

## 2 Circular Economy and the Extended Producer Responsibility

This chapter describes the basic idea of the CE and the associated waste management challenges. In addition, basic factors influencing the implementation of EPR in developing countries are outlined. Finally, the status quo of EPR and accompanying strategic measures in Lusaka are described.

### 2.1 CE and waste management

The basic idea of CE is to create a circular approach to the production and consumption of products in order to reduce the environmental pollution, to protect resources and disconnect economic growth from resource depletion (cf. Gheewala et al. 2021: 35–53). The mechanism of CE is defined by closed production, consumption and recycling cycles in which all material is kept in circulation: “A circular economy aims to maintain the value of products, materials and resources for as long as possible by returning them into the product cycle at the end of their use, while minimizing the generation of waste.” (cf. Eurostat n. d.). To achieve CE, each step of the product value chain must be considered and, if necessary, adapted. This system describes a regenerative and recovering handling of resources, reducing waste production and emission always trying to close open loops of the product cycle (cf. Prieto-Sandoval et al. 2018: 606–615). This includes the complete system from product design to use, repair, refurbish or disposal (cf. Prieto-Sandoval et al. 2018: 606–615). Even though all life phases of products in CE must be considered holistically, the focus of this

thesis is on the waste management system. Especially in developing countries, the system has a significant role in the CE development process (cf. Ferronato et al. 2019: 366–378). Waste management in the CE includes the following aspects: “Nationwide collection systems, development of recycling infrastructure, recovery at a high-quality level, environmentally compatible disposal, service obligations of the market participants, information, education and awareness among all involved stakeholders” (Prevent Waste Alliance 2022a: 8). In order to introduce a new sustainable waste system, it is particularly important to consider the fundamentals waste collection, sorting and recycling within the value chain (see Fig. 3:). This is due to possible effects such as market changes (e. g., increase value of secondary, recycled material) or the change of mindset of the stakeholders involved towards CE (cf. Ferronato et al. 2019: 366–378).

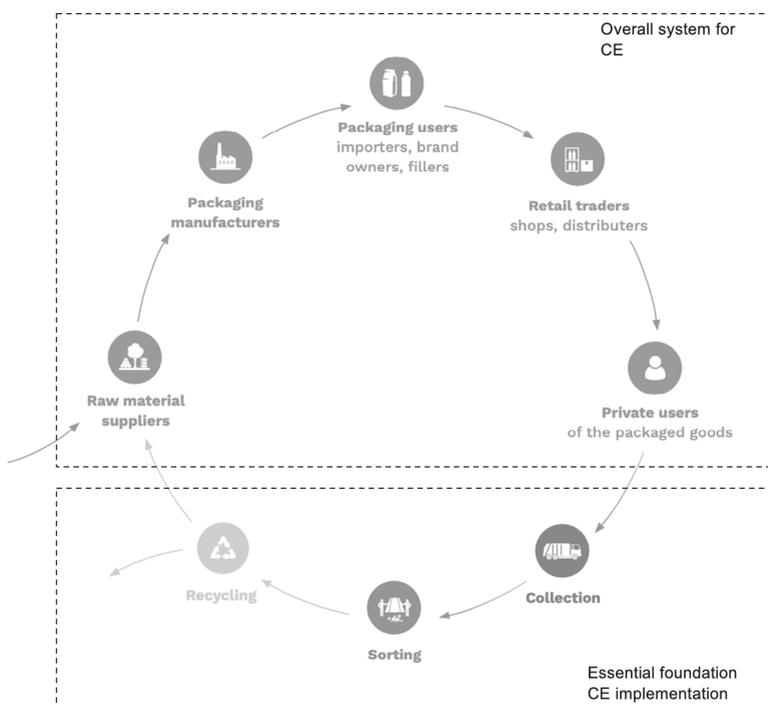


Fig. 3: Packaging value chain in CE (adapted illustration based on Prevent Waste Alliance 2022a: 7; Factsheet 00)

The City of Lusaka is addressing these fundamentals to implement CE through the Solid Waste Management Improvement Plan (SWMIP) 2022–2026. This can be seen, i.e., by the reference to the waste hierarchy (see Fig. 4:), which is a tool for ranking waste management options according to their environmental impact (cf. Lusaka City Council (LCC) 2022: 5). The basic principles of CE are also anchored here in preferred implementation: reduce waste generation, re-use, recycle and recover material and, as a last resort, final disposal of material (cf. Prevent Waste Alliance 2022a: 13).

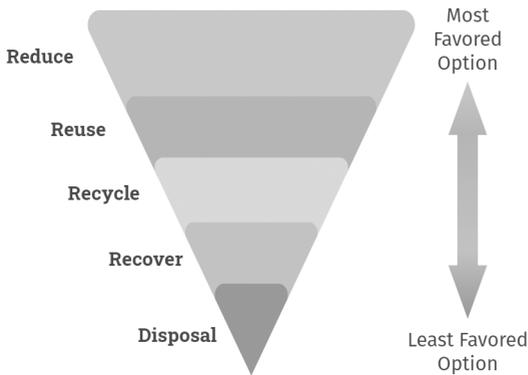


Fig. 4: Waste hierarchy (LCC 2022: 5)

## 2.2 Financing CE in developing countries

The challenges of CE are manifold, as it affects all areas from production to disposal as well as associated stakeholders. However, a particular difficulty is found in the financing of CE mechanism especially in developing countries (cf. Langsdorf and Duin 2022: 21). Ideally the CE results from the conduct of the market participants along the value chain. This would be a free-market economy-bases approach. Revenues are generated via trading of recycled materials and costs for using new resources are being avoided. However, not all steps of the value chain have proven to be cost-covering. Therefore, several instruments may provide financial support. Municipal fees or taxes can be used for waste services (e.g., collecting) or as specific funding. Private companies might provide voluntary

financial support for specific projects, i. e., in the form of Plastic Credits (PC). A promising approach lies in financing via the mode of action of the EPR, which makes the producer liable for the treatment and disposal costs generated (cf. Prevent Waste Alliance 2022a: 8). Local circumstances ultimately define the type of funding. In the case of PC and EPR the money raised is allocated to the dedicated purpose of waste prevention and/or waste collection and recycling (or treatment in general) and should generate enough revenues (based on EPR fee, revenue out of recycled material and prices for PC) for operating the corresponding system. This distinguishes these constructs for example from municipal fees (cf. WWF 2020: 10–18). In the case of EPR, it is also recommended to initially work with simple, traceable fees and to detail these in the course of setting up the system. This should both adequately shape the initial monitoring and control effort and increase transparency (cf. WWF 2020: 10–18). Thus, all of these mentioned options can be used in parallel or only individual actions. Although some local actions are mentioned in this paper, the focus is on the interaction of EPR and PC.

### 2.3 Mechanism of EPR

According to the OECD the EPR is “as an environmental policy approach in which a producer’s responsibility for a product is extended to the post-consumer stage of a product’s life cycle.” (cf. OECD n. d.). So, the EPR policy is consistent with the Polluter Pays Principle regarding the shifting of costs towards producers reduces the burden on municipalities in terms of waste management (cf. OECD 2016: 21). Thus, through EPR, externalities, i. e., costs incurred in the consumption or production of a product and not yet included in the market price, are to be covered by the polluter (cf. Sturm and Vogt 2018: 17–40). This is intended to address market failures and encourage producers to act responsibly, efficiently, effectively and sustainably. An EPR system works in two directions within the value chain. Upstream, i. e., in terms of production methods and product design to reduce and/or change the use of materials, and downstream, i. e., in terms of recycling or recover processes and the reusability of materi-

als (cf. Gupt and Sahay 2015: 595–611). The basic idea of an EPR system is promising and has already led to changes in production and waste handling in industrial nations like Germany. However, the implementation is also associated with many challenges within the waste management. EPR implementation may vary based on local conditions, defined objectives and context. Currently about 400 EPR individual schemes exist worldwide (cf. OECD 2005: 21; OECD 2021: 8). Nevertheless, all schemes base on the following principles: Context-specific implementation is one of the basic design principles of EPR (EDP). Accordingly, all local circumstances, be they legal, demographic, geographical, social or economic, must be taken into account (cf. OECD 2016: 40–45). Local conditions shape the implementation options and may require adjustments due to the lack of established waste systems or other cultural or structural factors in developing countries (cf. Akenji et al. 2011: 919–930). The other principles are target circularity, social inclusivity, co-operation and co-ordination, financial sustainability, transparency, monitoring & enforcement, clear definitions about covered materials, obliged companies and producer’s responsibilities (cf. OECD 2016: 40–45; WWF Akademie n. d. b.). Target circularity describes the clear focus on the transformation to a circular economy by improving product design and waste management. Social inclusivity stands for the support and inclusion of all existing waste management actors (e. g., informal sector, small businesses) on fair terms. Co-operation and co-ordination emphasize the need of an open and trustful relation between the involved stakeholders to create a stable EPR environment. The financial sustainability describes the cost covering of the operational EPR system by revenues out of the recycled material as well through the producer’s fee. Transparency, monitoring & enforcement are the basis to ensure that all producers contribute according to the defined goals. The clear definitions are setting the rules for the EPR scheme and provide clarity through the entire process (cf. OECD 2016: 40–45).

According to the final report “Development of Guidance on Extended Producer Responsibility (EPR)” of the European Commission (EC) 2014, several external factors (EF) shape the success, the costs as well as the design of implementation. These aspects are the existing waste management and treatment infrastructure, the willingness and awareness of

communities and residents to participate, the value of recycled (secondary) material on the national market, the country geography and demographics, the existing waste policy instruments and the transparency on key activities within the waste management (cf. Monier et al. 2014: 76; OECD 2016: 53). EPR schemes aim to implement CE but specific objectives may vary depending on specific circumstances. Possible overall EPR goals are prevention of waste, organization of waste collection, organization of waste treatment, assure financing of waste collection & treatment, reduce use of virgin material and increase recycling, reduce negative environmental impact (please see mapping of external factors and possible EPR objectives affected by them in Fig. 5).

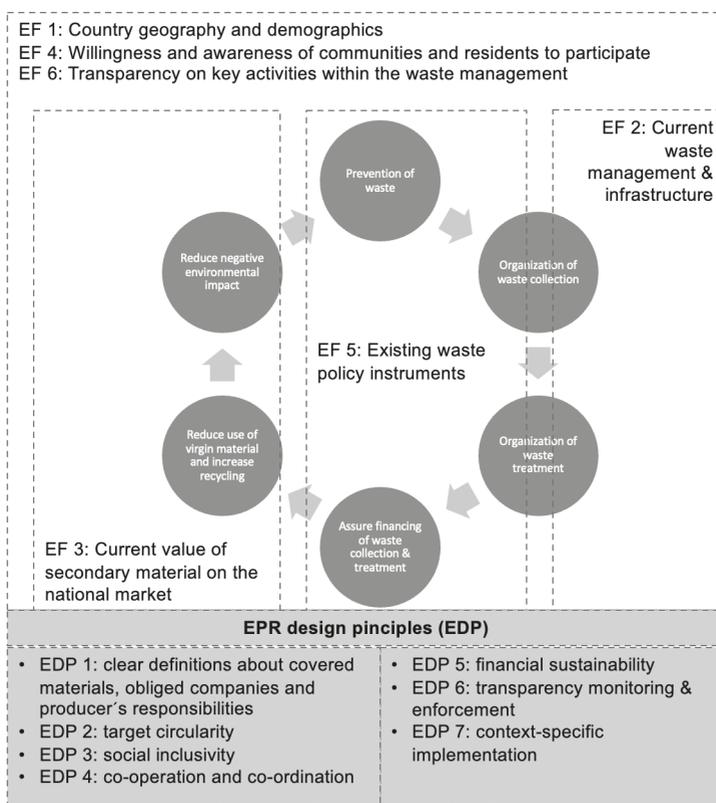


Fig. 5: Mapping of EF and possible EPR objectives affected by them. (own illustration based on WWF Akademie n. d. b.)

To reach the concrete goals and sub-goals of EPR, the introduction of producer responsibility organization (PRO) or Pre-PRO is recommended. This is an organization or preliminary organization which performs administrative and contractual tasks which are part of an operational EPR System. This also includes monitoring and reporting on EPR processes for the involved producers and other stakeholders which requires a high transparency (e.g., through regular reports) and lays the foundation for a functioning co-operation. (cf. WWF Akademie n. d. b.). However, the tasks also include educational aspects for consumers. Thus, a PRO has high impact on the entire economic, social and environmental system as well as on its involved actors and stakeholders (cf. WWF 2020:10–28). Although these tasks can also be performed by each producer individually (individual producer responsibility (IPR), this is usually cost-intensive and not as effective as working collectively (Collective producer responsibility = CPR) (cf. WWF 2020: 16). The following diagram illustrates possible tasks of a PRO in the context of CPR (See Fig. 6:).

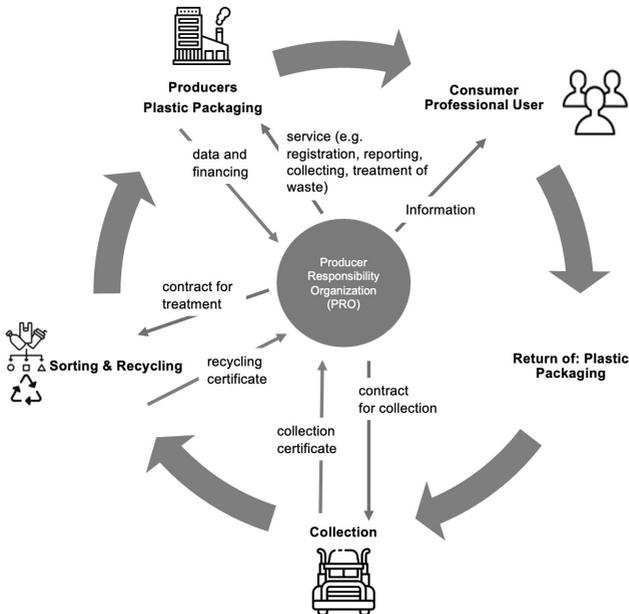


Fig. 6: Basic Flow CPR with PRO (own illustration based on OECD 2016; icon source iconfinder & flaticon; credits to Chanut-is-Industries; Freepik)

When implementing EPR systems, another independent control authority can be introduced, which collects data from stakeholders and controls compliance with regulations. This contributes to create transparency and also to build trust in the EPR system (cf. WWF Akademie n. d.c.). These tasks and required structure as well as the associated actions in the economic, environmental, legal and social areas might explain the long implementation times of EPR (the German EPR System is already 32 years in place and is still evolving) which can be a major obstacle for developing countries (cf. WCEF 2021; WWF Akademie n. d. a.). The EPR System is connected to existing waste management processes and structures. In developing countries, these are usually not in place and must be established which might happen via pilot projects (cf. WWF Akademie n. d. a.). Of course, the implementation of EPR can be done even if the waste management structure is not set up properly. Any concerns that products will become significantly more expensive due to EPR systems and the associated costs can be dismissed on the basis of previous experience. For example, product prices in Germany have often not increased by more than 2.2 % in the case of the introduction of EPR systems (Details see Annexure 10). This does not burden either the producers nor the consumers. Eventually, an increase in product sales is possible, as sustainability aspects have been proven to influence people's eating and shopping behavior (cf. Giz 2021; YouGov 2021). In addition, aspects of sustainability and a reliable implementation of these contribute to the improvement of the brand image and can thus promote the sale of products (cf. Esch et al. 2019).

## 2.4 EPR and waste initiatives in Zambia

Zambia is also considering the introduction of EPR and has already established the initial legal basis since 2018 (Statutory Instrument No. 65 of 2018). Since 2019 this means banning the use of plastic carrier bags and flat bags that are below 30 microns in thickness as well as the registration of packaging materials and conformity to the National Standard (cf. Zambia Environmental Management Agency (ZEMA) 2018). Currently, these regulations are only sporadically enforced. This is due, among

other reasons, to a lack of capacity and the highly fragmented structures (see chapter 4). Detached from a clearly defined EPR system, various initiatives exist that are intended to contribute to improving waste management and therefore might lay the foundations for EPR. One of these initiatives is the Solid Waste Management Improvement Plan (SWMIP) which aims to contribute to the global SDG, the national *Zambian Vision 2030* and local strategic goals (SG). While *Zambia Vision 2030* targets overall conditions like “Institutional capacity development for LCC, provision of appropriate equipment and infrastructure as well as nationwide anti-litter awareness campaigns” the SG target concrete aspects of the waste management within the city (LCC 2022: 5; Republic of Zambia 2006: 1, see Tab. 3).

Tab. 3: SWMIP strategic goals (LCC 2022: 9)

<b>STRATEGIC GOAL (SG)</b>	
Strategic Goal 1	80 % collection and clean-up of municipal solid waste generated and transported to designated disposal sites.
Strategic Goal 2	80 % of all waste generators who are provided with door-to-door collection services pay an affordable tariff by 2026. All collectors of domestic waste must hold a license from the municipality.
Strategic Goal 3	80 % of the total collection and clean-up of MSW is handled by Private Sector Partners (PSPs) outsourced by LCC/SWMC.
Strategic Goal 4	Interim improved landfill at Chunga disposal site is achieved between 2022 and 2026, and a new modern sanitary landfill disposal site is fully operational and receives 100 % of MSW by 2026.
Strategic Goal 5	100 % of special non-hazardous waste handled by LCC/SWMC. Food and other consumables that require controlled disposal will be exclusively handled by LCC/SWMC.
Strategic Goal 6	80 % of MSW collection and disposal operational costs are covered by revenues (e. g., license fees, tipping fees, user charges, penalties, etc.) by 2026.
Strategic Goal 7	80 % of billings are efficiently collected to support cost recovery objectives.
Strategic Goal 8	30 % of suitable commodity materials are recycled by 2026 (i. e., hard plastic materials, paper, cardboard, metals).
Strategic Goal 9	All designated disposal sites are 80 % compliant with National Environmental Standards by 2030.

Even though Zambia currently has a rudimentary EPR system, these SGs could become part of future EPR target definitions. The following image illustrated a mapping of external factors and the SG affected by them (see Fig. 7:).

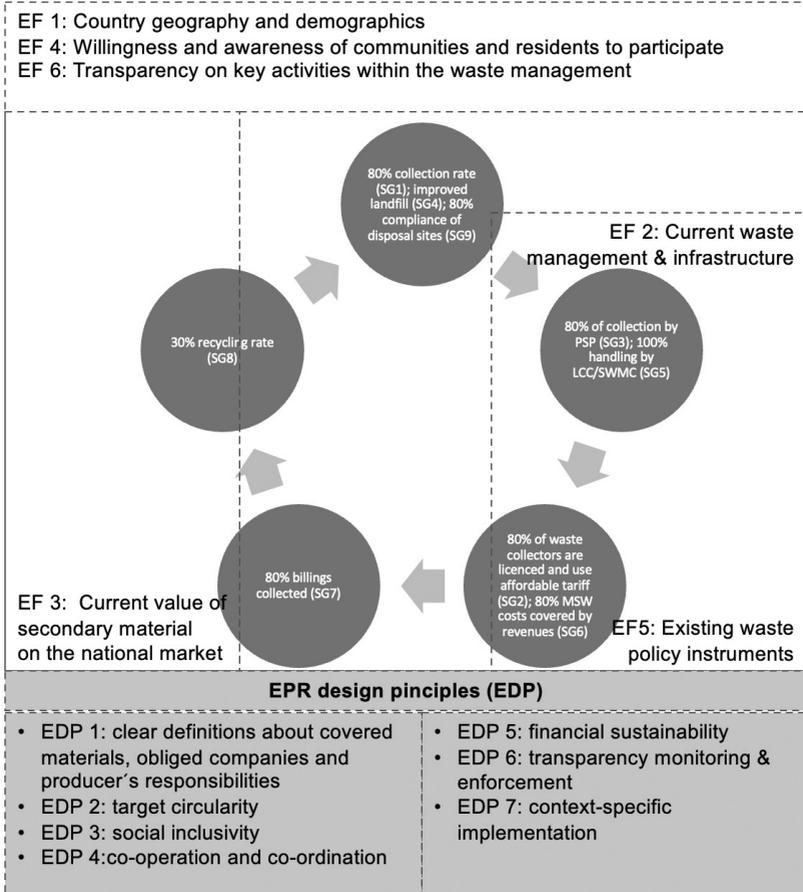


Fig. 7: Mapping of SG and external EPR factors (own illustration)

The SG and the allocation to external aspects suggest that waste management (SG3, SG5), associated legal regulations and their enforcement (SG7), as well as recycling processes (SG8) are weak in Lusaka. Be it the need for optimization at the landfills (SG4, SG9) and collection rate (SG1) clear allo-

cation of waste collection to different actors (SG3, SG5) as well as financing needs of the various measures (SG2, SG6). For a more detailed analysis of waste management in Lusaka, see chapter 4. Even though current activities and objectives are aimed at an EPR system and CE, the question arises regarding the implementation period and the associated costs. There are also questions about enforcement, when already the plastic ban cannot be controlled and implemented. Since Lusaka already has to deal with high plastic waste volumes, both short- and long-term actions are required. As described in chapter 2.2 PCs might be useful in short term.

This chapter dealt with the relationship between CE and waste management. In addition, CE financing options were presented and the basic mechanisms and principles of EPR were outlined. The status quo of the EPR system and other waste initiatives in Zambia was also explained.

