i.e.by producers, waste management companies or private investors [28]. One disadvantage of an industry-run PRO is that incentives for more circular product designs are less likely, e.g. through the modulation of fees, and the companies instead limit their efforts to waste collection, sorting, recycling and disposal [9]. This disadvantage can, however, be overcome through legal requirements for such a PRO to also provide incentives for more circular product designs.

Third, and again, **if the EPR scheme is run by a PRO, the legal framework needs to define whether a single non-profit PRO or several for-profit PROs run the EPR scheme** [3]. Generally, it remains difficult to assess which option works best [28].

In most countries, effective EPR schemes rely on a single non-profit PRO. They benefit from several advantages that reduce their overall cost: administrative simplicity, economies of scale, higher levels of transparency, easy identification of free riders, and less monitoring efforts than in the case of several for-profit PROs [3, 28]. Moreover, single non-profit PROs feature an advantage that is particularly important for SIDS: they temporarily reduce the risks of substantial and possibly irrecoverable investments in waste management systems [28]. In such a setup, however, it is important to ensure competition and avoid that the PRO abuses its power monopoly vis-à-vis other actors in the EPR scheme [28]. This is important in all different markets that an EPR scheme eventually might affect: the market of PRO, the market for collection and sorting, and the market for waste recovery and disposal [28]. A possible distortion of competition through single non-profit PROs can be overcome by appropriate legal rules and other measures that ensure competition (OECD 2016). The OECD recommends to have single non-profit PRO only temporarily run the EPR scheme in order to reap its benefits that are particularly important in the start-up phase of an EPR scheme. Once this phase is over, the EPR scheme should be opened to competition between several for-profit PROs [28].

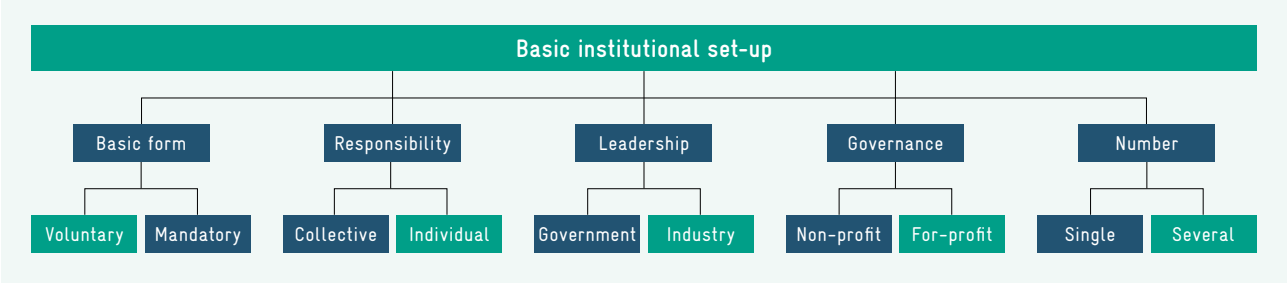
Implication for SIDS

A single and government-run PRO for the EPR is the most recommendable option

Against this background and given the specific context and challenges of SIDS in waste management, the establishment of a single government-run PRO is likely to be the most suitable option. The experiences with existing EPR schemes show that such a PRO not only generally performs well but also best overcomes the specific challenges with which most SIDS struggle, in particular the large and diverse number of sources of plastic waste, complex logistical challenges, the high costs and low efficiency of waste management systems, and the substantial investments. Moreover, in those SIDS where DRS or EPR schemes for other products are in place, they are usually mainly run by governments.

In all options, **governments need to decide on the allocation of tasks and the division of labour between the different stakeholders that contribute to the EPR scheme** [28]. At a bare minimum, the actor or organisation that runs the EPR scheme should take over all core responsibilities that are assigned to it in the framework and carry out all activities, services and tasks necessary to meet the requirements of the EPR scheme [3, 53]. Most importantly, it should establish, operate, maintain and develop the infrastructure and capacities for waste collection, sorting, recycling, recovery and, as last resort, disposal.

Figure 4: Summary of basic insitutional set up and recommendations for SIDS*



* Dark blue marked fields are options that are important/suitable in the context of SIDS.

3.2.2 Objectives, targets and minimum requirements

Most frameworks for EPR schemes **define overarching objectives, specific targets and minimum requirements** [3]. This is an important prerequisite to achieve the overarching goal of any EPR scheme: the reduction of pollution and the promotion of and transition to a more circular economy [12, 11, 54]. These include, but are not limited to,

- specific targets for waste collection, such as coverage of households or percentage of end-of-life products or of products put on the market;
- specific targets for waste management, such as increasing recycling rates and decreasing disposal rates;
- technical standards for sorting, recycling and recovery technologies or the operation of landfills;
- objectives for the clean-up and removal of legacy plastics and plastic products (that are already in the environment);
- minimum market shares for reusable plastic products or minimum thresholds for recycled contents in plastic products; or
- standards for the reusability and recyclability of plastics and plastic products [15, 9].

To effectively reduce plastic pollution, the **targets, objectives or design requirements need to be measurable and achievable** [49]. They should also align with the waste hierarchy and prioritise prevention, reduction and reuse over recycling and consider disposal or incineration only as the last resort [9, 57]. This also means that **targets for reuse and recycling are usually preferred over targets for collection** since the latter needs to be improved in any case in order to meet reusability and recycling targets [9]. Such targets already exist in SIDS. In addition, EPR schemes are particularly effective **if targets tighten over time**, thereby incentivising producers to continually innovate and invest in improvements that decrease the environmental footprint of plastic products and plastic waste [9]. In the context of SIDS, the prioritisation of prevention, reduction and reuse would have the advantage to relieve the overburdened waste management systems and to fill the existing policy gaps in waste management. At the same time, an EPR that sets gradually increasing targets for recycling of plastic and plastic products typically increases demand for recycling and promotes markets for secondary plastic and plastic products, thereby improving their competitiveness with virgin plastics [9, 57]. In SIDS, it can thus improve the economies of scale of recycling, make investments into recycling technologies more attractive and affordable, and ultimately reduce the demand for (and import of) virgin plastic and plastic products. Yet, in setting such targets potential negative substitution and side effects need to be thoroughly considered in order to avoid unintended consequences on environment or human health [9].

In most existing EPR schemes, the **targets for waste collection and waste management typically come as take-back requirements** for obliged companies [9, 28, 57]. In this case, the EPR scheme requires companies to take back a certain amount of their plastic and plastic products at the end of their life – measured as weight, volume or units – and to ensure their adequate treatment [12]. Companies or the organisation that runs the EPR scheme typically choose from four options to meet this requirement. They

1. organise the take-back themselves;
2. contract a third-party to take back their plastic products;
3. encourage consumers to turn back the plastic products; or
4. introduce a DRS, Advanced Disposable or Recycling / Recovery Fee (ADF or ARF).

These options are not mutually exclusive and may be combined.

Implication for SIDS

An EPR scheme needs to define context-specific objectives and targets for market shares of reusable and recyclable plastic and plastic products; waste collection, sorting and recycling; and removal of legacy plastics

a) In view of the limited and often insufficient capacities and technologies of existing waste management systems in SIDS, it is important that EPR schemes in SIDS gradually increase minimum market shares for reusable and recyclable plastics and plastic products. This helps not only minimise (the disposal of) plastic waste in the first place. It also gives a clear signal to the private sector that demand for and profitability of (more) reusable and recyclable plastic and plastic products as well as related technologies and business models will increase.
b) For the same reason, it is particularly important that the EPR scheme sets achievable and measurable targets for adequate waste collection and management that are tailored to the specific context in each SIDS. Such targets create favourable conditions for investments like predictability of needs in the waste management sector.
c) Given the large amounts of plastic waste in the domestic environment or on uncontrolled landfills in SIDS, it is equally important that any EPR scheme in SIDS specifies objectives for the removal of legacy plastics from the environment.

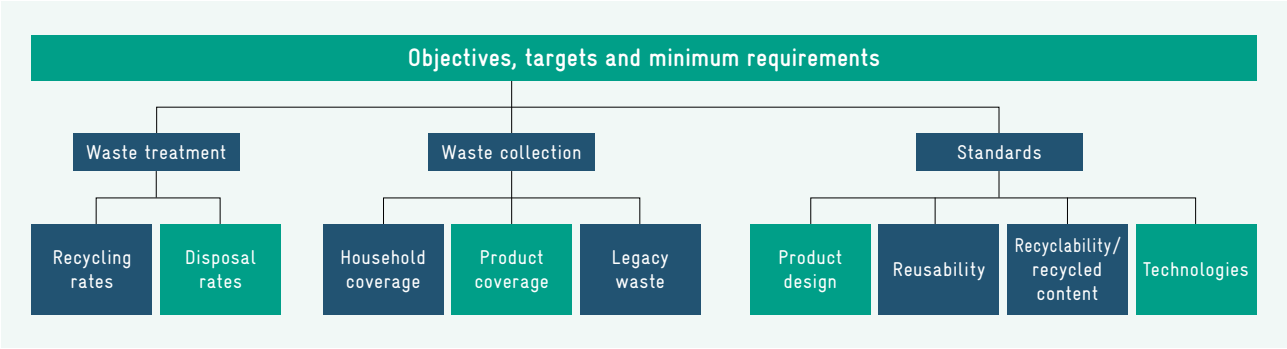
Knowledge and ideally accurate data on the current situation and developments in the areas to which they apply are certainly beneficial for setting the respective goals, targets and minimum requirements [9, 28]. Otherwise, there is a risk of setting the overall target of the EPR scheme either too high or too low. As mentioned above, however, such data is missing in many SIDS [28, 44].

3.2.3 Scope and coverage

Essentially, two aspects need to be considered in the legal framework when specifying the scope and coverage of the EPR scheme.

First, the **legal framework needs to clearly define which companies will be required to assume responsibility for their products under the EPR scheme** [14, 28, 49], that is, to participate in and make financial contributions to the EPR scheme, typically referred to as obliged companies [3]. Usually, obliged companies are those that first introduce and distribute plastic and plastic products on the regulated market, including plastic producers, manufacturers and importers [3]. The legal framework also needs to define at which entry point to the market the obliged companies will be identified and charged to make their financial contributions. Typically, this is the entry point at which companies first introduce their plastics and plastic products to the market, e.g., sale and distribution to retailers and plastic consuming businesses or import of plastics and plastic products [3]. Common exceptions are plastic producers, manufacturers and importers that fall below a certain minimum limit as regards turnover, quantity or weight of plastic and plastic products [3].

Figure 5: Summary of objectives, targets and minimum requirements and recommendations for SIDS*



* Dark blue marked fields are options that are important/suitable in the context of SIDS.

Implication for SIDS

An EPR that obliges all companies that import plastics and plastic products is advisable

In most SIDS, it is particularly important to oblige companies that import plastics and plastic products. They are responsible for the largest shares of plastic and plastic products introduced to the domestic market, as there is no significant plastic production or manufacturing in many SIDS. Moreover, in those SIDS that have a DRS in place, the deposit is usually collected upon import through the customs service.

Second, the **legal framework needs to clearly define what types of plastic and plastic products the EPR scheme will cover** [11, 49]. Two basic options exist here. In either approach, clear and unambiguous definitions of each type of plastic and plastic product that is subject to the scheme are indispensable.

On the one hand, the **EPR scheme initially covers only certain types of plastics and plastic products and gradually expands its coverage over time** [3]. Usually, such an approach starts with those plastics and plastic products that have a positive market value and are easy or easier to recycle. In the context of SIDS this could be for example plastic bottles and food and beverage containers made from PET, polyethylene (PE) or polypropylene (PP). The advantage of starting with such plastics and plastic products is that the collected materials are likely to be recycled and unlikely to end up in landfills, showcasing the usefulness of an EPR scheme in its early stages and broadening its acceptance among obliged companies and the population [3]. The disadvantage of starting with plastic and plastic products that have a positive market value are possible consequences for informal waste workers who play an important role in waste management in developing countries like SIDS. They usually collect and process only such products and therefore rely on them as an income source. Unless the informal waste workers are not appropriately integrated in the EPR in one way or another, they might lose their income source if the EPR starts with and covers only such plastic and plastic products. Against this background, the OECD even recommends considering EPR schemes that only cover products that have no positive market value and exclude such products with positive market value in order to protect the sources of income of informal waste workers [28].

Alternatively, a limited EPR scheme could start with the plastic and plastic products with the largest shares on the domestic market. In this case, any scheme in SIDS would best target plastic packaging in the first place as this is globally the most important source of plastic waste, accounting for over 40 percent of all plastic waste, followed by consumer products using plastic (12 percent) [29]. An EPR scheme for plastic packaging might, for example, cover packaging that retailers hand out to consumers (service packaging), packaging that contains a single product (primary packaging like containers for food, beverage or cosmetics), packaging that holds several products (secondary packaging like boxes or containers for bottles), and packaging that is used in transport of products (tertiary packaging like pallets used for shipping containers, storing and warehouses).

The first phase might yield important insights into strengths and weaknesses of the given EPR scheme, provide lessons for its effective operation and stimulate adaptations that inform and improve its later expansion to plastics and plastic products that are more challenging to manage [3]. This approach, however, requires a careful consideration and monitoring of possible and actual substitution effects that might counteract the EPR's objective to reduce plastic pollution [12].

On the other hand, **the EPR scheme covers from its very start all types of plastics and plastic products** [3]. The EPR scheme then encourages the establishment and development of a comprehensive waste management system that can also cope with plastics and plastic products that are more difficult to recycle and have no positive market value, like composite and mixed plastics. In this case, companies and citizens get accustomed early on to such comprehensive and complex waste management systems. Such an EPR scheme is likely to result in measurable impacts earlier that might spur its support.

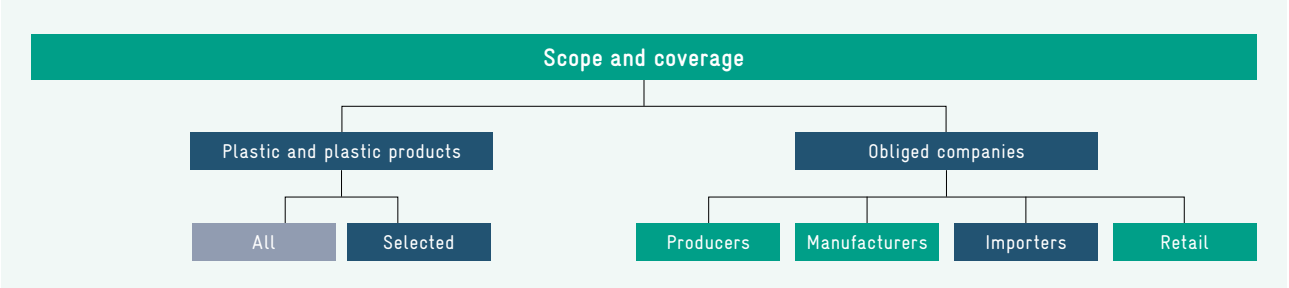
Implication for SIDS

The EPR scheme should initially cover plastic and plastic products that have a positive market value and are easy to recycle and then increase its coverage over time

In view of the limited and often insufficient capacities of existing waste management systems in SIDS, an EPR scheme that initially covers only certain types of plastics and plastic products and then gradually increases its coverage over time is certainly the preferred option. Such an approach also gives more time to gradually expand and upgrade waste management systems while already generating financial resources for the necessary investments. If this approach is chosen in SIDS, it is, however, important to adopt measures that integrate the informal waste workers from the very start of the EPR scheme's operation.

In general, an **appropriate definition of scope and coverage determines the success of any EPR scheme** [28]. Obviously, the number and kind

Figure 6: Summary of scope and coverage and recommendations for SIDS*



* Dark blue marked fields are options that are important/suitable in the context of SIDS. Green marked fields are options that might be considered in SIDS once EPR scheme has been running for some time.

of obliged companies and the number of covered plastics and plastic products influences the amount of financial contributions that the EPR is able to raise and the extent to which the plastics economy will become more circular. The more actors participate in the EPR and the more types of plastics and plastic products are covered, the more financial resources will be mobilised and the more comprehensive the transition to a circular plastics economy will be [28].

Overall, an **adequate definition of the scope and coverage of an EPR scheme requires good knowledge and ideally accurate data** on domestic plastic producers, manufacturers and importers as well as on the amounts and types of plastics and plastic products that are put on the domestic market [14, 28]. However, such data is lacking in many SIDS [4, 44] and therefore needs to be generated in the first place. This might not be too difficult in SIDS as most plastic products are imported and data should thus be available from the customs service [26], in particular if they use the Harmonised System, an international coding system to distinguish different product categories and types.

3.2.4 Financial flows

Any **legal framework for an EPR scheme needs to define the sources of funding.** In the first place, any EPR scheme largely relies on the financial contributions from obliged companies. In addition, it usually receives the revenues from sales of recyclable plastic waste or recyclable materials, but this is barely enough to fund all tasks, activities and services it carries out. The EPR scheme may also receive additional funding from public authorities or voluntary contributions from other actors.

Financial contributions from obliged companies are necessary to cover **all costs and expenditures associated with the activities and services under the scheme.** The overall market value of recyclable plastics or recycled material obtained by an EPR scheme alone is usually insufficient [11]. Estimates suggest that in some cases selling recyclable plastics or recycled material covers only meagre 20 percent of the total costs of an EPR scheme [3].

Typically, obliged companies make their financial contributions to the scheme by paying fees to the body or organisation that runs the scheme and carries out specific activities and services on their behalf. To ensure the successful implementation of an EPR scheme, the scope of activities and services that are funded should be clearly defined and the funding should be ongoing and sufficient [12, 11].

The **calculation of fees needs to ensure that the sum of all financial contributions continually covers and evolves with all costs and expenditures** associated with the essential activities and services under an EPR scheme minus its revenues from recovered materials [3, 28]. This includes costs and expenditures for

- the establishment of a new, separate and adequate waste management system or investment costs to expand and improve an existing one, including costs for operation and maintenance and adequate technological resources;
- collection, transport, sorting and treatment of plastic waste;
- the administration of the body or organisation that runs the EPR scheme, including human resources;
- public communication and awareness-raising campaigns;
- monitoring, verification of compliance and enforcement; and, if desired,
- research and development of new products and technologies [28, 49].

There are, however, also proposals that the EPR scheme should not cover all but only a substantial share of costs. This applies to EPR schemes in which the body or organisation that runs the scheme does not carry out all activities on its own and instead contracts or relies on third parties, e.g. for waste collection, transport, sorting, and / or treatment of waste, or for monitoring and enforcement. Otherwise, these other actors would have no incentive to work cost-efficiently or improve the execution of their tasks [28].

Generally, the **costs and expenditures are largely determined by the overall ambition of the EPR scheme in combination with the already existing waste management infrastructure and the plastic market** in the country where the EPR scheme is applied [14, 57]. In countries that lack or have only limited waste management systems, such as SIDS, this requires consideration of how the EPR can enable and accelerate the establishment of a modern system for waste collection, sorting, recycling and disposal [28, 11, 57].

For example, an EPR scheme would incur considerable costs and expenditures if it sets ambitious targets for collection, sorting, and recycling in a country where the quality and capacities of the existing infrastructure for waste collection, sorting and recycling are poor and the domestic market share of plastic products that are hard to recycle is high. In such a case, the implementation of the EPR scheme would incur high investment costs for expanding and upgrading the waste management infrastructure – on top of the regular costs for operating the waste management system. By contrast, if such an ambitious EPR scheme were implemented in a country with an already well-developed waste management infrastructure and a large market share of easy-to-recycle plastic products, the costs would be considerably less. In such a case, the financial contributions from obliged companies would mainly have to cover the operation costs and much less investment costs.

Moreover, costs depend on the type of waste collection, the waste composition, the contractual arrangements and additional financial contributions from other actors (e.g. municipalities or, in the case of SIDS, possibly international donors) [14, 53].

Implication for SIDS

The fees need to take into account the necessary and often considerable investment costs for establishing new or expanding and upgrading existing waste management systems

Given the limited and often insufficient capacities and technologies of existing waste management systems in SIDS, the necessary investment costs to establish or expand and upgrade these systems deserve particular attention when setting fees under an EPR scheme, as these are likely to be considerable.

In principle, the **calculation of these fees is based on the kind and the weight or quantity of plastics and plastic products** that each individual obliged company puts on the market [14, 11, 55]. All obliged companies need to be treated equally in this regard and have the same requirements, obligations and responsibilities in order to create a level playing field and not distort competition between them [3].

Nevertheless, **fees may be modulated according to certain qualities of plastics and plastic products** in order to incentivise companies to make the design of their products more circular and to facilitate a transition to a more circular plastics economy [25].

Criteria for such modulation includes reusability, recyclability, recycled content, actual recycling rate, durability or hazardousness [12, 25]. For example, lower fees can be set to reward more sustainable plastic products, such as those that are reusable or easy to repair or recycle [9]. Lower fees can also reward the provision of information on appropriate disposal or labels that facilitate sorting and recycling of plastics and plastic products. In reverse, higher fees can be set to penalise

less sustainable plastics and plastic products, such as those with more harmful and hazardous chemical additives or single-use plastic items [25]. Of course, the level of such penalising fees or the difference between rewarding and penalising fees need to be significant in order to be effective and stimulate the necessary investments [28]. If standards or targets for certain qualities of plastic and plastic products, e.g. minimum recycled content, complement such modulation its effects towards a more circular plastic value chain are reinforced [9]. Such a combination of modulated fees and product standards can effectively complement reuse and recycling targets in stimulating more circular product designs. Yet, and like in the case of targets, the modulation of fees has to take into account potential negative substitution and side effects in order to avoid unintended consequences on the environment or human health [9]. Finally, governments are the ones who should decide on the modulation of fees. Since the modulation affects competition between producers it is on the one hand rather unlikely that producers reach consensus. If they do, (a group of) companies might on the other hand abuse their market power and / or collude [28].

In practice, however, the effects of EPR schemes on product design have been less than expected [28]. Moreover, modulated fees lead to higher administrative costs and should therefore only be used when the environmental or financial gains are significant [28]. In the case of SIDS, it is also questionable whether the modulation will affect the design of plastic and plastic products. Most plastic producers and manufacturers are located outside SIDS. Given the limited and in global comparison negligible market size of SIDS, modulated fees in these countries will hardly affect the producers' and manufacturers' considerations on product design. Rather, they might stop exporting their products to SIDS. Yet, the modulation would then minimise the import of such less sustainable plastic and plastic products, possibly leading to decreases of their market share and increases in market shares of more sustainable plastic and plastic products.

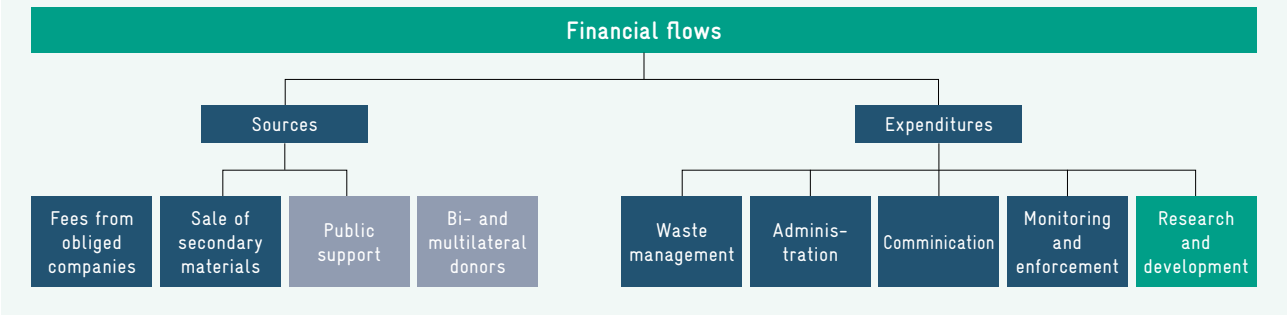
Implication for SIDS

An EPR scheme should modulate fees in order to minimise the amount of plastic and plastic products that are disposed of and to foster a transition towards a more circular plastics economy in SIDS

In view of the limited and often insufficient capacities of existing waste management systems in SIDS, EPR schemes in SIDS should modulate fees according to the reusability, repairability, recyclability and labelling of plastics and plastic products. In SIDS, such incentives are likely to reduce the import of less sustainable plastic products and to minimise (the disposal of) plastic waste. The modulation thus eventually relieves the overburdened waste management systems and enables a more circular plastics economy.

Overall, setting the right fees is thus a highly complex task and again **requires accurate data** on domestic plastic producers, manufacturers and importers as well as on the amounts and types of plastics and plastic products that are

Figure 7: Summary of financial flows and recommendations for SIDS*



* Dark blue marked fields are options that are important/suitable in the context of SIDS. Green marked fields are options that might be considered in SIDS once the EPR scheme has been running for some time.

put on the domestic market, including secondary market value and costs of recycling [28]. In addition, it requires good knowledge and accurate data on the quality and capacities of the existing infrastructure for waste collection, sorting, recycling, recovery and disposal [28]. Finally, and ideally, it requires sophisticated ex ante cost assessments that take into account the planned requirements of the EPR system and the specific national context in which it will be applied [28, 57].

3.2.5 Organisation of waste management

Any EPR scheme needs to clearly define the different roles and responsibilities of actors that contribute to or are affected by the EPR scheme [28]. Most importantly, it needs to define how the collection, sorting, recycling, recovery and disposal of plastic waste is organised under the EPR [49, 57]. Governments typically delegate related decisions to the organisation that runs the EPR scheme [28]. Four basic options exist in this case [3, 28].

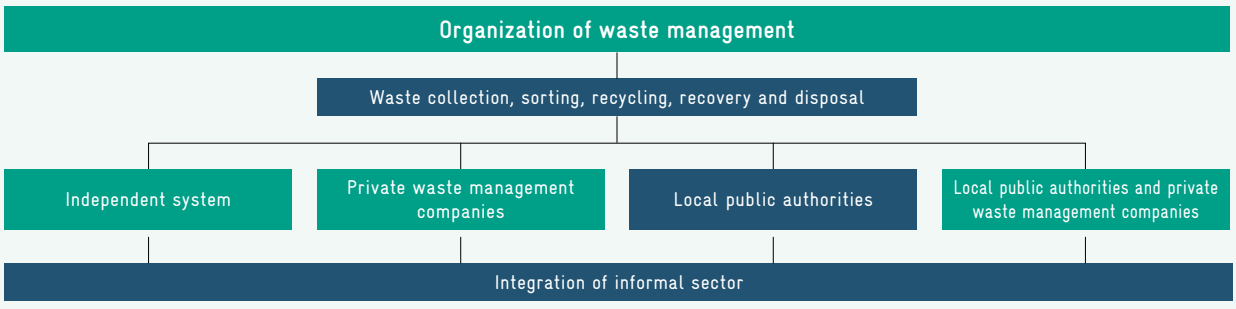
The organisation

1. sets up an own system;
2. contracts and pays private waste management companies;
3. contracts and pays local public authorities; or
4. contracts and pays local public authorities that in turn pay and contract private waste management companies.

These **options can be combined and limited to certain activities or certain types of plastic waste** [3]. For example, public authorities can be contracted and paid only for the collection (of all plastic waste or only plastic waste in households) and private waste management companies can be contracted and paid for sorting, recycling, recovery and disposal services. If other parties are contracted under the EPR scheme to carry out certain tasks, adequate certification, licensing and permission schemes as well as registration requirements for these parties help ensure compliance with the standards and aims of the EPR scheme as well as fair competition [19]. In SIDS, the integration of the informal sector here deserves particular attention and possibly requires specific mechanisms, processes and measures, since informal waste workers play an important role in waste management particularly in developing countries and emerging economies [19, 28].

The **actual suitability of each approach depends on the specific domestic context** in which the EPR scheme is applied [3]. For example, if local public authorities already run the waste management (or only the waste collection) in a country and are then contracted and paid for these services, the EPR scheme can benefit from their existing infrastructure and experience in waste management. In existing EPR schemes this option is often chosen [14, 57]. If this is the case, it is important to clearly define the role of local public authorities in the EPR scheme [28]. Such an approach, however, reduces the direct influence of the organisation that is ultimately responsible for achieving the objectives and targets of the EPR scheme, increasing its expenditures for monitoring compliance and enforcement [3].

Figure 8: Summary of organisation of waste management and recommendations for SIDS*



* Dark blue marked fields are options that are important/suitable in the context of SIDS.

Implication for SIDS

Contracting public authorities under the EPR scheme is most suitable

Given that in most SIDS local public authorities operate the waste management and that waste management is hardly economically profitable for private companies outside urban areas, any EPR scheme in SIDS should contract and pay them for their waste management services or involve them in other ways in providing these services.

3.2.6 Supervision, monitoring and enforcement

In order to avoid free riding and ensure compliance with the EPR scheme's requirements, **any framework needs to define adequate monitoring and enforcement mechanisms**, including credible means and appropriate sanctions [12, 28, 11, 57]. This is a crucial prerequisite for any EPR scheme in order to operate effectively and fairly [15, 53].

The **monitoring usually covers three groups of actors: the body or organisation that runs the EPR, obliged companies, and contracted waste management operators** (if they carry out the waste management activities under the EPR scheme) [3].

In cases where the EPR scheme is run by a PRO or another independent organisation (and not a public authority or agency), the legal framework needs to define rules and responsibilities for its supervision through public authorities [57]. More precisely, it should

- apply a formal authorisation procedure for the responsible organisation;
- define monitoring procedures and audits for the responsible entity, including indicators and reporting obligations that ensure the quality and comparability of reported data; and
- promote compliance and enforcement through a system that discourages free riders [49].

The monitoring and enforcement of compliance of obliged companies and waste management operators is usually the task of the organisation operating the EPR scheme. Alternatively, the government or an independent body might carry out the monitoring [28].

To monitor the obliged companies, the **organisation that runs the EPR scheme usually establishes a registry in order to identify and hold accountable obliged companies and ensure their compliance** [14, 55]. In this registry, obliged companies above all report and verify the amounts, weights and type of plastics and plastic products that they put on the market [28, 49, 55]. In the case of SIDS, a good entry point for such a registry are customs services since most plastic and plastic products are imported to SIDS. On the basis of the registry, the responsible organisation can monitor whether the obliged companies pay their share to the EPR scheme and carry out other required activities in line with the scheme's requirements [3]. In addition to monitoring, the registry also serves as a basis to calculate and set the fees as well as the resulting payments for obliged companies.

Implication for SIDS

The most suitable entry point for an effective monitoring and enforcement is a registry for importers of plastic and plastic products

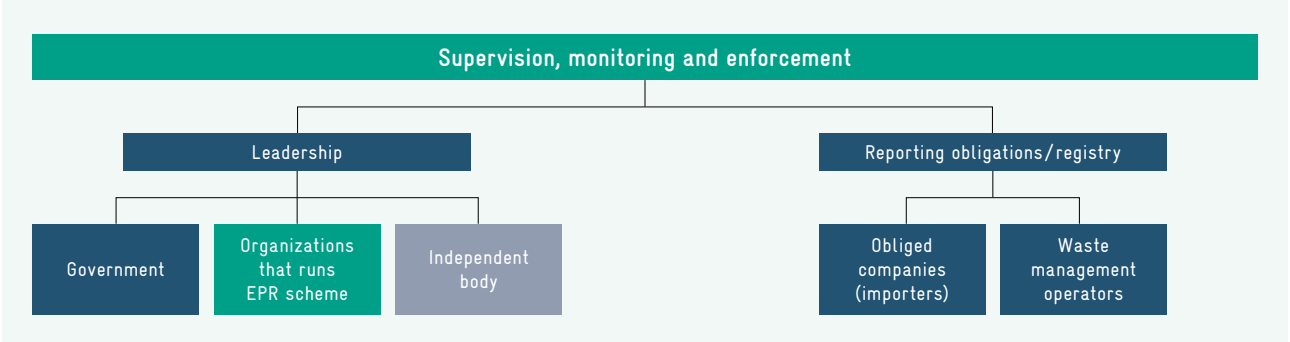
In most SIDS, it is best to mandate obliged companies to report on their imports of plastics and plastic products. Imports are responsible for the largest shares of plastics and plastic products introduced to the domestic market, as there is no significant plastic production or manufacturing in many SIDS.

Likewise, in the case of waste management operators a registry best serves the purpose of monitoring. Waste management operators report on the activities that they carry out under the EPR scheme, e.g. collection, recycling, recovery and disposal rates of plastic waste [28]. On this basis, it can be monitored whether the waste management operators carry out the requested services, comply with the agreed standards and are paid accordingly [3].

Both, obliged companies and waste management operators, thus need to keep records of and report on their inputs and outputs and any other activity or service that is regulated under the EPR scheme.

Overall, the **monitoring and enforcement of any EPR scheme require not only accurate data collection and processing [53], but also an adequate governance structure and installed capacity for monitoring and compliance.**

Figure 9: Summary of supervision, monitoring and enforcement and recommendations for SIDS*



* Dark blue marked fields are options that are important/suitable in the context of SIDS. Green marked fields are options that might be considered in SIDS once the EPR scheme has been running for some time

3.3 Complementary measures

There are several complementary measures that can support the effective implementation of EPR schemes [49]:

1. Economic and market-based instruments: DRS, taxes, levies, fees and plastic credits
2. Regulatory policies
3. Information, communication and education
4. Integration of the informal waste sector

Complementary actions might even be indispensable since EPR schemes hardly work on their own [15, 57]. These actions typically serve several functions in the context of an EPR scheme. They can help ensure the effectiveness of a waste management system [57] and improve the circularity of plastics and plastic products, thus reducing their environmental footprint [12]. In addition, they can foster much needed innovation across the entire life-cycle of plastics [28].

3.3.1 Economic and market-based instruments

Economic and market-based instruments are often used in combination with EPR schemes. Their use can help achieve the EPR schemes' basic objectives and is often seen as improving the effectiveness of these schemes [9, 28]. They typically either provide incentives or disincentives, and target different actor groups whose behaviour influence the effectiveness of the EPR scheme, namely plastic producers, manufacturers, importers, plastic consuming businesses, consumers and waste management operators. Incentives help implement the EPR scheme by rewarding certain behaviours, such as design for circularity, use of recycled materials, or proper collection with lower costs or refunds. Disincentives are intended to discourage actors from behaving in a way that interferes with the effective implementation of the EPR scheme by penalising certain behaviours, such as littering, unsustainable design, or excessive packaging with higher costs. In addition to influencing behaviours of different stakeholders, economic and market-based instruments can also directly contribute to the operationalisation of the EPR scheme, e.g. by financing sustainable waste management operations, infrastructure and / or the operating costs of the scheme itself. In particular, in developing countries like SIDS economic and market-based instruments are important since they provide additional incentives or disincentives to comply with the EPR scheme [28] and may generate much needed additional resources.

One such market-based instrument that is often employed to support the overall goals of an EPR are DRS [3, 28, 57]. Under such a scheme, consumers pay a deposit when buying a product in plastic packaging and receive a refund once they return the used packaging. Such schemes considerably increase the end-of-life collection rates for products [3]. DRS **usually work best for specific and clearly identifiable plastic products**, such as PET bottles, and also often successfully incentivise reusable product design [9]. If well-designed, DRS are likely to effectively increase the waste collection rates and to promote the reusability of plastic and plastic products [9], thereby increasing the effectiveness of EPR schemes [15].

There are different considerations to make when organising a deposit-refund scheme [26].

- The scheme can be managed by the public or private sector.
- The first point of payment for the deposit can vary from the consumer at the shop, to the distributor / retailer or the producer / importer.
- The rate of the deposit needs to be high enough to encourage collection and return of the products, but at the same time not too high, in order to avoid that consumers opt for cheaper, though possibly less sustainable alternatives.
- The points where consumers can return the plastic product and receive the refund can include the point of purchase, a specific group of retailers, all retailers or redemption centres.

Another popular example of a fee to support the effective implementation of EPR schemes are the ADF or ARF [9, 57]. The disposal / recycling fees are levied upon market entry of a product [9]. The fees are not limited to specific products but can be applied to a vast variety of plastic product

groups, such as packaging materials or single-use plastics. As such, they do not incentivise collection by consumers. Instead they garner funds through which a collection and waste management system can be established and operated [9]. In addition, those ADF or ARF that distinguish between problematic (i.e. non-reusable, difficult to recycle or harmful) products and less problematic, reusable, easy to recycle or less harmful products, can incentivise producers and importers to choose the latter over the former [9]. The financial resources can also be used to promote more circular product designs, e.g. more durable, reusable or recyclable plastic products, and to develop improved recycling technologies [9]. Since the disposal / recycling fees do neither encourage consumers to return plastic and plastic products nor to properly dispose them, they are generally less likely than DRS to increase the waste collection rates [9]. To overcome this, both, ADFs and ARF as well as the above-mentioned DRS can be combined, e.g. through levying a fee and only partially refunding the consumers upon returning the product while using the other part for funding waste management systems. Moreover, ADFs and ARFs do not provide any incentives for more circular product designs, unless they are modulated along certain characteristics of plastic and plastic products [12].

Other economic instruments that support the effective implementation of EPR schemes are taxes, levies and fees [3]. They can raise additional funds that could be used to complement the resources mobilised by the EPR and spent to establish, expand or upgrade waste management systems. Taxes can work as incentives or disincentives, while fees and levies usually work as disincentives. They can target the production, consumption or waste management of plastics and plastic products [28]. Incentives in the upstream or for improved product design are particularly suitable to reduce the environmental impacts of plastic and plastic products [28].

For example, tax reductions or exemptions, and thus lower prices for reusable or easy to recycle plastic or plastic products with a certain minimum content of recycled plastics, can support the EPR scheme in achieving its goals for their minimum market share. By lowering prices, they contribute to increasing production, sales and consumption of these preferential products [11]. Likewise, tax exemptions or reductions for investments into waste management technologies or facilities can support the EPR scheme. They can incentivise the establishment, expansion or upgrade of waste management systems so that they meet certain sustainability standards. Conversely, higher taxes, levies or fees, and thus higher prices for non-reusable, hard to recycle or non-recyclable (single-use) plastic or plastic products without any recycled content can contribute to decreasing production, sales and consumption of such products, again supporting the EPR scheme in achieving its related goals [11]. Likewise, taxes, fees or levies on the disposal of plastic waste, e.g. through landfill taxes or pay-as-you throw systems, disincentivise such disposal, diverting plastic waste from landfills, and in theory thereby incentivising reduction of plastic waste or other treatments such as recycling. In reality, however, such taxes and fees, in particular in developing countries such as SIDS, have been known to lead to illegal dumping as an unintended consequence [3]. Finally, and in particular in countries where tourists significantly contribute to plastic pollution, fees and levies on tourists might be introduced and then used, for example, for improvements in the waste management. They can be imposed at the arrival of cruise ships, departure from airports, at accommodation or other tourist services, or for specific plastic products in the tourism sector [33]. They might be collected through travel agencies, customs / immigration service, tour operators (e.g. cruise and ferry operators or airlines), or individual local tourism services (e.g. hotels, lodges, resorts, etc.) [33].

Even if the EPR scheme has not defined any specific goals for market shares of certain plastic products or collection and recycling targets, taxes, levies and fees generally and indirectly support the scheme's effective implementation. They reduce the overall burden on the waste management systems by preventing and reducing plastic waste that needs to be processed in one way or another.

Recently, plastic credits have attracted increasing attention in the discussion of actions that might complement EPR schemes [16, 31]. Under a plastic credit scheme, tradable certificates are issued for a specified amount of plastic waste that is collected from the environment for recovery and recycling. Other actors, e.g. organisations, companies or consumers, can then buy (and trade) the plastic credits and indirectly reduce their plastic footprint or even

achieve plastic neutrality. These schemes thus price the collection or removal of plastic waste from the environment and often do so for plastic waste that has no or only low value and would not have been collected otherwise [8, 56]. In other words, the schemes reward the environmental service of collection and removal, thereby reducing plastic pollution. Plastic credits are an innovative instrument to mobilise resources for waste management, in particular in countries where waste management is underfinanced and insufficient and where the informal waste sector plays an important role [31]. Most existing plastic credit schemes fund collection of plastic waste [8].

The (potential) **relationship between plastic credits and EPR schemes is still under discussion.** On the one hand, **plastic credits might conflict with or undermine EPR schemes. Companies could use existing plastic credit schemes** as an argument to oppose the introduction of a more stringent and mandatory EPR scheme that typically comes with more obligations and higher costs for them [31]. Plastic credit schemes could also compete with EPR schemes if they lead to the collection of plastic waste that has a positive market value or if waste is collected at lower prices than through the EPR scheme. This might hinder the establishment of a new EPR scheme or reduce the effectiveness of an existing one [31]. More generally, the establishment and operation of plastic credit schemes requires considerable political, technical and human resources and capacities that – depending on the specific domestic context – might then lack for establishing and / or running an effective EPR scheme. Against this background, some experts conclude that plastic credits should only be used as a last resort and once other strategies for reducing plastic pollution have been implemented [16, 8, 56]. They recommend prioritising EPR schemes that – as opposed to plastic credit schemes – have already been shown to effectively reduce plastic pollution [56]. This is particularly relevant in the context of SIDS where implementing and monitoring a plastic credit scheme and an EPR scheme in parallel might overburden already scarce resources and capacities.

On the other hand, **there are ways to integrate, or at least combine, plastic credit schemes and EPR schemes so that they are mutually supportive.** Plastic credit schemes could be implemented in a transitional period preparing and leading to the establishment and operation of an EPR scheme [16]. The resources they mobilise could be used to start developing sustainable waste management capacities and infrastructure on which a future EPR scheme can build and expand [56]. They could also be used to collect the necessary data on plastic waste streams on which the effective design of any EPR scheme relies [31]. Once an EPR scheme is established, plastic credits could be used as an additional incentive and as a mechanism to collect certain types of plastic waste, e.g. difficult-to-recycle or low-value plastic waste, by providing extra payments for such waste. It could thus help increase the plastic waste collection rates beyond the EPR baseline [56].

In the case of integration, several aspects are seen as particularly important [16]. The institutional set-up of such an integration is best defined through public policies or regulations. Activities or actions under the plastic credit scheme and under the EPR scheme need to be clearly separated and distinguished from each other and any price competition between the two schemes must be avoided [16, 56]. Finally, the plastic credit scheme needs to regularly and transparently report to the EPR scheme and needs to be monitored by an independent body.

More generally, for a plastic credit scheme to operate successfully and unlock its potential, it needs to meet certain minimum requirements, irrespective of whether it supports an EPR scheme or not. **Additionality is the most important requirement** [31, 56]. Any plastic credit scheme should be designed in a way that more plastic waste is collected from the environment through new actions than without the credits and that no certificates are issued for plastic waste that would have been collected in any case. If the plastic credit scheme is run in parallel or under an EPR scheme, additionality means that the plastic credit scheme increases waste collection rates beyond the rates that the EPR scheme provides and certificates for plastic waste are only issued if the waste would not have been collected under the EPR scheme. In order to ensure additionality, **clear definitions of plastic waste and standards for certification and credits** are needed [8]. Additionality also requires effective control and monitoring mechanisms and governance structures that facilitate transparency in certification and methodologies, ensure proper documentation, and establish external and inde-

pendent compliance verification. Current plastic credit schemes often meet these requirements for additionality only partially [8, 56]. Overall, this increases the risk of greenwashing or even fraud [8, 56] and might thus impair the benefits that a plastic credit scheme might provide as a complementary measure in the context of an EPR scheme.

Besides additionality, the effectiveness of plastic credit schemes and thus their potential contribution to an EPR scheme generally depends on several other design factors [16, 8, 56]:

- **Set right prices**: The prices of plastic credit schemes need to be set at levels that do not undermine other substantial actions to reduce plastic pollution. If prices are too low, actors might choose plastic credits as a cheap alternative to more effective actions to reduce plastic pollution. Moreover, the prices need to ensure sustainable collection and processing of plastic waste as well as reliable and decent income for waste workers.
- **Maximise coverage**: Plastic credit schemes need to cover all kinds of plastic waste and not only plastic waste that is easy to collect and process while ignoring waste that is hard to collect and process such as light-weight multi-layered plastic.
- **Foster end-of-life sustainability**: Plastic credit schemes need to ensure proper, environmentally sound and sustainable processing and treatment of plastic waste after its collection.
- **Drive actual effects**: Plastic credit schemes need to encourage actions that lead to actual changes in and minimise behaviour, practices and processes that contribute to plastic pollution.
- **End plastic pollution as a long-term aim**: Plastic credit schemes ultimately need to aim at reducing and eliminating plastic pollution in the environment. They thus should make themselves unnecessary in the long-run. To this end, they need to avoid that plastic credit buyers use them as their only strategy to reduce and merely offset their plastic footprint without taking any further measures to effectively reduce their plastic footprint.

Finally, additional funding from other sources might (be needed to) complement EPR schemes, e.g. such as public funding, voluntary contributions and / or external multilateral and bilateral financial support [57].

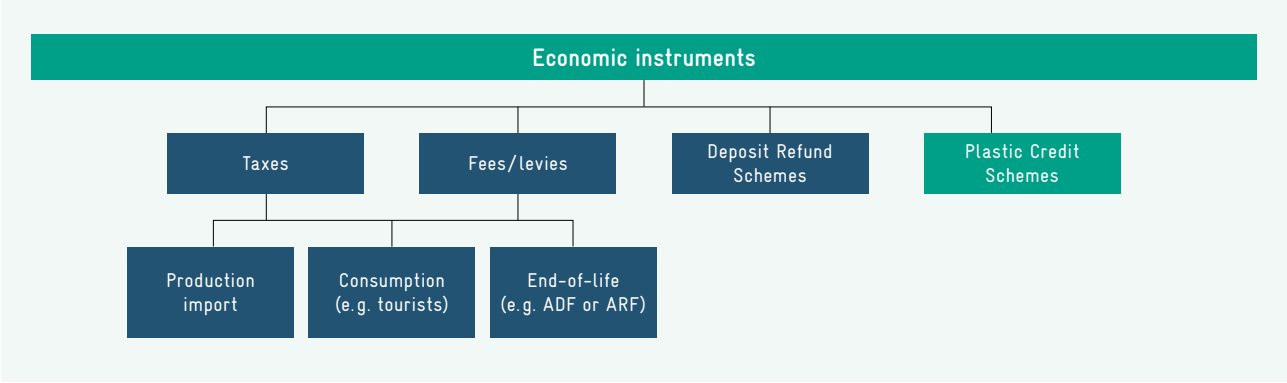
Implication for SIDS

The implementation of a DRS and the imposition of fees on tourists and single-use plastic can best support EPR schemes

In view of the limited and often insufficient coverage of waste collection in SIDS, the implementation of a DRS is likely to complement EPR schemes as it effectively increases the collection rate.

In SIDS, tourists significantly contribute to plastic pollution, hence the imposition of a fee on tourists and single-use plastic can help SIDS to address important sources of plastic pollution. Thus, fees can raise much-needed additional financial resources for waste management systems in SIDS.

Figure 10: Summary of economic instruments and recommendations for SIDS*



* Dark blue marked fields are options that are important/suitable in the context of SIDS.

3.2.2 Regulatory policies

All regulatory policies that reduce the generation of plastic waste in the first place directly relieve waste management systems under the EPR scheme, thereby helping the scheme to effectively manage the remaining plastic waste. These include above all bans, phase-outs, product standards and labelling.

In particular, **bans or the progressive phase-out of plastics and plastic products take pressure off waste management systems**. Many SIDS already apply bans or progressive phase-outs, typically targeting many different single-use plastic items.

Standards for certain plastic products also have the potential to support an effective implementation of EPR schemes [28, 57]. In particular standards that prescribe certain minimum criteria for the reusability or recyclability of plastic products are helpful in this regard since they help achieve related goals of the EPR scheme. Other elements of such standards are requirements for the

- use of certain environmentally friendly materials;
- reduction of material use;
- increase of recycled content;
- improvement of production processes; and
- reduction or elimination of harmful environmental and health effects during and after use [12].

In SIDS, such standards will help to reduce or even eliminate the import of certain plastic and plastic products. Like in the case of modulated fees, standards will hardly affect the producers' and manufacturers' considerations on the design of products that they export to SIDS given the limited and in global comparison negligible market size of SIDS.

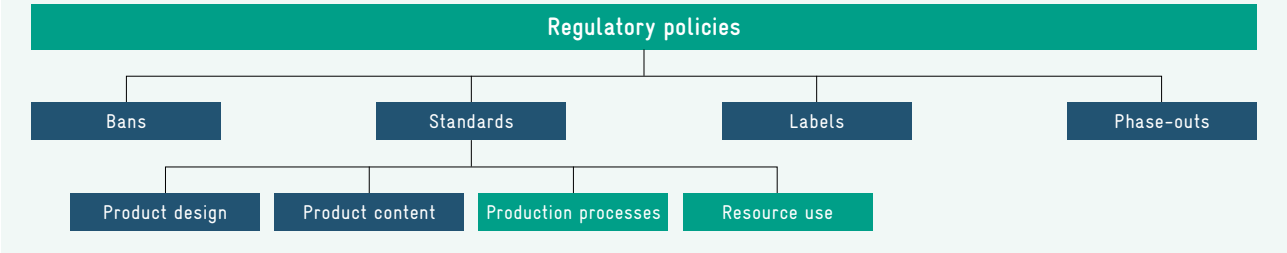
Finally, **mandatory labels on plastic products may be conducive to the implementation of an EPR scheme** [3]. For example, labels might inform consumers about the appropriate handling of plastic products after their use, namely, where to drop off the products so that they can be recycled. Other labels, or bar codes, might facilitate sorting and recycling of plastic products through waste management companies. Each label could help EPR schemes increase their recycling rates.

Implication for SIDS

Standards and bans can effectively support EPR schemes and reduce investment costs in waste management systems

Given that most plastic and plastic products are imported to SIDS, standards and bans are an effective instrument to complement EPR schemes by reducing or even eliminating imported plastic and products that pose challenges to the already overburdened waste management systems in SIDS. In the mid- or long-term they might thus reduce the need for (more) waste management and in particular disposal capacities that are and will be severely limited in SIDS. Overall, this leads to less investment costs for the establishment, expansion or upgrade of waste management systems and thus also reduces the costs of the EPR schemes in SIDS.

Figure 11: Summary of regulatory policies and recommendations for SIDS*



* Dark blue marked fields are options that are important/suitable in the context of SIDS.

3.3.3 Information, communication and education

Any EPR scheme on plastic waste relies not only on the compliance of obliged companies with its requirements but also on the participation of various other stakeholders, in particular retailers, individual consumers of plastic products and waste management operators [3]. They influence the success of any EPR scheme to a considerable extent since their decisions and behaviour either facilitate or complicate the collection, sorting, recycling, recovery and, as last resort, disposal of plastic waste.

Therefore, **it is essential for any EPR scheme to provide information on the scheme and actively communicate it to retailers, consumers and waste management operators in order to raise their awareness** [12, 28, 57]. In particular, information and communication about the adequate handling of plastic products after their use is important in order to increase the collection rates under the EPR scheme and their appropriate treatment in the waste management system [3]. This might include information about segregation of different waste streams, including plastic waste, or where and how to dispose of or return plastic products after their use so that they can be easily collected and sorted. This might also include information on the content of plastic and plastic products that helps recyclers. This information might be communicated through public campaigns, labelling [12] or guidance documents [57]. In addition, an EPR scheme can be supported by educational measures that aim at changing the prevailing attitudes towards plastics, plastic products and plastic waste [3].

In fact, many EPR schemes use the financial resources they mobilise also to finance measures that ensure, advance and expand the information, communication and education that is necessary to promote and improve a more sustainable management of plastic waste. In some cases, governments fund such actions [28].

Finally, EPR schemes could also establish communication channels between actors in different stages of the plastics value chain in order to improve product designs [28].

3.3.4 Integration of the informal sector

In many low- and middle-income states, including SIDS, informal waste workers and businesses play an important, if not indispensable role above all in collection, but also in sorting and recycling of plastic waste [3, 7, 28]. **The integration of informal waste workers is therefore often seen as indispensable for a successful EPR scheme** [3, 15, 28].

As experience from previous EPR implementation processes has shown, **EPR schemes have proven to be less effective when the informal waste workers were not properly integrated in the process** [7, 15]. EPR schemes usually benefit from the integration of informal waste workers in several ways. Informal waste workers bring invaluable experience, skills, knowledge and organisation in particular in waste collection and sorting [3], thereby reducing the amounts of plastic waste that end up in the environment [28]. Essentially, they provide free waste collection and sorting services for households, businesses and municipalities, as they make a living from selling the collected waste and do not charge any fees [28]. If they are not integrated, their contribution and benefits are lost and might even negatively affect the EPR scheme. Informal waste workers might compete with the scheme by collecting the types of waste that it covers without feeding the waste back to the scheme, thereby hindering its goal and reducing its revenues.

Implication for SIDS

The integration of informal waste workers is indispensable for an effective EPR scheme

Given that informal waste workers play an important role in waste management, any EPR scheme can only operate effectively if informal waste workers are integrated and their contribution in particular to waste collection is recognised and built upon.

Essentially, while there is no single-best solution, four basic options exist to integrate informal waste workers [7].

First, **EPR schemes can provide incentives to formally integrate individual informal waste workers into private or public waste management companies** that carry out services on their behalf, namely as employees of these companies.

Second, **EPR schemes can integrate informal companies and their workers as business partners by licensing and contracting these companies** to carry out certain services in the collection, sorting and recycling of plastic waste or by helping to legalise businesses and register in the tax system, ultimately formalising the informal work to the best possible extent [28].

Third, and in order to avoid negative impacts on informal waste workers, **EPR schemes could be designed in a way that they do not cover waste streams where private value chains already work well**. Instead, they could address market failures and rather focus on waste streams that are not attractive economically, such as low-value or difficult-to-recycle plastic and plastic products, or where transport costs are too high, like in many SIDS [28].

Fourth, a mechanism could be established that enables informal waste workers to voice their interests in the EPR scheme [7, 23].

Key requirements and enabling factors to effectively integrate informal waste workers into EPR

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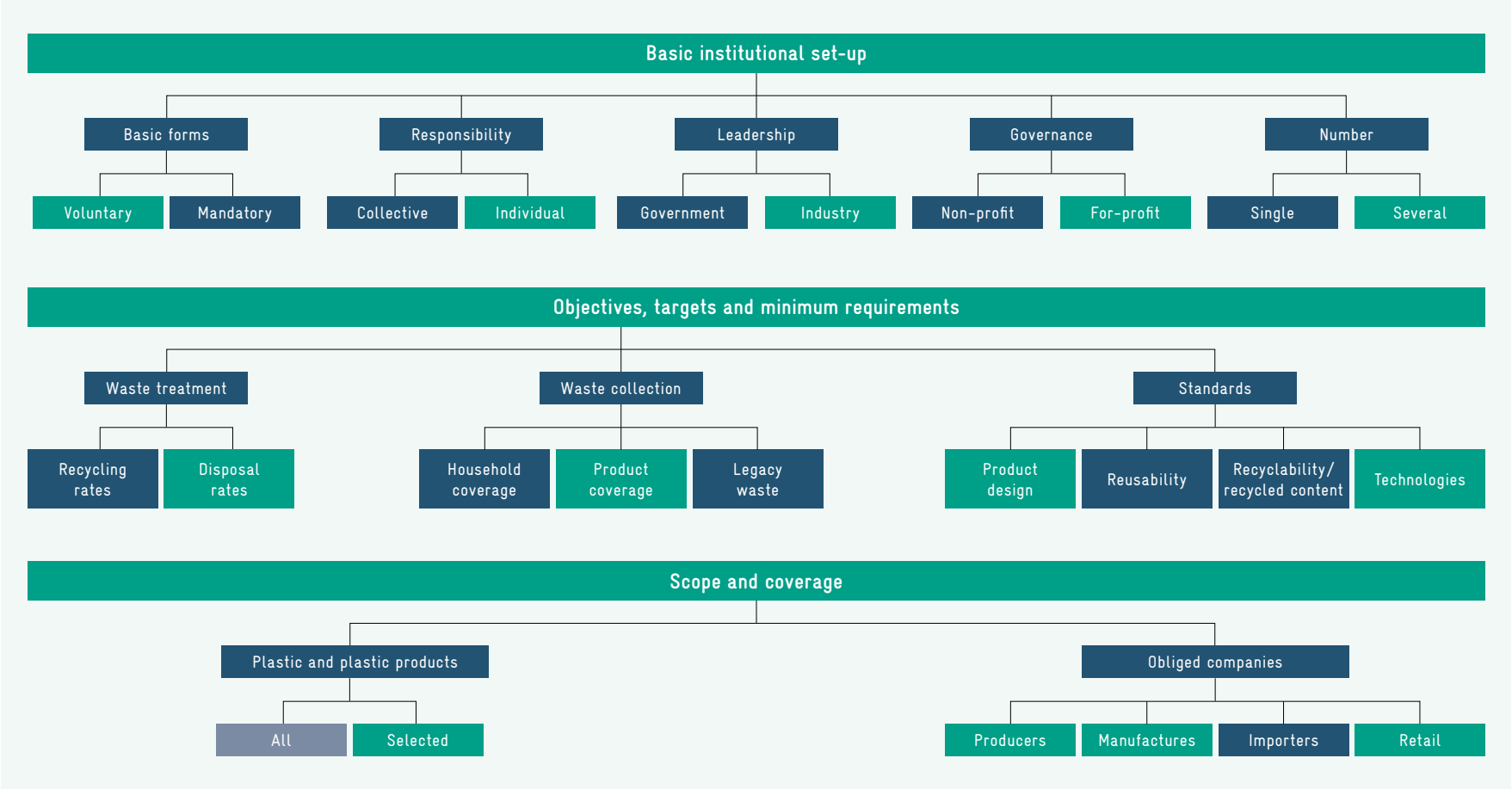
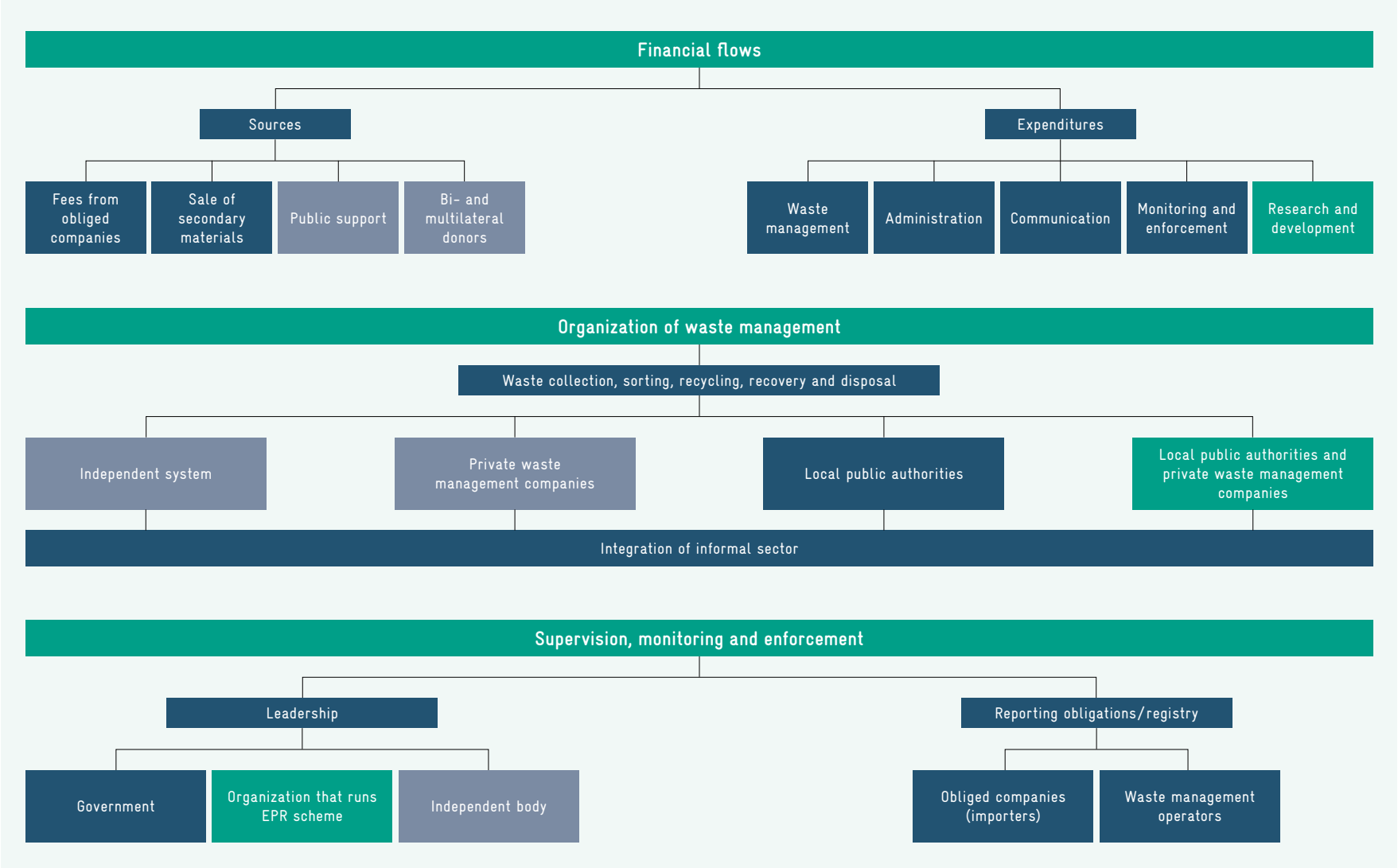
- Research on the roles and contribution of informal waste workers in the value chain
- Institutionalised consultations with informal waste workers in the preparation and design as well as during the implementation of the EPR scheme
- Legal recognition of the rights of informal waste workers, including a complaints mechanism
- Rules to integrate informal waste workers that ensure:
  - non-exclusionary, affordable and attainable registration or licensing requirements for informal waste workers,
  - open access to plastic waste and recyclable plastic and
  - fair competition between informal waste workers and larger waste management operators and / or producers, including fair prices for plastic waste and recyclable plastic
- Strengthening of domestic markets for mechanical recycling and investments in local recycling facilities
- Facilitated access of informal waste workers to capacity development and training; to infrastructure, land and equipment; to finance; to legal support and administration; and to technologies

3.4 Summary

Figure 12: Overview of core elements and complementary actions and their suitability/importance in SIDS*



* Dark blue marked fields are options that are important/suitable in the context of SIDS.
Green marked fields are options that might be considered in SIDS once an EPR scheme has been running for some time.



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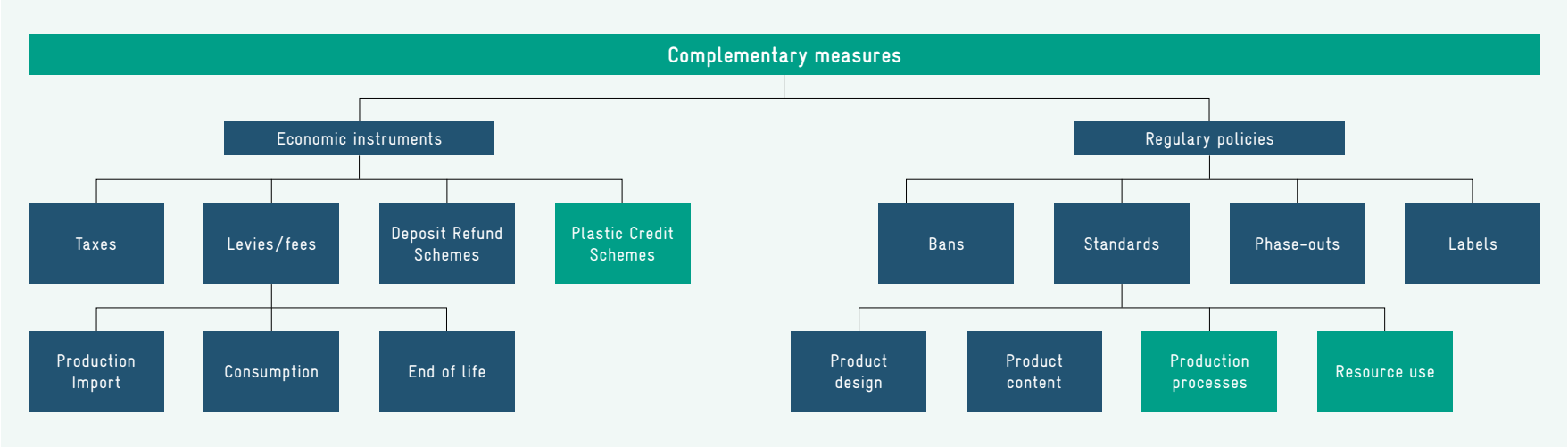

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Green marked fields are options that might be considered in SIDS once an EPR scheme has been running for some time.

Challenges of Extended Producer Responsibility schemes in SIDS

4

In general, EPR schemes "are not necessarily suitable models for transplanting into developing countries. Developing countries must therefore evaluate their capacity in light of resource needs and set priorities that reflect local and national characteristics" [2].

The development and implementation of EPR schemes poses several challenges for SIDS, of which five stand out:

1. the considerable need for financial resources
2. the unavailability or unsuitability of technologies to improve waste management
3. the lack of appropriate and adequate data
4. limited governance, monitoring and enforcement capacities, and
5. the integration of informal waste workers

In many SIDS, the need for financial resources to run and improve the waste management systems is extraordinarily high

In many SIDS, any **improvement of the waste management infrastructure requires substantial investments and therefore the need for financial resources to address the key needs are extraordinarily high** [28]. Estimates suggest that at least twice the current investment is needed. In addition, and even if the EPR scheme raises sufficient funds for these investments, the regular costs of operating effective and sustainable waste management systems in SIDS are considerable and, in some cases, possibly prohibitively high. Finally, even more costs arise since many SIDS lack domestic demand and thus markets for recyclable plastic waste, while their remoteness from international markets makes exports very expensive and uncompetitive, if not impossible [36].

Overall, **in many SIDS these cost-related drivers might necessitate very high fees to cover the costs of the EPR scheme**. Since average income in many SIDS is relatively low and EPR schemes usually pass costs onto consumers, this might lead to opposition against the introduction of an EPR scheme. In the worst case, the overall need for financial resources may simply overstrain what EPR schemes are able to manage in the socio-economic contexts of SIDS.

To reduce the burden of investment costs, **additional domestic public funding, voluntary contributions and/or external multilateral and bilateral donors might support these efforts**. For example, using blended finance can reduce the risks of necessary investments carried out by the companies participating in the EPR scheme [19, 11] or additional funds could be raised through taxes, fees and levies. These funds could, for example, be used to subsidise exports of recyclable plastic waste [37]. This is already practiced in some Pacific SIDS where parts of the revenues from DRS are used to finance exports of recyclable plastic waste to countries with adequate recycling facilities [26]. In such cases, external assistance could also help to overcome the funding gap [37].

Conversely, **measures could be taken to reduce the overall costs of waste management**. This includes, above all, targets for the share of reusable and repairable plastic and plastic products on domestic markets or other complementary measures that reduce or minimise the amount of plastic waste that needs to be managed, such as standards for more sustainable plastic and plastic products as well as bans on less sustainable plastic and plastic products. Moreover, regional hubs and transfer stations might be established between neighbouring SIDS in order to realise economies of scale and reduce the costs of transporting recycled materials to international markets [23, 37]. In addition, a combination of backloading and reverse logistics could be expanded, using empty shipping containers to return (imported) plastic products after their use to their origin or point of production [13]. For many Pacific SIDS, the public-private Moana Taka Partnership has been organising and implementing this approach since 2020 and transports certain recyclable waste free of charge to countries with adequate recycling capacities [35]. Yet, even with such assistance the export of recyclable plastic waste is economically often not viable and would incur negative costs [37]. Finally, investments in shredding, baling or compressing machines that reduce the volume of plastic waste transports and thus the transportation costs can also help [23, 37].

In many SIDS, technologies to improve waste management are unavailable or unsuitable

To improve the waste management in SIDS under an EPR scheme, **adequate and modern waste management technologies are critical. In many SIDS, such technologies are, however, unavailable or unsuitable.** This has several reasons that an EPR scheme can only partially overcome.

Above all, the **transport and shipping costs of such technologies to remote and isolated islands are often prohibitively high.** This applies in particular to those SIDS that overall feature relatively poor economic and financial conditions. An EPR scheme could, in principle, raise the necessary financial resources. This would, however, further increase the costs that the establishment, expansion or upgrading of waste management systems already causes.

Even if the EPR scheme were to generate sufficient financial resources to buy and operate adequate and modern waste management technologies and / or the public sector could afford and were willing to bear the higher costs, two other challenges remain. On the one hand, the **waste management in many SIDS lacks economies of scale**, in particular SIDS with small and sparse populations. The application of recycling technologies is therefore often not cost-efficient [10, 24]. On the other hand, the **necessary operation and maintenance of waste management technologies often poses a significant challenge.** The considerable technical skills and knowledge needed for this are often missing in SIDS [1, 48]. Taken together, these factors make certain technologies with their specific and often demanding requirements for operation and maintenance unsuitable for SIDS [38].

Many SIDS lack adequate data to develop and implement an EPR scheme

The third important challenge to overcome is the lack of data. The development and effective implementation of an EPR scheme requires accurate and comprehensive data on several aspects [28, 53]. First, the definition of the scope and coverage of an EPR scheme requires accurate data on domestic plastic producers, manufacturers and importers as well as on the amounts and types of plastics and plastic products that are put on the domestic market, including their secondary market value and recyclability. Second, the definition of objectives, targets and minimum requirements for waste collection, sorting, recycling, and recovery requires accurate data about the current situation and developments in the areas to which they apply. Third, the calculation and setting of fees under an EPR scheme requires good knowledge and accurate data on the quality and capacities of the existing infrastructure for waste collection, sorting, recycling, recovery and disposal.

Yet, **most SIDS lack such data a**s a result of three factors [20, 44, 48]: First, most SIDS do not yet conduct environmental monitoring, let alone waste monitoring [36]. Second, harmonised methods of data collection have not been agreed upon [44]. Third, many SIDS lack basic technologies to monitor and assess waste streams. Overall, they often lack the necessary infrastructure, resources and expertise [44]. The preparation of a suitable data collection system, however, takes considerable time and is relatively complex. Thus, even if this hurdle can be overcome, it will take time. Yet, for Pacific SIDS, for example, the Secretariat of the Pacific Regional Environment Programme (SPREP) published a Regional Waste Data Collection, Monitoring, and Reporting Framework that ensures and harmonises the collection of necessary data across all Pacific SIDS [44].

In many SIDS, adequate governance, monitoring and enforcement capacities are missing

EPR schemes are highly complex and demanding policy instruments and require considerable governance, monitoring and enforcement capacities of public authorities, even if they are run by private entities [28]. Yet, in many SIDS the implementation and enforcement of the existing, often less complex policies on plastic pollution, such as bans, is already a challenge because governance capacities are limited, control and monitoring mechanisms are inadequate or lacking, financial resources are insufficient and coordination among responsible actors and across different governance levels is low. Likewise, basic licensing, certification or permission schemes in the waste management sector on which an EPR scheme could and needs to build are often incomplete or missing in SIDS [40]. This situation at least raises concerns about the ability of public authorities to supervise, promote and, if necessary, enforce the effective implementation of an EPR scheme.

SIDS need to effectively integrate informal waste workers

In SIDS, like in most low- and middle-income countries, **an integration of informal waste workers into EPR schemes is important for two reasons** [28, 49, 57].

First, **informal waste workers and businesses might compete with the regular or newly created plastic waste collection, sorting and recycling regulations under the EPR scheme** since they focus on collecting plastic waste that has a positive market value [3, 23, 28]. This might reduce the share of such plastic waste collected under the EPR scheme if the informal sector remains outside the scheme, ultimately reducing the scheme's revenues from selling this plastic waste.

Second, **if informal waste workers are not integrated into an EPR scheme, those households in SIDS that rely on informal waste work risk losing their source of income** [7, 28]. This could spur resistance to the introduction of an EPR scheme.

Roadmap

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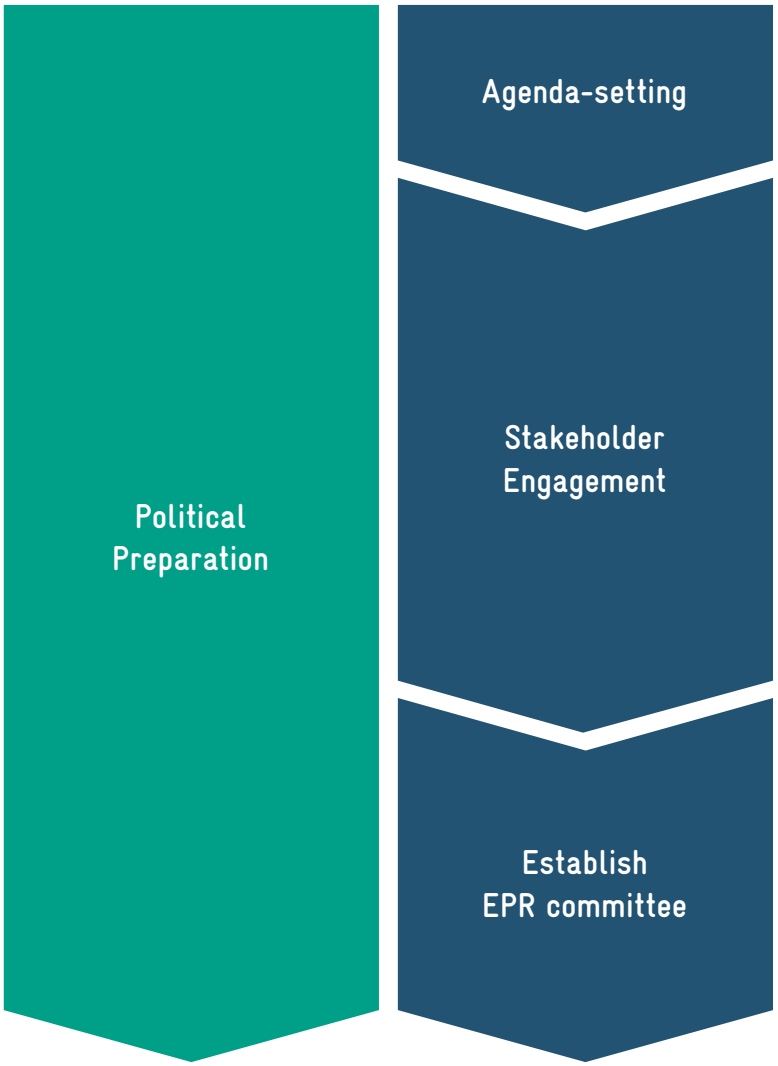
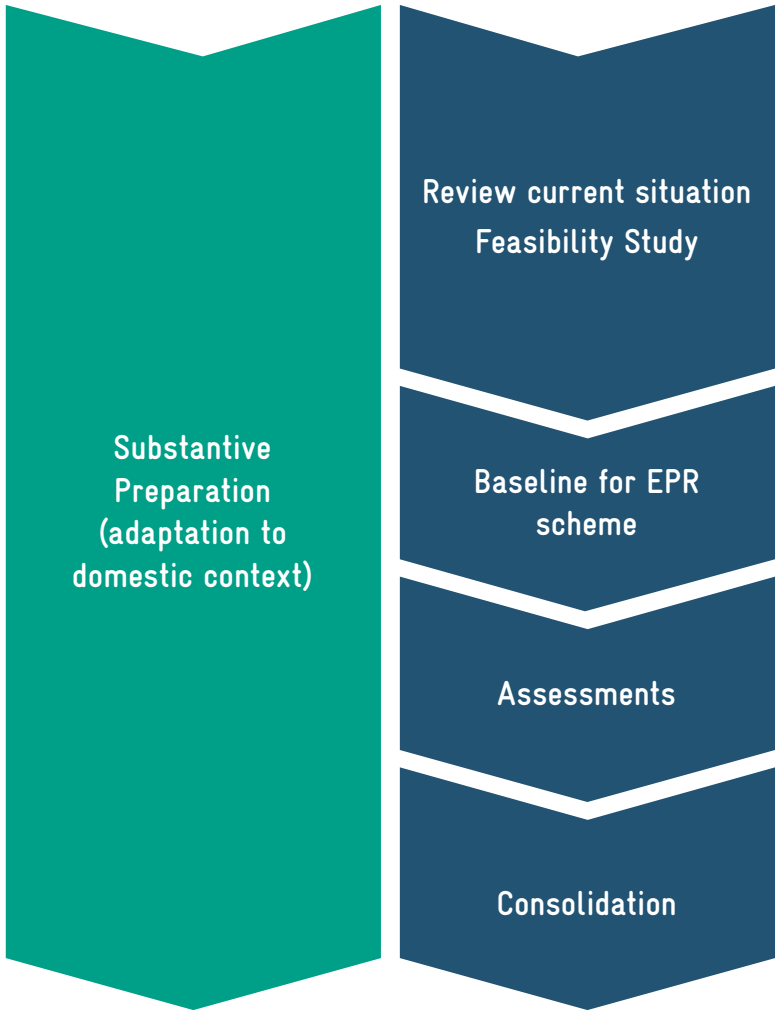


- Put EPR scheme on political agenda
- Garner political support for EPR scheme among key stakeholders

- Identify key stakeholders
  - relevant ministries and public authorities/agencies, including customs services
  - plastic producers, manufacturers and importers
  - retail
  - tourism
  - plastic consuming businesses
  - waste management operaters
  - consumers
  - communities
  - public
  - civil society
- First preparatory consultations with key stakeholders

- Invite representatives of relevant and interested stakeholders
- Invite exports
- Introduce basics of EPR scheme
- Clarify process until implementation of EPR scheme, including role, tasks and competencies of EPR committee and individual representatives
- Establish feedback mechanism
- Create ownership

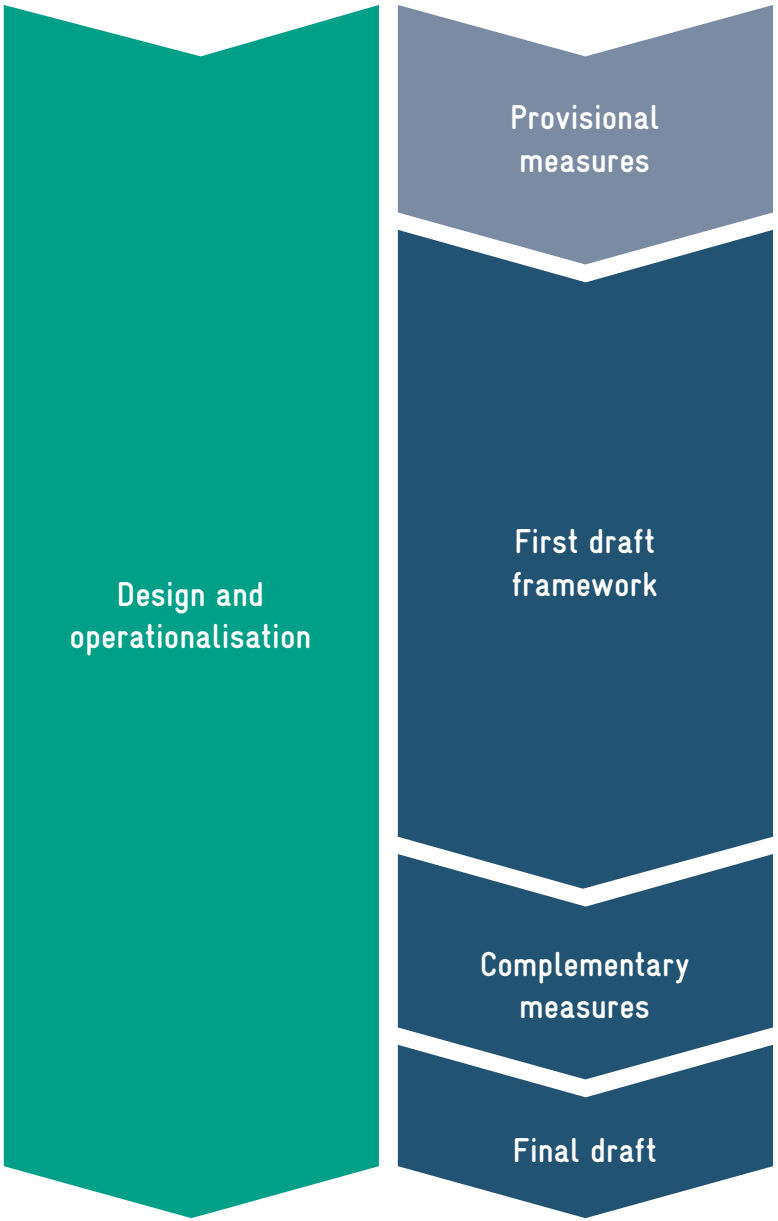


- Domestic market for plastic and plastic product (quantities, types)
- Domestic/international market for recycled plastic and plastic products
- Plastic waste streams (origin, quantities, types, treatment)
- Waste management infrastructure and capacities (collection, sorting, recycling, disposal)
- Detailed stakeholder mapping
- Status, role and contribution of informal waste workers
- Existing and related political and regulatory framework
- Gaps, challenges and needs (political, technological, administrative, personnel, financial, data)

- Collect data on plastic and plastic products through market study as well as on waste streams through waste audit (if needed in the case of lack of data)
- Establish and run system to collect data on plastic and plastic products as well as related waste streams (if needed in the case of lack of data)

- Need for financial resources (investment and operational costs)
- Socio-economic implications of EPR scheme for private sector, consumers/households, informal waste workers, waste management operators, including implications for competition

- Discuss results of review, feasibility study and assessments with key stakeholders
- Derive recommendations for design of EPR scheme
- Identify main elements and their design options
- Consider suitable complementary measures

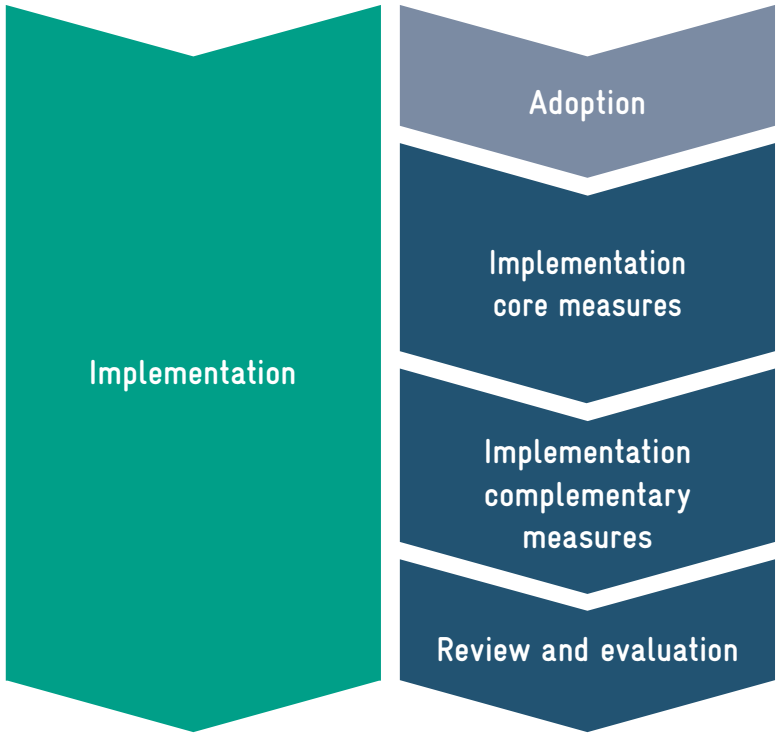


- Encourage business to run voluntary EPR scheme or pilot projects for selected plastic products and companies
- Establish and run preliminary system for data collection and monitoring of plastic and plastic products as well as plastic waste streams in order to prepare registry and to identify plastic types and waste streams for tailored design of EPR scheme

- Define and specify
  - basic institutional set-up (roles and responsibilitios of different stakeholders and organizations), including measures that ensure competition;
  - targets, obligations, minimum requirements and timeline for their evolution (in particular for collection, reusability and recycling rates);
  - obliged companies, their duties and obligations;
  - scope and coverage of plastic and plastic products, starting off with specific coverage and then gradually expand;
  - financial flows (determine fees, permissible expenditures, scope of funded activities and services);
  - organization of waste management, in particular: integration of informal waste workers, certification, accreditation, licensing, permit, authorization. contracting, registration procedures for waste management operators;
  - supervision, monitoring and compliance mechanisms (who, what, when and how often), including enforcement options like sanctions; and
  - mandatory reporting scheme/registry for obliged companies and waste management operators: who runs the system, who reports what, when and how often.

- Design and operationalize economic instruments and regulatory policies Design, specify and schedule information, communication, and education strategy, including for example campaigns, products, outputs and workshops
- Design and specify feedback and complaints mechanism for stakeholders

- Consultations with and comments from key stakeholders and actors in the EPR scheme
- Final revision and adaptation of framework and complementary measures



- Adoption of framework for EPR scheme

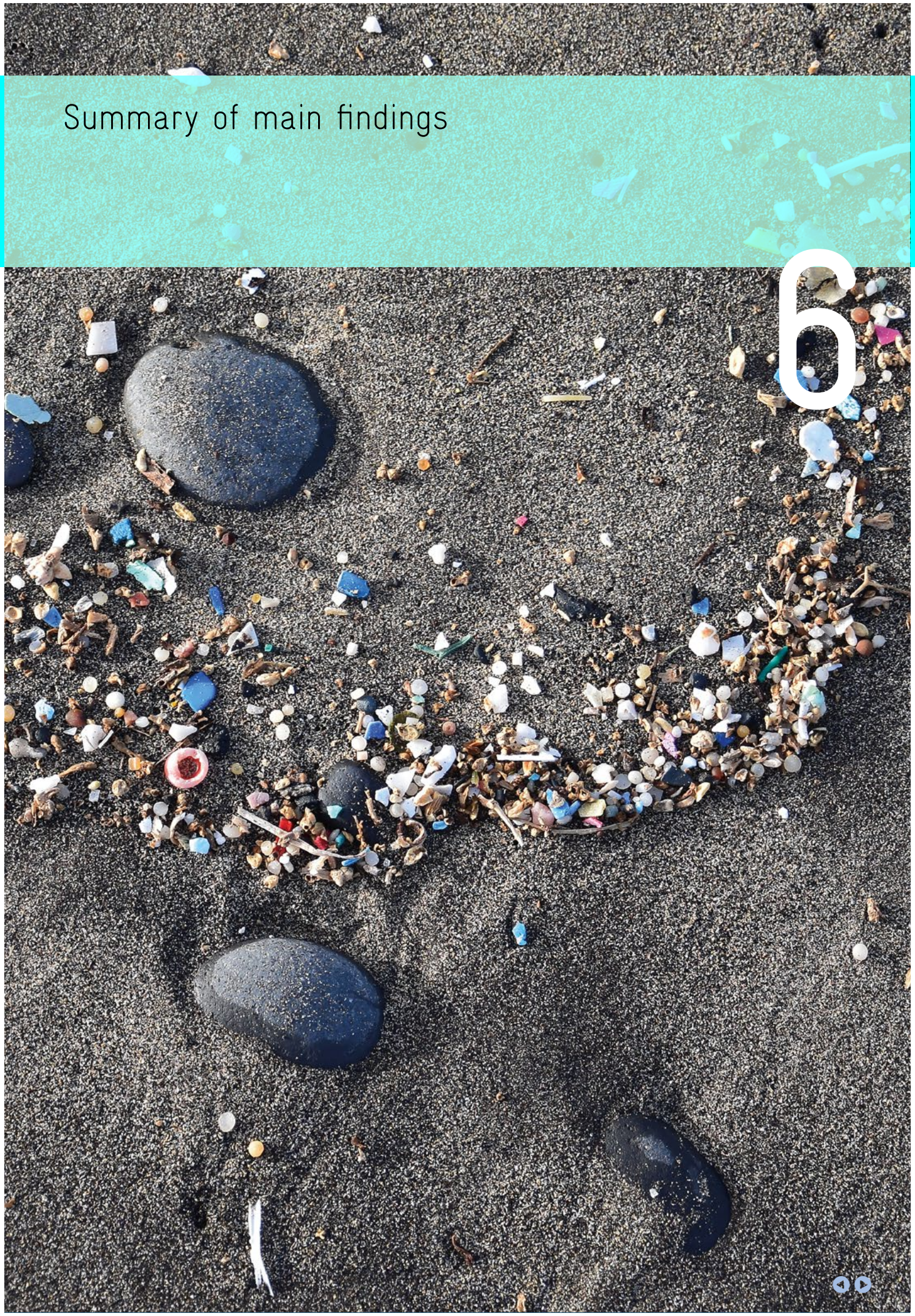
- Set-up organization that runs the EPR scheme
- Set-up registry for reporting, data collection and monitoring
- Collect financial contributions from obliged companies
- Improve waste management

- Implement economic instruments and regulatory policies
- Implement information, communication and education strategy

- Monitor, review and evaluate operation of EPR scheme and its progress
- Adapt EPR scheme in view of results of review, evaluation and feedback

Summary of main findings

6



Overall, there is no simple answer to the question of whether EPR schemes are a suitable instrument to combat plastic pollution in SIDS.

On the one hand and aside from the challenges faced by SIDS, EPR schemes first and foremost have the potential to address the most important key need of SIDS in their fight against plastic pollution: they can improve the provision and access to regular and comprehensive waste collection and enhance capacities for treatment of plastic waste by expanding and upgrading sorting and recycling plastic waste. This could minimise the amounts of plastic waste that are disposed of in (controlled or uncontrolled) landfills or at least ensure its environmental sound disposal in controlled landfills that meet environmental standards.

To enhance the prospects of realising this potential, SIDS like any other country need a well-designed EPR scheme that is tailored to their specific contexts. Against the background of the analysis, EPR schemes might benefit SIDS if they

1. are mandatory and run by a government-led PRO;
2. initially cover only certain types of plastics and plastic products and then gradually increase their coverage over time;
3. pay particular attention to the investments needs for expanding and upgrading waste management systems when setting the fees under the EPR scheme;
4. modulate fees according to the reusability, recyclability and labelling of plastics and plastic products;
5. focus on companies that import plastics and plastic products;
6. contract and pay local public authorities for their waste management services or involve them in other ways in providing these services;
7. set achievable and measurable targets for adequate waste collection and management that start from the existing capacities and infrastructure;
8. gradually increase minimum market shares for reusable and recyclable plastics and plastic products; and
9. specify objectives (and allocate funds) for the removal of legacy plastics from the environment.

Moreover, SIDS need to adopt and implement complementary measures that support the EPR scheme. Namely, the EPR scheme in SIDS might benefit from the

1. implementation of DRS to increase the waste collection rates;
2. imposition of fees on tourists and single-use plastic products;
3. adoption and implementation of standards and bans that reduce the import of less sustainable plastic and plastic products;
4. implementation of a communication, awareness-raising and training strategy; and
5. integration of informal waste workers.

On the other hand, however, it is questionable whether even well-designed EPR schemes can actually realise this potential, as there are four significant challenges that may be difficult to overcome, if at all. In many SIDS

1. the need for financial resources to run and improve the waste management systems is extraordinarily, possibly prohibitively high;
2. technologies to improve waste management are unavailable or unsuitable;
3. adequate data to develop and implement an EPR scheme is lacking; and
4. adequate governance, monitoring and enforcement capacities are missing.

Unfortunately, even if SIDS succeed to overcome these challenges, they will not be able to address the most significant source of plastic pollution in SIDS: plastic waste that originates from other counties and is washed ashore on their coasts.

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On behalf of

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