EPR GUIDELINES FOR RWANDA

For efficient plastic waste management strategy

This study has been funded by UK aid from the UK Government; however, the views expressed do not necessarily reflect the UK government's official policies

Section - 1

Background to EPR

- 1.1 Introduction to EPR
- 1.2 EPR benchmarking around the world
- 1.3 Global material waste flow overview
- 1.4 Principles of EPR design and implementation

1.1

Introduction to EPR

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Introduction to EPR

Definition

OECD defines Extended Producer Responsibility (EPR) as an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle.

An EPR policy is characterized by:

1. **The shifting of responsibility toward the Producers and away from municipalities**.

2. **The provision of incentives to producers especially while designing their products.**

Introduction to EPR

What are the principles of EPR?

Redesigning

Eliminating waste

Preserving the value of materials

EPR

Why is EPR important?

EPR can create various environmental, economic, and social benefits ensuring sustainable growth over time by:

- Optimizing the use of resources
- Reducing the consumption of material
- Reducing the amount of plastic waste dumped into landfills or oceans
- Facilitates in closing of material loops

What is the purpose of EPR guidelines

- Implementation of an EPR for Rwanda, covering plastic waste exclusively
- Boost for formalization and further development of plastic waste management sector
- Prescribing a framework for the implementation of EPR fee on the basis of material classification of plastic waste
- overview of the concepts and procedures to be followed by stakeholders

EPR best practices

The basics of any EPR policy should, as a minimum requirement, ensure that:

- Every producer or obliged company becomes responsible for the end-of-life management of their packaging, either individually or collectively.
- Obliged companies who join a collective EPR scheme pay a fee for financing the collection, sorting, reuse, recycling and/or final disposal of their products.

An EPR policy and legal framework should clearly outline :

- The obligations, roles and responsibilities of all stakeholders involved.
- The objectives, scope and targets of the EPR policy.
- A framework for establishing a PRO The EPR fee cost coverage of activities & differentiation or modulation based on various characteristics of the packaging and end-of-life systems and infrastructure available.
- Monitoring, enforcement, compliance and penalty mechanisms. The timeline for implementation.

EPR advantages and challenges to implementation

As the demand for waste management services grows alongside the population and the global economy, it will be increasingly important to support:

- efforts to recognize a product's end-of-life value and its potential to be used as a resource;
- consideration of the social and environmental impacts that products may have throughout their lifecycles and;
- a means of managing the resources that remain at a product's end-of-life in a socially, environmentally, and economically responsible manner

ADVANTAGES

1) Shared responsibility for recycling management between govt and private industry

2) Provides funding for expanded recycling collection infrastructures

3) Minimizes disposal costs to local governments

4) Encourages design of environment friendly packaging

5) Builds alignment, framework and funding

CHALLENGES

1) Public hesitation or industry resistance regarding the uncertain or potential burden of EPR

2) A lack of competition or credible enforcement to drive efforts to fulfill these obligations

3) Some limitations in the data available to confirm the effectiveness of EPR

1.2

EPR benchmarking around the world

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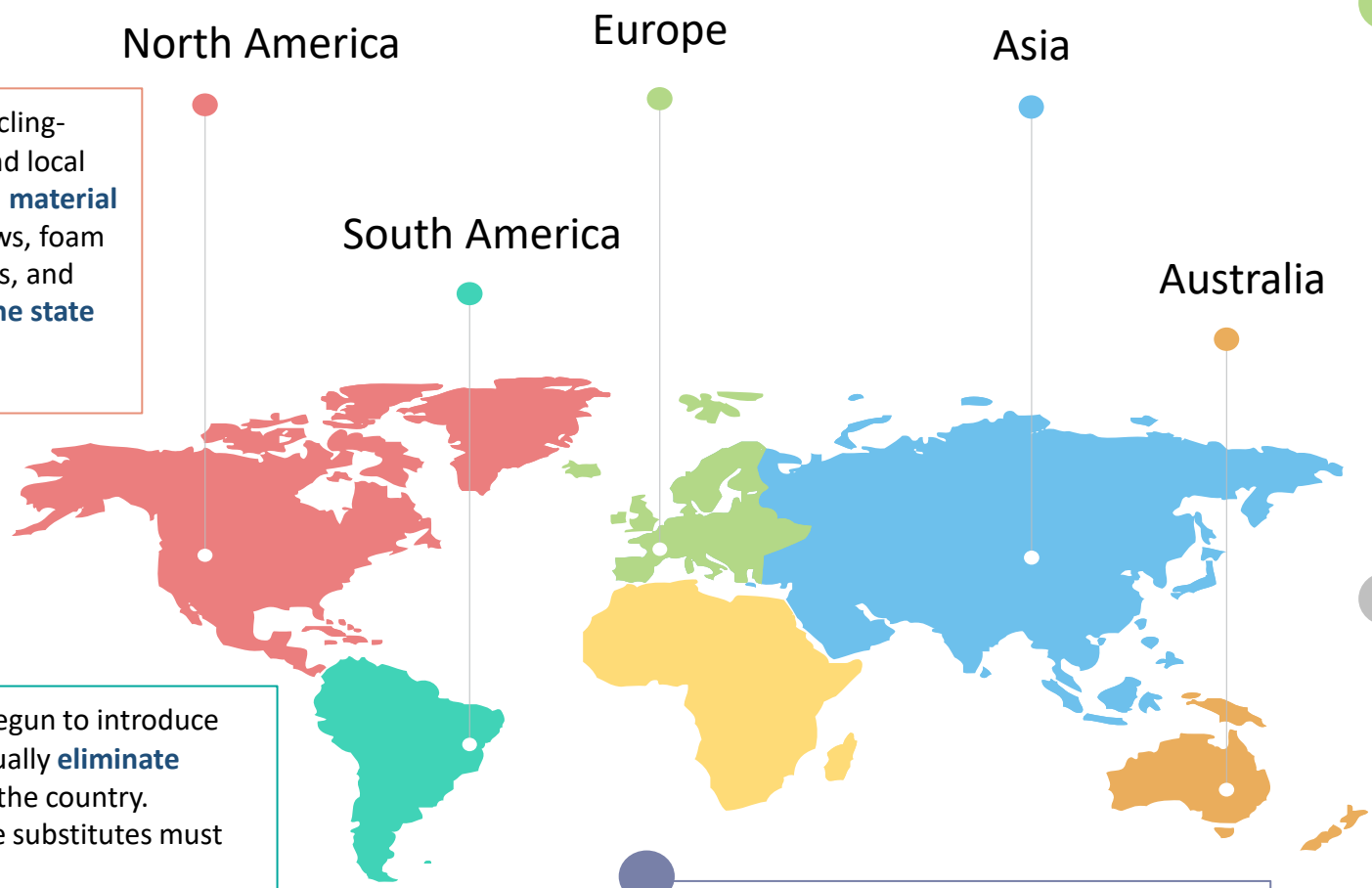
Plastic regulations around the world



The U.S. has left much of recycling-based legislation to the state and local level - several initiatives such as **material bans** (plastic grocery bags, straws, foam trays), beverage deposit systems, and **PCR content requirements at the state or local level.**

Brazil government has begun to introduce legislation that will eventually **eliminate single-use** plastic around the country. Biodegradable or reusable substitutes must be used instead.

Australia: Ban on Single-Use Plastic Products Enacted in Australian Capital Territory by prohibiting the supply of identified single-use plastic items.

The European Union has approved **a plastic tax** on nonrecycled plastic waste, which is implemented Jan. 1, 2021. The plan includes a **0.8 euros per kilogram** levy on nonrecycled plastic packaging waste

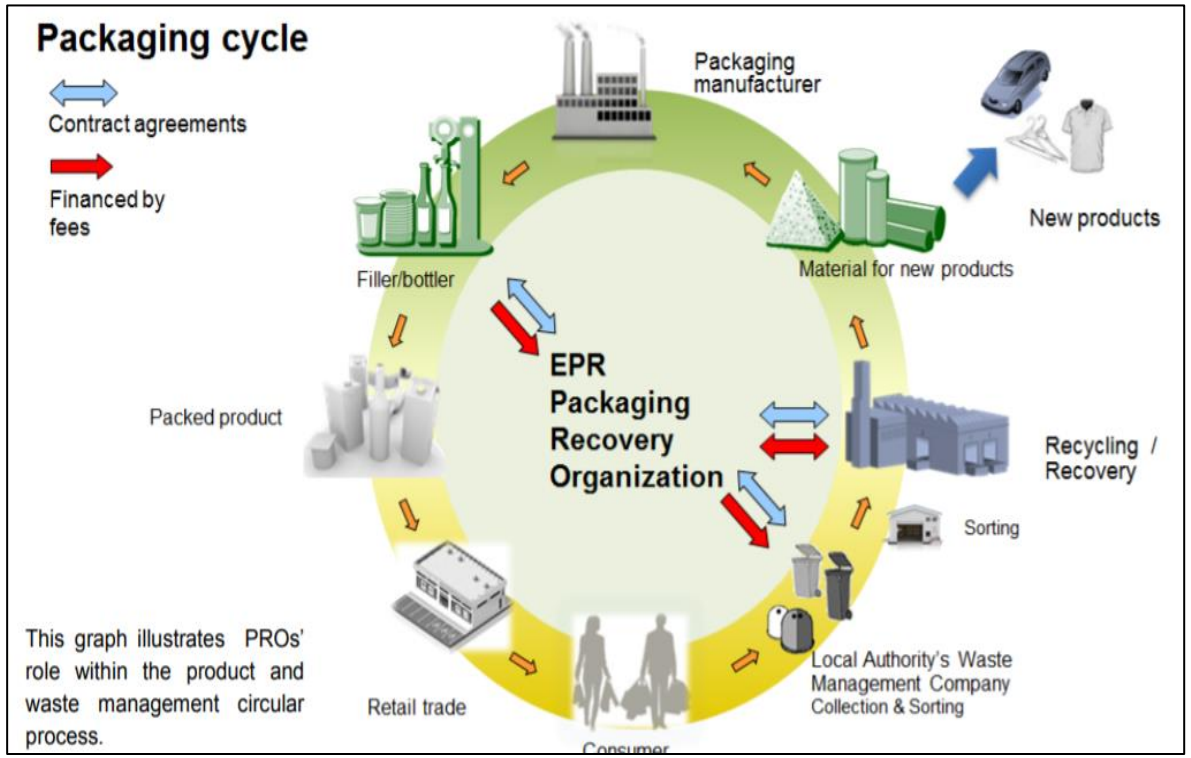
The **UK** is proposing a tax if plastic packaging **does not include 30% PCR**, while **Italy** is looking to implement a tax of **€450/ton in 2021 on virgin plastic** and Spain a similar fee on non-recyclable plastic packaging

India – PWM Rules Potential **Restriction on Single Use Plastics**, Non-recyclable Multi-layer Plastics **NGT Order** Use of Plastics for Food pkg **EPR guidelines by CPCB**

China - Prohibits import, use or purchase of food-related products (e.g., food additive, food packaging materials) not in compliance with the Chinese Food Safety Standards

EPR management in Europe

EPR for packaging is a mechanism where producers are responsible for the recovery and recycling of the packaging that they place on the market after it has been used. Typically, this is through providing financial support to facilitate the collection, sorting and recycling of packaging waste. Some Producer Responsibility Organizations (PROs) may also get operationally involved, in particular in the sorting and recycling elements of the supply chain.



The legislative framework for the development of EPR at the European Union level

It is composed of both general waste legislation, and specific directives framing the recovery and recycling of specific waste streams

The companies bound by EPR legislation must properly handle the end-of-life management of products and their packaging either individually or by setting up collective entities, mainly PROs.

At an industrial and commercial level, as packaging waste is often directly collected by waste collectors, PROs must, at least, establish a monitoring system for both packaging quantities that have been put on the market and collected as well as recycled

Citizens should be equipped with an easy access to infrastructure, enabling them to sort waste on a daily basis, so that household waste collection can be deployed

Operating models in Europe

EPR models Country wise

Sharing the collection infrastructure (Germany): Inhabitants have access to a common container and the collected packaging waste is split between the various PROs prior to being sorted. In this case, the cost distribution is established by a clearing house.

Dual model (Austria, Germany, Sweden): Industry has full operational and financial responsibility over collection, sorting and recycling. There is a separate collection system designated to local authorities, but their influence is minimal.

Shared model (France, Spain, Belgium, Netherlands, Italy, Czech Republic, Slovenia): The responsibility is shared between industry and the local authorities based on common agreements regarding collection. Municipalities are responsible for collection, and often for sorting of packaging waste, arising on the municipal level, while industry's financial responsibility differs from country to country.

Vertical integrated systems (Germany, Poland, Slovenia, Romania, Bulgaria): Several, usually profit-oriented entities companies. In compete to attract obliged vertical integrated systems, waste management differs from country to country.

Competing on the infrastructure (Estonia): Every PRO offers its own container to inhabitants.

Tradable Credits Model (UK, partly Poland): There is neither a link between industry and municipalities nor differentiation between commercial and packaging arising at the municipal level.

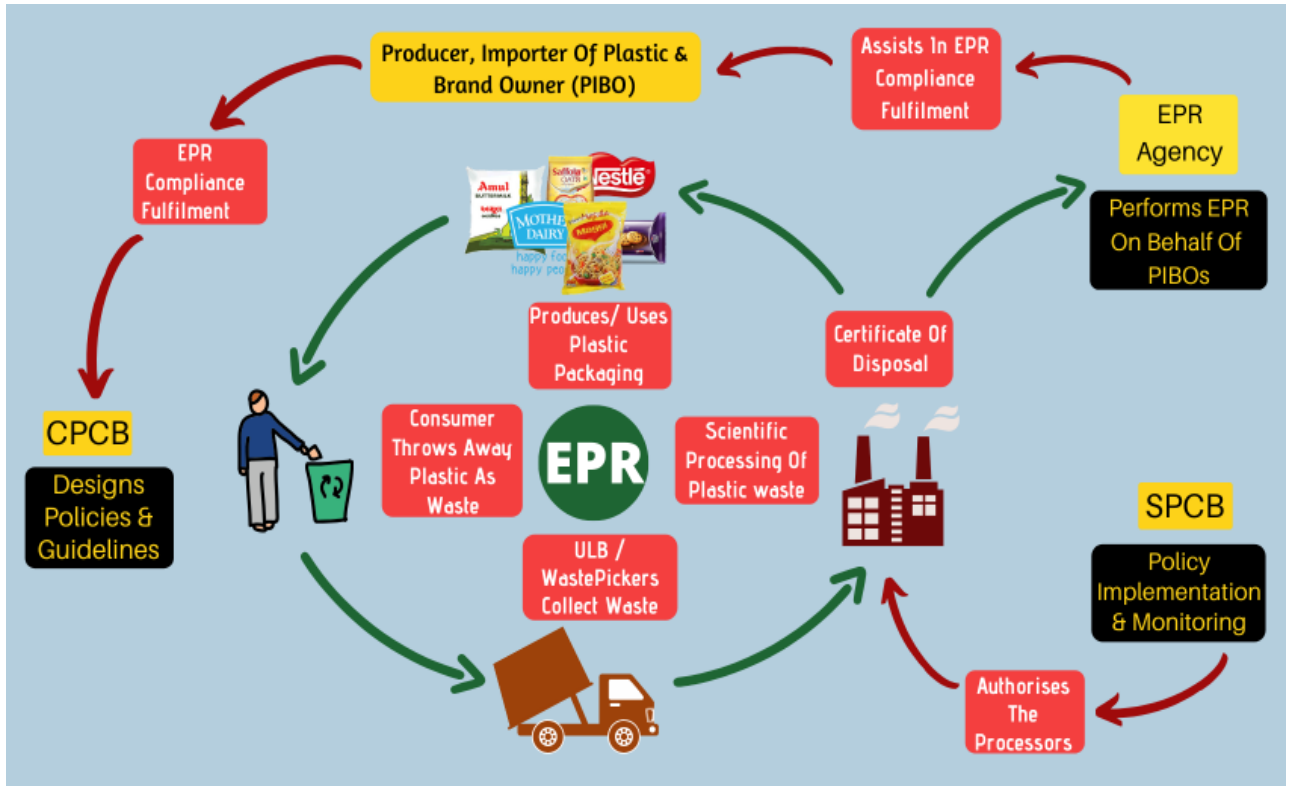
Each PRO in a separate district (Poland, Romania, Bulgaria, Slovakia, Malta, Latvia, Lithuania): Each PRO signs up with as many municipalities as needed to fulfil targets according to market shares

PROs in hands of obliged industry (**Belgium, Czech Republic, Ireland, Italy, France, Netherlands, Norway, Portugal, Spain**): Obliged industry creates one common non -profit entity that collects the necessary funding, cooperates with local authorities and ensures recycling in the most cost-efficient and environmental way.

PROs only responsible for packaging arising at the municipal level (Belgium, Germany, France, Spain), for commercial packaging (Belgium), or for integrated packaging waste streams (Netherlands, Italy, Czech Republic).

EPR management in India

Extended Producer Responsibility" may be defined as a policy principle to promote total life cycle environmental improvements of product systems by extending the responsibilities of the manufacturer of the product to various parts of the entire life cycle of the product, and especially the take-back, recycling and final disposal of the product .



CPCB	SPCB/PCC	ULBs	Port Authorities
Authorization of Producers (based on EPR plan)	Monitoring as per EPR Plan	E-waste pertaining to Orphan Products-collection & Channelization	Verifying EPR Authorization
Registration of PRO	Authorization of Manufacturers	Segregation of E-Waste & Channelization	Informing CPCB any Illegal Traffic
Forwarding approved EPR plan to SPCBs/PCCs	Filing Annual Report to CPCB		
Conducting Random Checks	Authorization to Dismantlers/Recyclers/ Refurbishers		
Submitting Annual Report to MoEFCC	Checking Form-2, Form-3 & annual returns of Bulk Consumers		

Operating models in India

FEE BASED MODEL

Under the fee-based model, it is proposed that the **producers/importer/brand owner who are using less quantity of plastic for packaging** (cut-off quantity shall be decided by the Government after the registration process) **shall contribute to the EPR corpus fund at the central level**

The **amount to be contributed** by each of the producers/importer/brand owner will be decided based on normative cost. These calculations are **based on the generation of plastic waste viz-A-viz the efforts required and money spent by the ULB/Government to handle the plastic part of the waste**.

PRO BASED MODEL

PROs will be registered in the **framework to carry out the legal requirements on behalf of their member companies**
Producers/importer/brand owner by their own or through PRO required to ensure that an equivalent amount of plastic is being collected and processed. ii. Producer/Importer/Brand Owner/PRO will lead implementation and provide funding required under the Rules on behalf of producers to support plastic recycling

PLASTIC CREDIT MODEL

A plastic credit model is envisaged where a **producer is not required to recycle their own packaging, but to ensure that an equivalent amount of packaging waste has been recovered and recycled** to meet their obligation. However, producers are mandated to acquire evidence of recycling or recovery [PLASTIC CREDIT] from properly accredited processors [recyclers, W2E plant operators, cement co-processors, users utilizing plastic in road] or exporters.

Summary of EPR framework in India

Key features

Single national registry for registration of all stakeholders like producers, importers, brand owners, recyclers, PROs etc. with allocation methods to meet individual state data requirements.

Development of **an end-to-end EPR digital transaction platform**, which has all producers (FMCG, Brand Owners, Plastic Manufacturers, Importers, Super Stockists, Distributors and retail chains) and Plastic Recovery Organizations (PRO) (waste collectors, sorters & bailers, Recyclers) empaneled onto the platform

The ownership of portals and digital exchange should rest with the Government like GST to ensure protection and confidentiality of members' data.

The Manufacturers and PIBOs will procure a digital certificate from the PRO, comprising of information about procurement all forms of plastics through their waste management agencies engaged with a chain of collectors, bailers / sorters and recyclers.

Recycling targets **should cover all post-consumer packaging waste** (including household waste). Since this is a Uniform EPR Framework, there should be an **overall National EPR Target covering all packaging formats.**

The **EPR obligation for MLP shall be higher than the normal recyclable plastic.** The producer, importer, brand owner shall have to pay higher cost for EPR of MLP.

Monitoring & Implementation

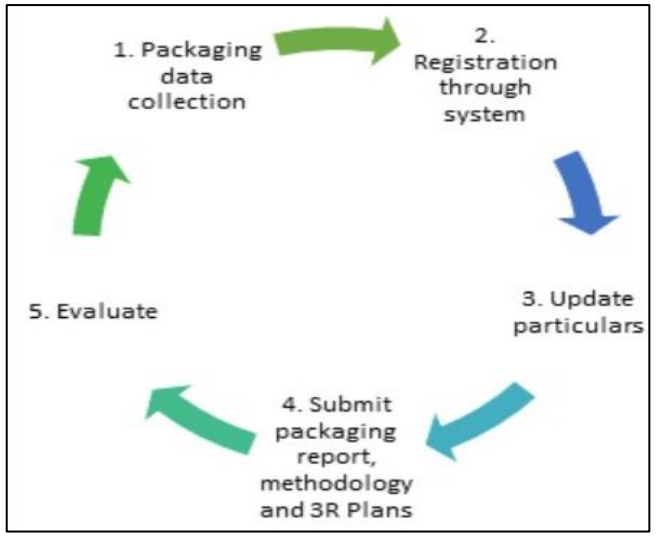
Set up a methodology to monitor the effectiveness of the plastic waste recovery system. PIBOs after registering with the Portals on their targets with select and make agreements with PROs. The PROs on their own or through the waste management agencies (WMAs) will adopt a systems approach for segregation, collection, recovery and recycling of all plastics.

Existing waste collection infrastructure will be used. **Incentivize the current channel with the value for the non-value plastics to ensure collection.** They will be encouraged through the use of waste management agencies (WMAs) by the PROs

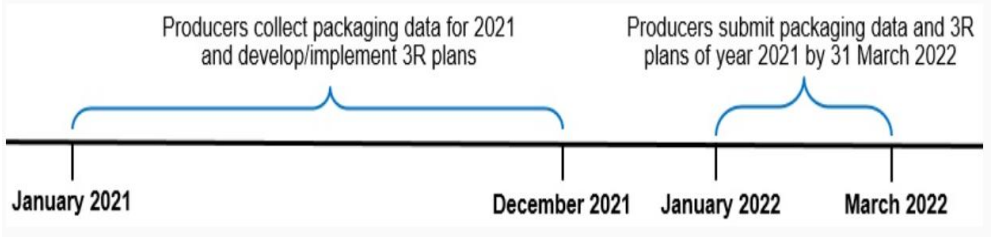
Penalties shall be imposed on the Producer/Importer/Brand Owner for the portion of waste he **could not able to collect against the targeted collection**. This money shall be used for creating infrastructure for plastic waste management

Mandatory packaging reporting framework in Singapore

Mandatory packaging reporting aims to raise companies' awareness of the benefits of packaging reduction and to spur companies to reduce the amount of packaging used. It will lay the foundation for an Extended Producer Responsibility (EPR) framework for packaging waste management, which will be implemented no later than 2025



Timeline for 2022 reporting



Stakeholders, such as manufacturers and importers and retailers be required to submit packaging data and 3R plans to the National Environment Agency

Companies that meet all the following criteria are required to comply with the MPR requirements under the Resource Sustainability Act (RSA):

- Carries on a business of supplying regulated goods* in Singapore
- Meet the prescribed threshold criteria which is an annual turnover of more than S$10 million
- Imports or uses specified packaging**

**Regulated goods means any goods other than goods prescribed as excluded from this definition (please refer to Subsidiary Legislation)*
***Specified packaging means any packaging other than any type of packaging prescribed as excluded from this definition (please refer to Subsidiary Legislation)*

https://www.nea.gov.sg/our-services/waste-management/mandatory-packaging-reporting

Summary of EPR framework in Singapore

Regulatory Framework

Regulatory Framework for Packaging Waste Management

Introduce **Mandatory Packaging Reporting** of packaging data and plans to reduce, reuse or recycle packaging in **2020,** for businesses with annual turnover of **more than $10mil**

Extended Producer Responsibility (EPR) framework to manage packaging waste (including plastics) **no later than 2025**

Objectives of EPR

Raise producers' responsibility for the end-of-life management of the packaging they place on the market

Producers who place packaging into the market will be financially or physically responsible for the collection and recycling of the materials they use to package their products

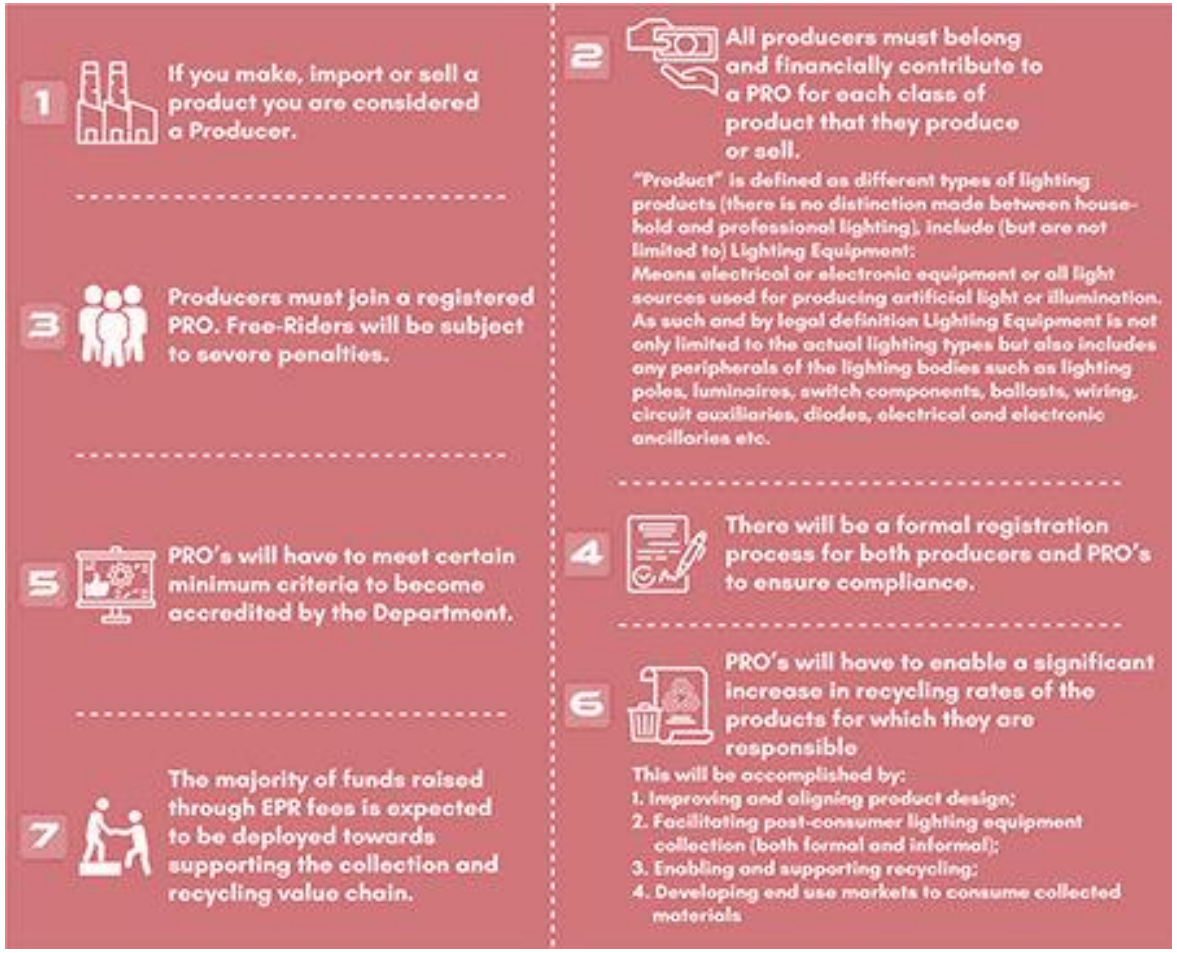
Target companies that have greatest influence over packaging use and drive producers to use packaging that are more recyclable

Increase recycling rates and thus reduce waste sent for disposal

The concept of EPR is re-introduced in the Zero Waste Masterplan (2019) with the engagement to enforce an EPR on packaging waste no later than 2025

EPR management in South Africa

Extended producer responsibility (EPR) is a policy principle that extends producers' responsibility for their products and packaging to the end-of-life stage of these products to ensure sustainable waste management



https://www.environment.gov.za/event/deptactivity/extendedproducerresponsibility_regulations2020registration

The purpose of the Regulations regarding extended producer responsibility, 2020 is to:

- Provide the framework for the development; implementation, monitoring and evaluation of EPR schemes by producers in terms of S18 of the NEMWA;
- Ensure the effective and efficient management of the identified end-of-life products; and
- Encourage and enable the implementation of the circular economy initiatives.

Stakeholder recommendations from South Africa

STAKEHOLDER RECOMMENDATIONS

PRO market and governance structure	Roles and responsibilities, opportunities for collaboration and EPR targets	EPR monitoring, reporting and compliance
Stakeholder recommendations to strengthen the PRO market and governance structure included the following: ▪ Closely manage costs and EPR fees for each material type ▪ Conduct a cost analysis for a centralised PRO ▪ Integrate generic, operational elements ▪ Integrate existing PROs to take advantage of their expertise, networks and knowledge, and facilitate cohesion, collaboration and alignment at a higher level ▪ Link the centralised PRO to a centralised monitoring, reporting and compliance system ▪ Expand the scope of a centralised PRO to become a centralised PRO for all packaging materials ▪ Establish an inclusive and representative governance structure, which includes informal waste reclaimers and civil society ▪ Establish an expert advisory panel with skills across the value chain ▪ Packaging SA could potentially play the role of a centralised PRO but might be better suited as a centralised clearinghouse for monitoring, reporting and compliance.	**Collection and collaboration** ▪ Address policy incoherence and misalignment, particularly on the responsibility of collection of obliged material. ▪ Divide responsibility for collection between municipalities and producers/ PRO(s) according to two household waste streams: • Wet/residual waste (municipalities) • Obliged material (producers/PROs). ▪ Collection services should take the municipal context into account. **Integration of informal reclaimers** ▪ Investigate a hybrid payment system to include a living wage / service fee in addition to the market value of material collected. ▪ Consider implementing decentralised collection systems, where all obliged materials are collected by the informal sector and brought to small "stock-piling" centres. **Targets** ▪ To be defined and established via an inclusive stakeholder process. ▪ Conduct a cost analysis to determine investment needs for realising targets. ▪ Include a "repurpose rate target" in the EPR Regulations. ▪ Explore the possibility of establishing collection targets for municipalities.	Stakeholder recommendations to strengthen EPR monitoring, reporting and compliance included the following: ▪ Clearly define monitoring and reporting requirements. ▪ The monitoring and compliance system should monitor EPR fees and ensure that all producers are either joining a PRO or implementing EPR responsibilities on their own. ▪ Establish a virtual reporting and monitoring system, for the whole value chain. ▪ Ensure easy accessibility to the monitoring and reporting system for all stakeholders. ▪ Define specialised material departments for the clearinghouse. ▪ Develop "unit/weight" conversion tables to streamline reporting for producers.

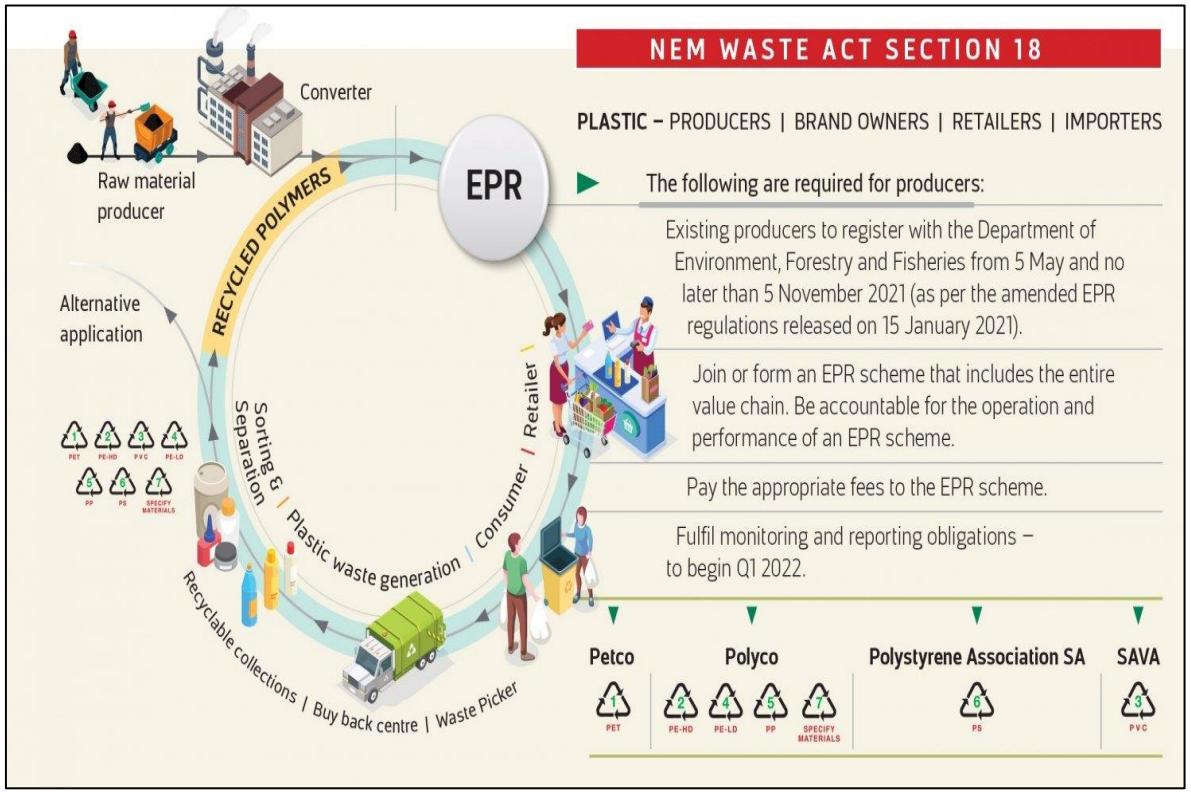
ALTERNATIVE SUGGESTIONS FOR THE PRO MARKET AND GOVERNANCE STRUCTURE :

Alternative suggestions regarding the PRO market and governance structure included the following:

- Establish a central administrative body, with a network of independent material PROs.
- Establish a handful of large multi-material PROs based on material or collection types and their relative efficiencies.
- One PRO could be established for industrial and commercial packaging and another for consumer packaging.

Summary of EPR framework in South Africa

NEM Waste Act Section 18



Key features

Section 18 refers to the Extended Producer Responsibility aspect of the National Environmental Management Waste Act (NEMWA) and essentially replaces Section 28 (Industry Waste Management Plans) from 2017

The producers are obligated to pay the EPR funds to the PRO. Each producer will be tracked for compliance through various mechanisms to ensure they a paying their required EPR fees to the PRO.

A Producer Responsibility Organisation (PRO) is an organisation that assists producers meet their extended producer responsibility targets through various key stakeholders within the value chain in the country. The PRO is responsible for setting up and managing the value chain mechanisms for the targeted waste material and to create awareness for the recycling of all electrical and electronic waste

Emphasis is on the role and responsibilities of the Producer Responsibility Organisation (PRO) - It will be the responsibility of the PRO to drive sector-based waste minimisation programmes, manage financial arrangements for funds to promote the reduction, re-use, recycling and recovery of waste; drive awareness programmes and innovate new measures to reduce the potential impact of products on health and the environment.

EPR framework in Philippines

EPR as an environmental policy and financial mechanism provides a systematic approach to reducing and managing plastic wastes, defining the key responsibilities of all stakeholders, and allows limited government resources to be focused on basic services

Mandatory EPR scheme within a clear timeframe

- Voluntary compliance phase (years 1-3)
- Mandatory compliance phase (years 3+)

Cover all materials from households and equivalent places of origin Includes service packaging, those from offices, canteens, and restaurants, etc.

One, non-profit Producer Responsibility Organization (PRO)

- Includes a wide range of stakeholders representing obliged members (local and MNC producers and importers), other members (plastic value chain including waste management operators), and government representatives from all levels, academia and representatives of the consumers who constitute an Advisory Board.

Strict monitoring and control systems

- Strict and enforced monitoring, controls and penalties are indispensable and shall be carried out by the government (i.e., DENR)

Building high-quality recycling capacity

- Financial flows of the EPR system are directed towards measures for increasing both quantity and quality of recycled plastics to enable closed-loop recycling (e.g.- bottle-to-bottle recycling).

IMPLEMENTATION PLAN

Government action must be anchored on a system mandated by law and regulation, with sufficient provisions for capacity and knowledge building for all stakeholders. The implementation plan for the proposed EPR scheme requires two main steps:

Build foundation for EPR with focus on capacity building

- Prepare a medium-term system change based on an aligned understanding by all stakeholders, first by introducing the concept and then forming collaborations
- It should aim to establish a mandatory EPR framework and related organizations (i.e., the PRO) in the next 3 years

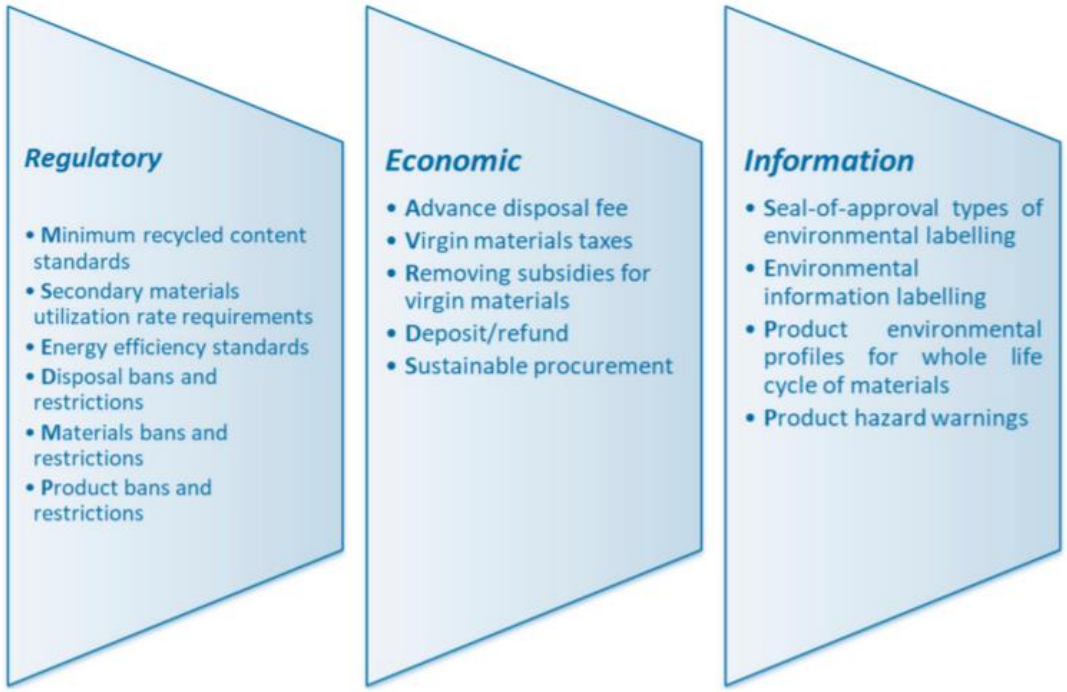
Stimulate a holistic, basic waste management

- Basic waste management needs to be in place and improved, which can be re-organized according to the EPR scheme once the system is set for implementation

EPR framework in Australia

Extended Producer Responsibility (EPR) places the financial, and even physical, responsibility to producers, manufacturers or even retailers in making sure of post-consumer products' disposal and repurposing.
For an easier understanding, the concept simply means that those who created the product should make sure it is properly disposed of and recycled in an easier manner and less-costly way.

Three policy instruments that facilitate EPR implementation:



EPR policy development and implementation, particularly for C&D waste, is still at an early stage in Australia:

A study results showed that there is widespread support among different stakeholders to develop EPR and expand the existing regulation to other materials. The barriers were cost and time implications for EPR policy establishment and enforcement, diversity of stakeholders involved, construction product lifecycle, responsibility of manufacturers, complexity in implantation of EPR regulations, modification inbuilt facilities and health and safety issues.

EPR framework in Synopsis

	Europe	India	Singapore	South Africa
Framework	The legislative framework for the development of EPR at the European Union level is composed of both general waste legislation The companies bound by EPR legislation must properly handle the end-of-life management of products and their packaging either individually or by setting up collective entities, mainly PROs.	• The EPR obligation for MLP shall be higher than the normal recyclable plastic. The producer, importer, brand owner shall have to pay higher cost for EPR of MLP. • Recycling targets should cover all post-consumer packaging waste (including household waste). Since this is a Uniform EPR Framework, there should be an overall National EPR Target covering all packaging formats.	Mandatory packaging reporting aims to raise companies' awareness of the benefits of packaging reduction and to spur companies to reduce the amount of packaging used. It will lay the foundation for an Extended Producer Responsibility (EPR) framework for packaging waste management, which will be implemented no later than 2025	EPR scheme is a policy approach under which producers are given the end-of-life FINANCIAL, ADMINISTRATIVE and OPERATIONAL responsibility for their products put on market. This mainly involves a take-back scheme of post-consumer products for the collection, transportation, repair, refurbishment, management, and treatment. The administration and operational costs of the PRO is also covered by the EPR fees
EPR Model	Country wise EPR models • Sharing the collection infrastructure • Dual model • Shared model Tradable Credits • Vertical integrated systems	**Fee Based Model** – PIBO who are using less quantity of plastic for packaging shall contribute to the EPR corpus fund at the central level **PRO based & Plastic Credit Model** - producer is not required to recycle their own packaging, but to ensure that an equivalent amount of packaging waste has been recovered and recycled	MPR - manufacturers and importers and retailers be required to submit packaging data and 3R plans to the National Environment Agency	Producers are obligated to pay the EPR funds to the PRO. Each producer will be tracked for compliance through various mechanisms to ensure they a paying their required EPR fees to the PRO.
EPR Fees	EPR fee modulation based on a product or material's sortability, recyclability, recycled content, and existence of sorting and recycling infrastructure. Partial modulation of EPR fees based on: „ Amount of packaging placed onto market „ Recyclability of the packaging material.	The fee amount that a plastic manufacturer would be required to contribute to the corpus would be decided based on their quantum of plastic generation vis-à-vis "the money spent by the ULB/government to handle the plastic part of the waste",As per the proposed EPR fee rates, plastic, paper, glass, tin or aluminium packing can be charged at ₹10 per kg.	For E-waste. The doorstep collection charges are S$ 17.12 per three small items and S$ 42.80 per one large items. These prices are of standard service and there are additional charges for express services and weekends or night collection.	EPR fees will be paid according to material stream on rand per tonne basis : • All importers of packaging (filled/unfilled) . The EPR fees is paid directly to Packaging SA • All converters. Manufacturers, producers,and brand owners for local packaging. The EPR fees ia paid directly to PRO responsible for specific material stream

EPR framework in Synopsis

	Europe	India	Singapore	South Africa
PRO structure	An industry-owned PROs can be mandated by the obliged industry to take responsibility for collection or take-back, and sorting or recycling, thus shifting the individual responsibility to a collective one At the municipal level, PROs must establish and maintain the necessary infrastructure for the collection, or take-back, and the sorting of packaging waste	PROs will be registered in the framework to carry out the legal requirements on behalf of their member companies	Not yet defined	It will be the responsibility of the PRO to drive sector-based waste minimization programs, manage financial arrangements for funds to promote the reduction, re-use, recycling and recovery of waste; drive awareness programs and innovate new measures to reduce the potential
Implementation plan	At an industrial and commercial level PROs must, establish a monitoring system for both packaging quantities that have been put on the market and collected &recycled Citizens should be equipped with an easy access to infrastructure, enabling them to sort waste on a daily basis, so that household waste collection can be deployed	Development of an end-to-end EPR digital transaction platform, which has all producers and Plastic Recovery Organizations Set up a methodology to monitor the effectiveness of the plastic waste recovery Existing waste collection infrastructure will be used Operations will be monitored though digital platform. infrastructure will be created to support this.	To manage packaging waste including plastics no later than 2025	The Regulations and Notices have been amended to allow additional time for the registration, development, and submission of EPR schemes

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Global material waste overview

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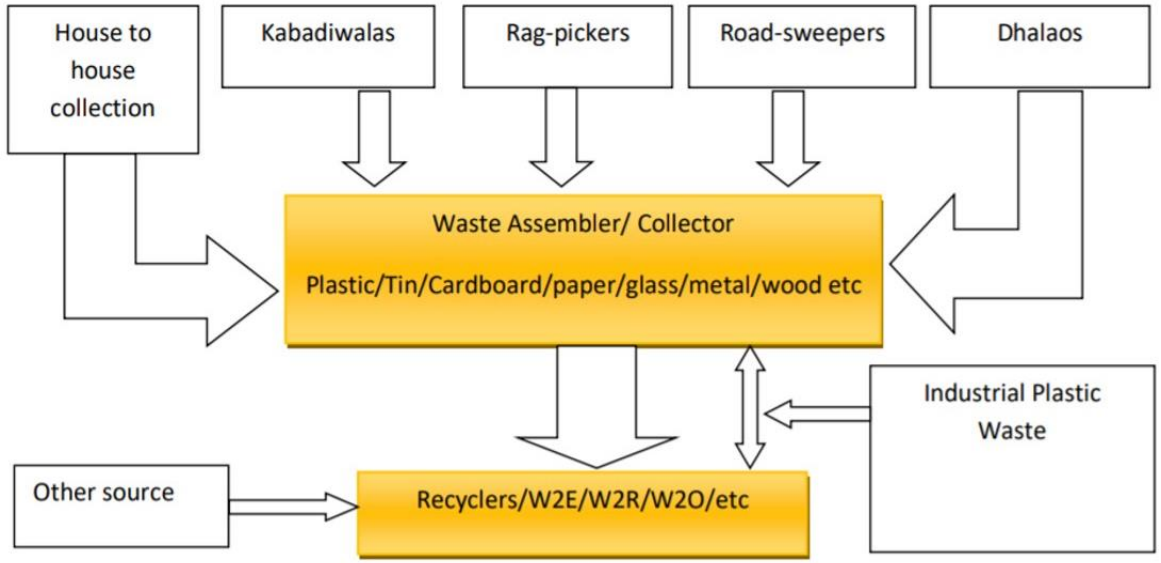
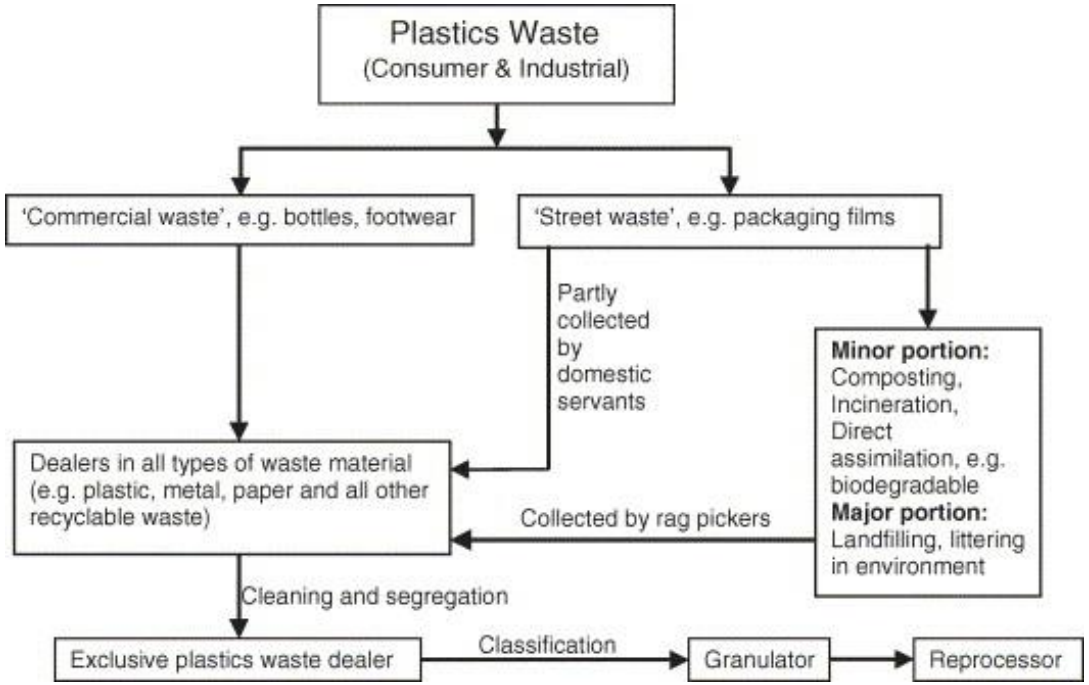
Material waste flow for plastic in India

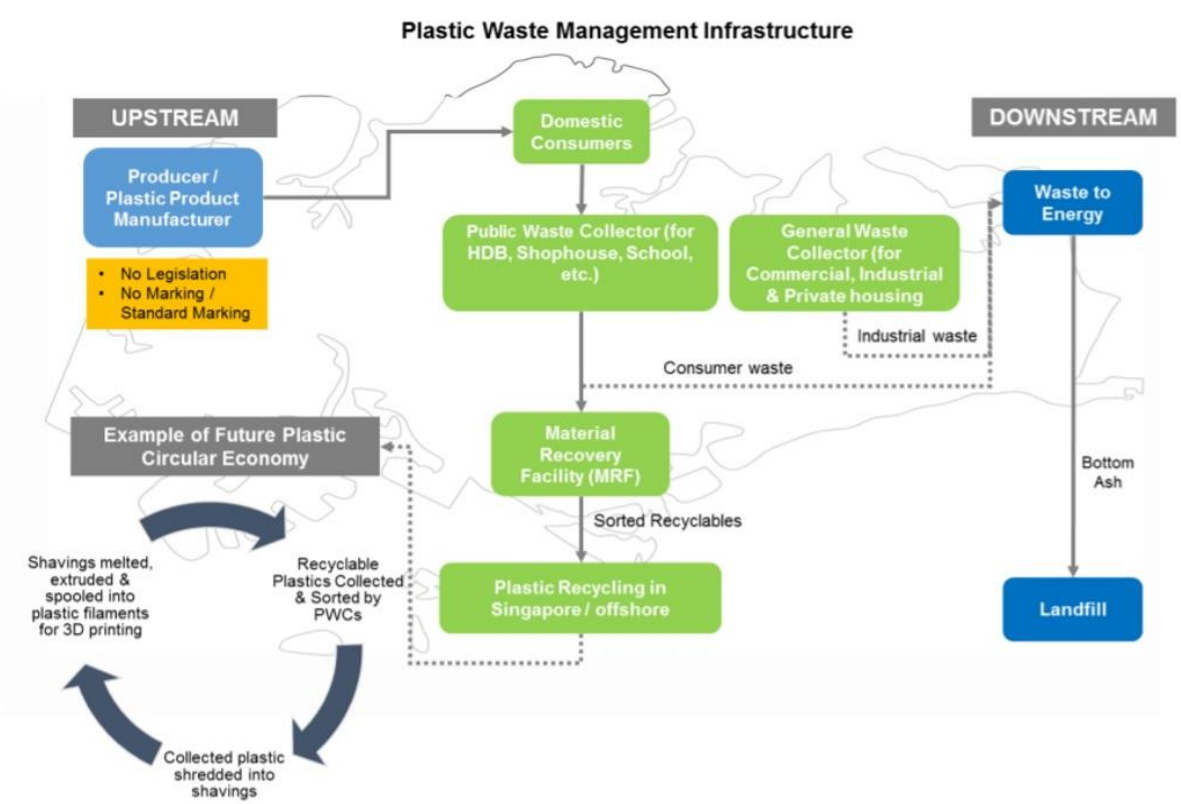


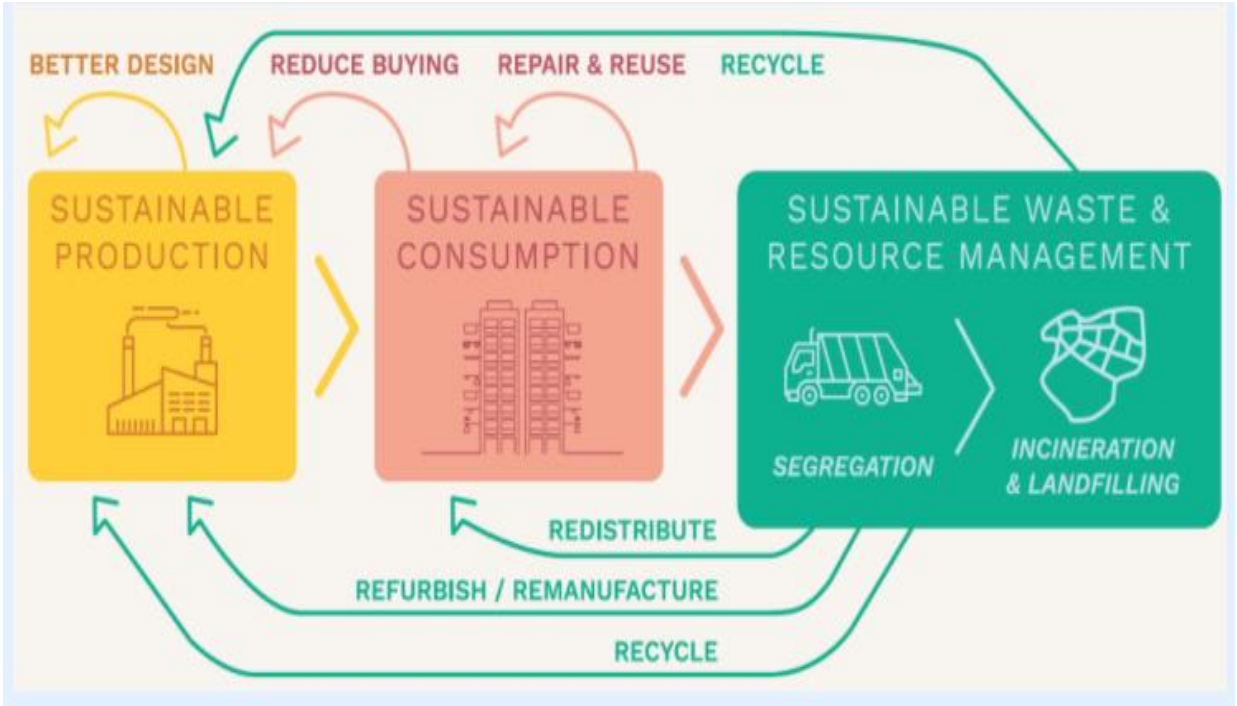
The above flow is a representation in which a waste assembler plays the role of collecting and segregating all the waste obtained from various sources that are allotted for the collection of waste. It is then further segregated and sent to the respective recyclers, Waste to energy or Waste to recycling. Waste from other sources and industrial waste are also segregated and follow the same flow as above.



The plastic waste consisting of consumer as well as industrial waste Is further divided into two categories namely: Commercial waste and street waste. The rag pickers are responsible for the collection of waste, and it is further sent to dealers. After cleaning and segregation of the waste the dealers further send the plastic waste to an exclusive plastic waste dealer that then deals with the EOL of the plastic waste.

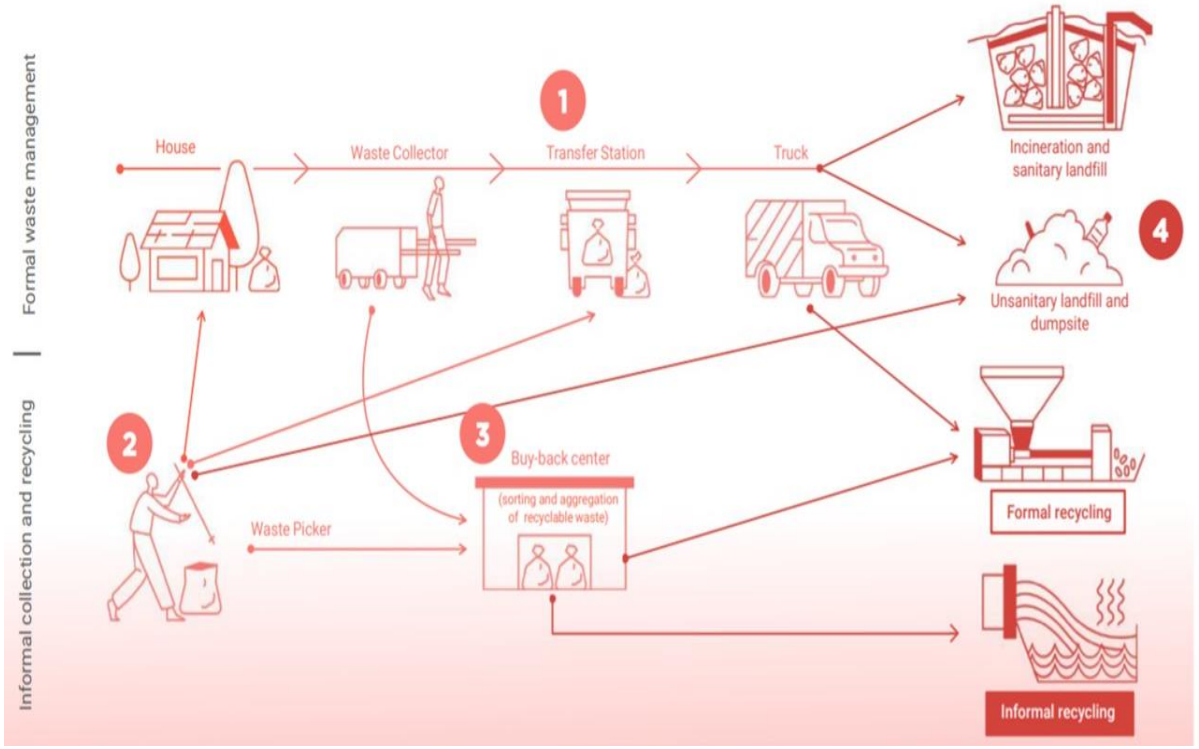
Material waste flow for plastic in Singapore





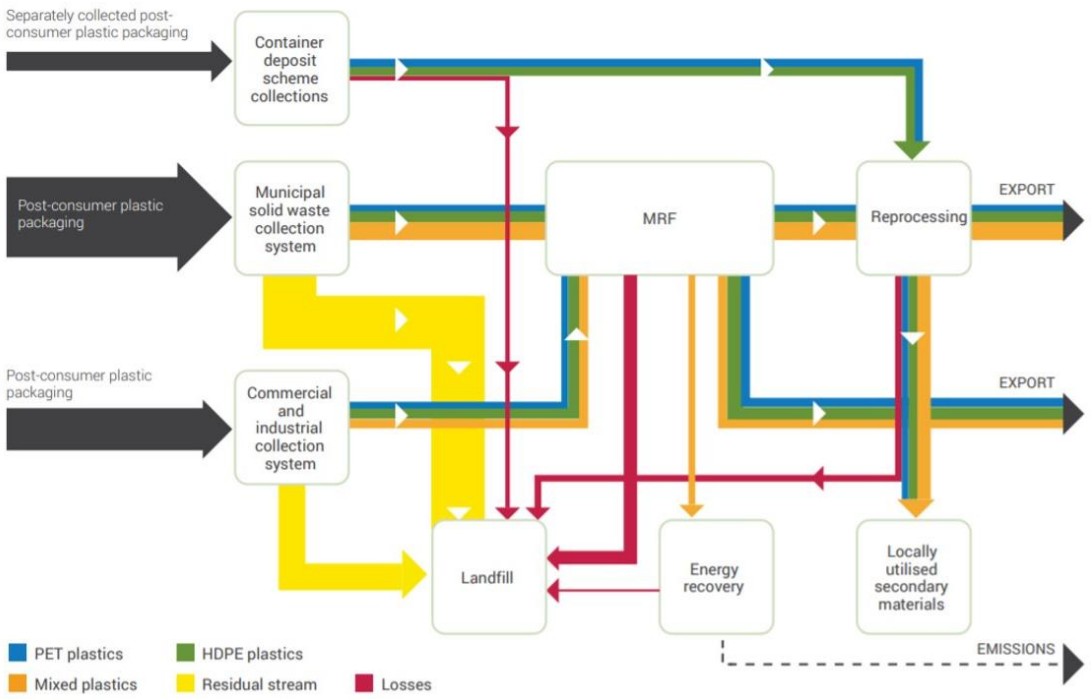
Waste management in Singapore follows a flow in which the domestic consumers give their waste to a waste collector depending on the type of waste namely: Consumer and industrial waste. Industrial waste is sent to Waste to Energy and landfills which can be termed as downstream activities. The consumer waste if sent to MRFs for further sorting and segregation which thereafter are sent for recycling mainly for plastics. The aim is to push for a plastic circular economy and promote the breaking down and reuse of plastics in order to maximize value and promote recycling.

Material waste flow for plastic in South Africa

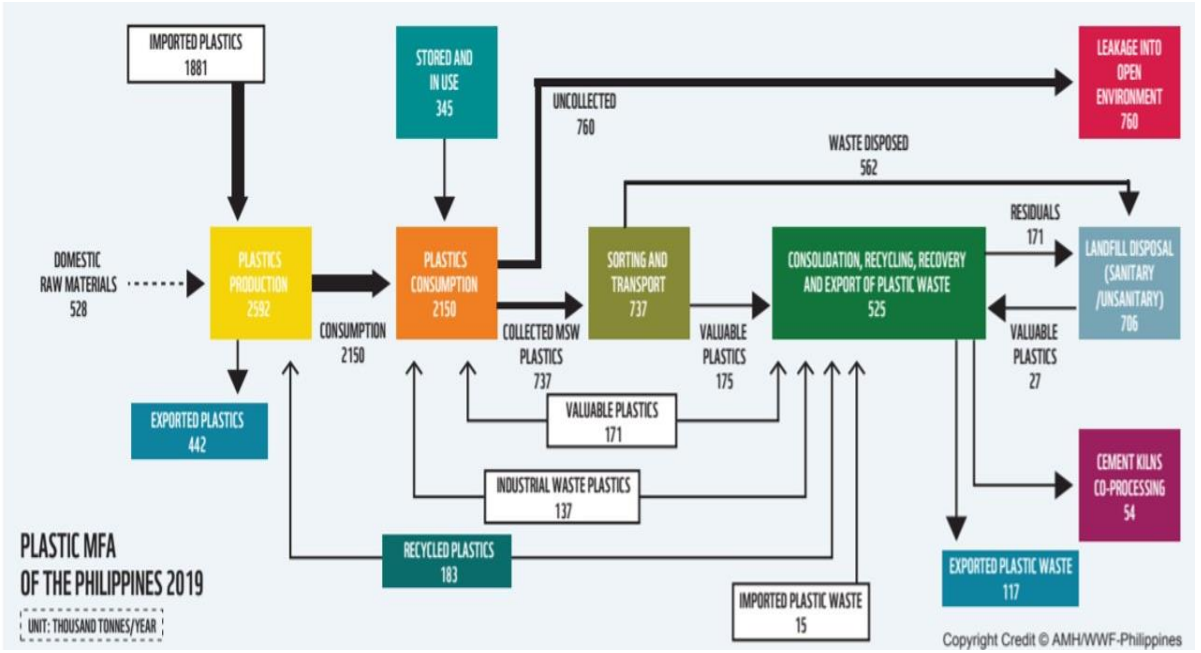


The most common waste flow consists of the waste being collected from a consumer's household by a waste collector who further delivers the waste to a transfer station. From the transfer station the waste is further transported to landfills, either for incineration (sanitary) or dumped in dumpsites (unsanitary). A second outcome is one in which the waste from the transfer station is directly sent for formal recycling. Waste pickers that do not follow the common flow of waste collection, collect the waste directly from households, Transfer stations and dumpsites and give them to buy back centers who further segregate and send the waste for either formal recycling or informal recycling depending on the type of waste.

Material waste flow for plastic in Australia and Philippines



The plastic waste flow in Australia for post consumer plastic packaging follows two waste systems namely: Municipal and commercial and industrial waste collection system. The waste for both systems consists of Mixed plastics, PET plastics, HDPE plastics and others. Both the systems collect the waste and send it to the MRFs for segregation. Depending on the eligibility of the materials they are further sent for energy recovery, reprocessing. After reprocessing the materials are further utilized as secondary materials. The losses overall throughout the flow are then delegated to landfills.



This study can be the basis of the current status of the Philippines' plastic waste stream. Additional collection and recycling streams, detailed waste characterization data, and flows per types of plastics were incorporated. Data from various government and private institutions, together with primary data, were used as starting points to generate key amounts and rates for plastics production, consumption, collection, recycling, recovery, disposal, and leakage.

1.4

Principles of EPR design and implementation

This study has been funded by UK aid from the UK Government; however, the views expressed do not necessarily reflect the UK government's official policies

Key features of EPR guidelines

- **PRODUCT DEFINITION -** The product(s) to be covered by EPR must be clearly defined.
- **PRODUCER DEFINITION AND REGISTRATION -** All affected producers should be registered and treated equally.
- **TYPE OF PRODUCER RESPONSIBILITY (OBLIGATIONS) -** The obligations placed on producers, i.e., their responsibilities, should be clearly defined. Various approaches can be taken.
- **SETTING TARGETS AND RESPONSIBILITIES -** Realistic, but also reasonably ambitious, and measurable targets should be set for waste collection and management, and periodically reviewed. Targets should take into account mandatory (legislative) targets set by governments, technical and economic feasibility, existing/needed infrastructure, geographic and demographic characteristics, etc.
- **SETTING FEES AND COST COVERAGE -** PROs should ideally set fees to cover the full net costs of waste management for their products, including separate collection, transport, disposal, administrative and communication costs.
- **INFORMATION PROVISION** - Adequate information must be provided by governments and/ or PROs to consumers and stakeholders to support the good functioning of the EPR scheme. Dialogue among stakeholders (PROs, producers, government, local municipalities, waste companies, consumers, NGOs) should be encouraged.
- **TRANSPARENCY, MONITORING AND ENFORCEMENT -** Much information should be made publicly available. EPR schemes should be adequately monitored, and rules enforced, by public authorities and the obligated producers.

Potential steps to implement EPR in developing countries

STEPS FOR GOVERNMENTS	STEPS FOR BUSINESSES
Undertake research/feasibility studies including on benefits and opportunities of establishing EPR	
Familiarize themselves with the key objectives and principles of EPR	
Begin to develop legislation to support the introduction of EPR	Discuss with national governments what governments and companies can do to support the introduction of EPR
Begin to support the necessary waste collection infrastructure	Create a network or communication between like-minded businesses keen to participate in EPR
Consider how to support the development of markets for recycled material	Create a PRO, in cooperation with key stakeholders
Establish comprehensive and stable EPR laws and enforce them to create a reliable legal framework for all stakeholders	Participate in EPR schemes by reporting plastic quantities and characteristics, paying respective EPR fees and complying with additional EPR measures

Key message from EPR guidelines

KEY MESSAGE ON EPR GUIDELINES

Reduced disposal and increased recycling

Reduced burden on public budgets

Economic opportunities

EPR GOVERNANCE

Measures to aid in implementation of guidelines

Measures

Public Private dialogue to define the scope and roadmap for EPR implementation

Independent PRO (Producer Responsibility Organization) to oversee and administer the implementation of the policy

Appropriate EPR pricing mechanism – cover all costs of mitigation and incentivise shift to more sustainable packaging

Role clarity & capability building – across stakeholders – government, municipality, PRO, waste collectors, recyclers, manufacturer, consumer

Monitoring & Evaluation systems

Build demand for recycled materials

Case examples

The Singapore Packaging Agreement (SPA) was a joint initiative by government, industry and NGOs to reduce packaging waste, which constitutes about one-third by weight of Singapore's domestic waste disposed off. The Agreement was voluntary, so as to provide flexibility for the industry to adopt cost-effective solutions to reduce waste.

Malaysia - recommendations for non-profit and one PRO for all packaging material. Germany has transitioned from a single, non-profit PRO to several for-profit PROs, operating in competition with each other.

EPR fee modulation based on a product or material's sortability, recyclability, recycled content, and existence of sorting and recycling infrastructure. E.g.. SA proposed 2% (paper) to 10% (multi-layer plastic) of packing material costs as fees

e.g. Belgium - Municipalities have contracts with PROs and are responsible for collecting packaging waste from households.

Singapore - Mandatory Packaging Reporting (MPR) framework, producers of packaged products, such as brand owners, manufacturers and importers, as well as retailers such as supermarkets, will be required to submit packaging data and 3R plans to the National Environment Agency

E,g,. PCR usage norms for plastic in EU – 30% target

Principles of EPR design and implementation

Package Design Element

- ***EPR model should incentivize keeping waste plastics in circulation***
- ***Reduce> Reuse > Recycle > Recover > Dispose.***

Setting up targets and responsibilities

- ***Brand owners, Producers, Importers, Distributors, PRO/WMA shall ensure -***
  - Collected & disposed should be equivalent to the amount of plastic waste that is generated
  - Collected can be brand neutral
  - Should be disposed-off to the registered Recyclers, Waste Processors, Waste to Energy Plants, Cement Plants etc.

- ***Clear and detailed set of quantitative targets for reuse/recycling and targets developed in consultation with all stakeholders***

Type of producer responsibility obligation

- ***PRO - key coordinating stakeholder Initially, only one monopolistic PRO is recommended. For long term, thoroughly regulated competitive PROs can be established.***

Principles of EPR design and implementation

Setting EPR fee and cost coverage

- *EPR Fee to be used exclusively for collecting, sorting, and recycling, communication activities and administration costs*

Monitoring traceability/transparency

- *PIBOs to ensure that an equivalent amount of plastic is being collected and processed.*
- *To include instruments to combat corruption. Financing and financial flows must be transparent.*
- *PRO/Producers/Importers can also obtain certificates from accredited processors [recyclers, W2E plant operators, cement co-processors, users utilizing plastic in road] as an evidence of recycling or recovery, which will act as EPR compliance.*

Successful implementation design

- *A viable and thriving recycling for all categories of plastics: to recover maximum value from waste and transfer it back to the waste collector, a thriving recycling market will have to be developed*
- *Public-private partnerships involving industries, civil society organizations and local government bodies can create sustainable models.*

Section - 2

Analyzing waste generation and management in Rwanda

2.1

Rwanda at a glance

This study has been funded by UK aid from the UK Government; however, the views expressed do not necessarily reflect the UK government's official policies

Rwanda at a glance

Population size
12.1 million

Govt. & Parliament
Presidential republic
Bicameral parliament

Official languages
Kinyarwanda,
French, English, Swahili

GDP per capita
USD 774 (3.8x since ‘02)

Literacy/Unemployment
68% / 16%

GDP (10-year growth)
USD 9.1bn (7.5% p.a.)

Currency/exchange rate
Rwanda Francs (RWF)
~RWF 875/USD[1]

Ratings
B+, “stable” - Fitch
B, “stable” - S&P

1. As of 27 Oct. 2018 | Sources: World Atlas, World Bank, Fitch, S&P

Rwanda at a glance

...fast growing

- 2nd fastest growing economy in Africa (7.5% p.a. since 2007)
- Most improved nation in human development in the world
- Young and growing population (~70% of population under 30)

...low risk

- 5th safest country to walk at night worldwide
- Lowest debt ratio in region & stable credit ratings
- Stable currency

...business friendly & modern

- 2nd for doing business in Africa[1]
- 1st for Government transparency in Africa
- Most women in Parliament and in a gender-balanced Cabinet in the world (respectively 61% and 50%)

...a regional platform

- Strong African hub potential; thought leader in East African region, highly connected African airline
- 3rd MICE ranking in Africa; +18 ranks in 3 years
- Growing bilingual, educated workforce (~50k tertiary grad./yr), 200 Million population in close proximate countries

...Green

- 1st mover in banning plastic bags (2008) & currently rolling out Single Use Plastic ban (2019)
- Strong footprint in responsible tourism & hospitality
- Growing agri-produce export base

1. Doing Business 2019

Sources: UN (UN-HDI), World Bank, WEF, Global and Africa Competitiveness Report, ICCA, Global Gender Gap report, Gallup, ICCA, RDB, BSC (majority 2017)

2.2

Vision for greener cities Rwanda

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Rwandan aspirations for sustainable development

2022
Starting the **EPR journey**

Rwanda has several policies and initiatives that drive forward their sustainable development ambitions. Some of these policies acted as a benchmark in the formulation of the EPR guidelines.

2018/2019

Ban issued on Single Use Plastics and implementation of **Polluters Pay Principle.**

2025

Establish strong goals such as reducing the amount of recyclable plastics ending up in landfills by **strengthening the collection and segregation systems.**

2035

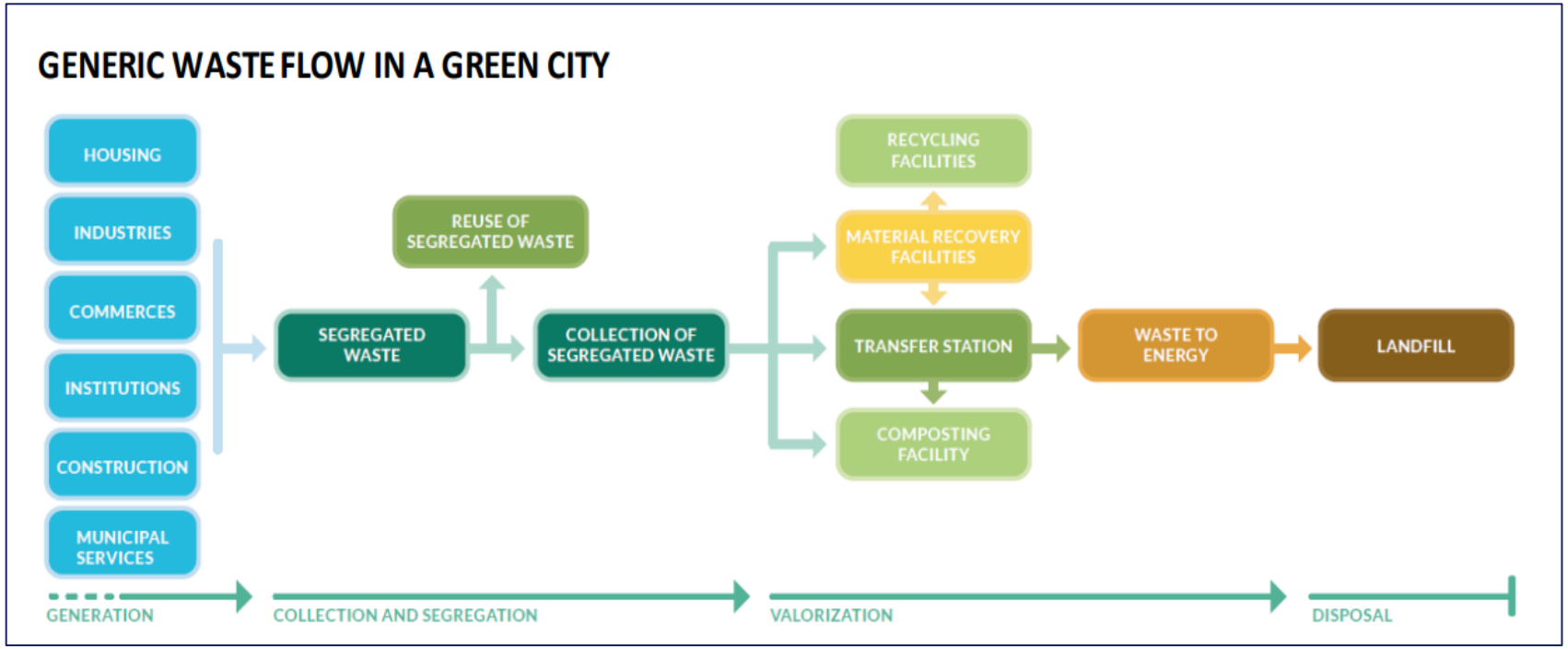
Aspires to attain **Middle-income country status** by formalizing the current informal waste sector and creating multiple avenues for employment of waste pickers.

2050

- Rwanda's vision for 2050 revolves around **achieving the High-income country status** by offering full and high-quality employment
- **Secondary cities to be Net Zero Carbon**, resource efficient and sustain a diverse and inclusive green economy which coincides with NST and hence **emphasis can be laid on adequate solid waste management.**

Green city waste flow and aspirations

- Currently, the waste management system in secondary cities is structured around partial collection, open dumping, partial recovery of recyclables by the informal sector, limited composting, and some landfilling
- By 2050, Rwanda's secondary cities will be net zero carbon, resource efficient, and sustain a diverse and inclusive green economy, offering full and high-quality employment and employing established and innovative green technologies.



2.3

Policies and rules in Rwanda

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Rwandan policies and regulations related to EPR and plastic management

2003

The Rwandan Ministry of Environment **carried out an assessment on the country's plastic problem**.

2004

In August 2004, the Government of **Rwanda introduced a ban on plastic shopping bags**, specifically targeting bags with **thickness less than 60 microns**, through awareness and education campaigns.

2008

In 2008 Rwanda introduced Law No.57/2008 **banning polyethylene bags** (Manufacturing, importation, and sale).

2019

In 2019, the existing Law No. 57/2008 was extended to form Law No.17/2019, which now included **straws, bottles, and food containers in the single-use plastic ban**.

Guidelines for granting exceptional permission for manufacture, use, import and sale of SUPs in Rwanda

Article 1:
Details person/persons entitled to apply for exceptional permission

Article 2:
Defining the eligibility criteria if plastic packaging materials for exceptional permission.

Article 3:
Defining the exclusive areas where SUP is acceptable.

Article 4:
Details of application (online or in writing) explaining the use of SUP and seeking for exceptional permission.

There should be justification that no other alternatives to SUP can be used for which permission is sought and while filing for application, a detailed plan indicating the collection, recycling/disposal of these materials within a stipulated timeframe must be indicated.

2.4

Introduction to key institutions in Rwanda

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Introduction to key institutions in Rwanda

CATEGORY	INSTITUTION	RESPONSIBILITY
Regulation	**Rwanda Environmental Management Authority (REMA)**	Mandated by regulatory instruments, REMA is responsible for ensuring proper waste management, especially plastic waste.
Regulation	**Rwanda Utilities Regulatory Agency (RURA)**	Regulate and supervise all players involved in plastic waste management activity, ensure they are operating within the legal and regulatory framework.
Policy	**Ministry of Infrastructure (MININFRA)**	Leads in formulation of policies, strategies, legislation, standards, guidelines; responsible for coordination for solid waste and radioactive nuclear waste management; overall sector performance including monitoring and evaluation; supporting different institutions in activities regarding e-waste, industrial waste, radioactive waste and healthcare waste management.
Implementation partners	**Districts and Local Government**	Districts and local governments are responsible for implementing decentralized environmental protection and management activities – including overseeing the collection of waste and its disposal.
Implementation partners	**Private waste management companies / agencies**	Take primary responsibility for waste collection, including plastic (and are usually contracted to do so by local government). A few of these companies also take part in recycling initiatives.
Policy	**Ministry of Environment (MoE)**	MoE has the responsibilities to develop laws and regulations to ensure protection of the environment and conservation of natural ecosystems, develop institutional and human resources capacities in environment and climate change, monitor and evaluate the implementation and mainstreaming of environment and climate change policies, strategies and programs across all sectors, especially productive sectors and oversee and evaluate institutions under its supervision by providing guidance on the implementation of specific programs to be realized by the institutions under its supervision and local government.
Policy implementation	**Water and Sanitation Corporation (WASAC)**	Responsible for the development, evaluation, and support of adequate technical sanitation solutions.
Policy	**Rwanda Development Board (RDB)**	RDB has the mission of fast-tracking economic development in Rwanda by enabling private sector growth in diverse investment opportunities, including sustainable packaging and recycling.
External partners	**Donors and NGOs**	Partners provide funding and technical assistance to projects with national environmental benefits.

2.5

Waste flow in Rwanda

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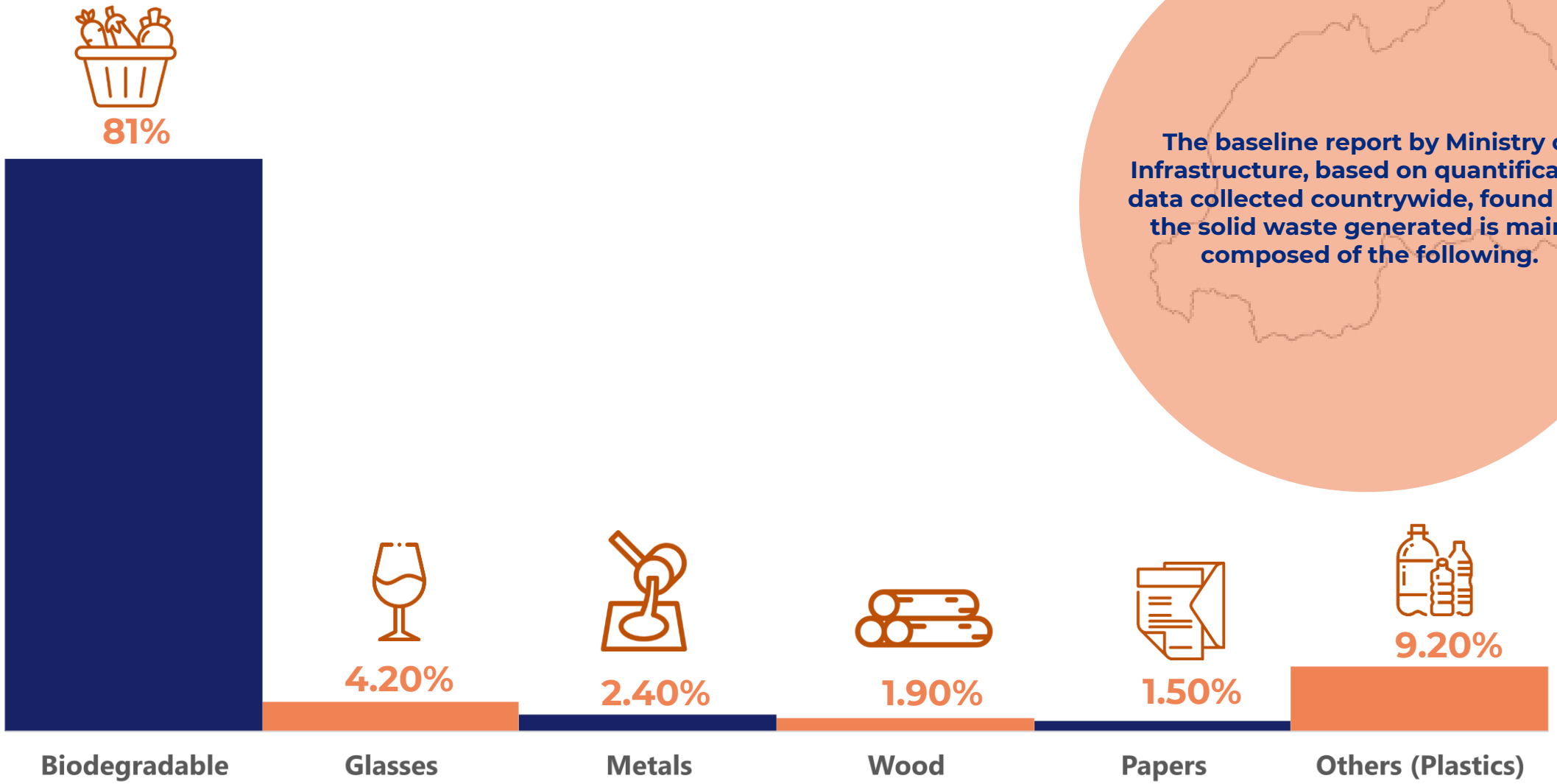
Waste value chain- In Rwanda

Composition of solid waste generated in Rwanda



The baseline report by Ministry of Infrastructure, based on quantification data collected countrywide, found that the solid waste generated is mainly composed of the following.

MININFRA Baseline waste collection Final report (003).pdf

Waste value chain- In Rwanda

Proportion of MSW collected and managed in controlled facilities – Urban Areas

Total MSW **generated** in urban areas

4546 tonnes/day

2000 tonnes/day

Total MSW **collected** in urban areas

1.6M tonnes /year

0.73 M tonnes /year

81%

Biodegradable

19%

Dry Waste

A single small recycling plant usually has a capacity to handle 5-6K tonnes of waste in urban areas, meaning that under EPR these recycling plants would be able to effectively manage and extract value out of the total valuable plastics generated.

Assuming 15% are valuable plastics, out of the waste generated and collected in urban areas (**approximately 10k tons)**

MININFRA Baseline waste collection Final report (003).pdf

2.6

Waste value chain-good practice

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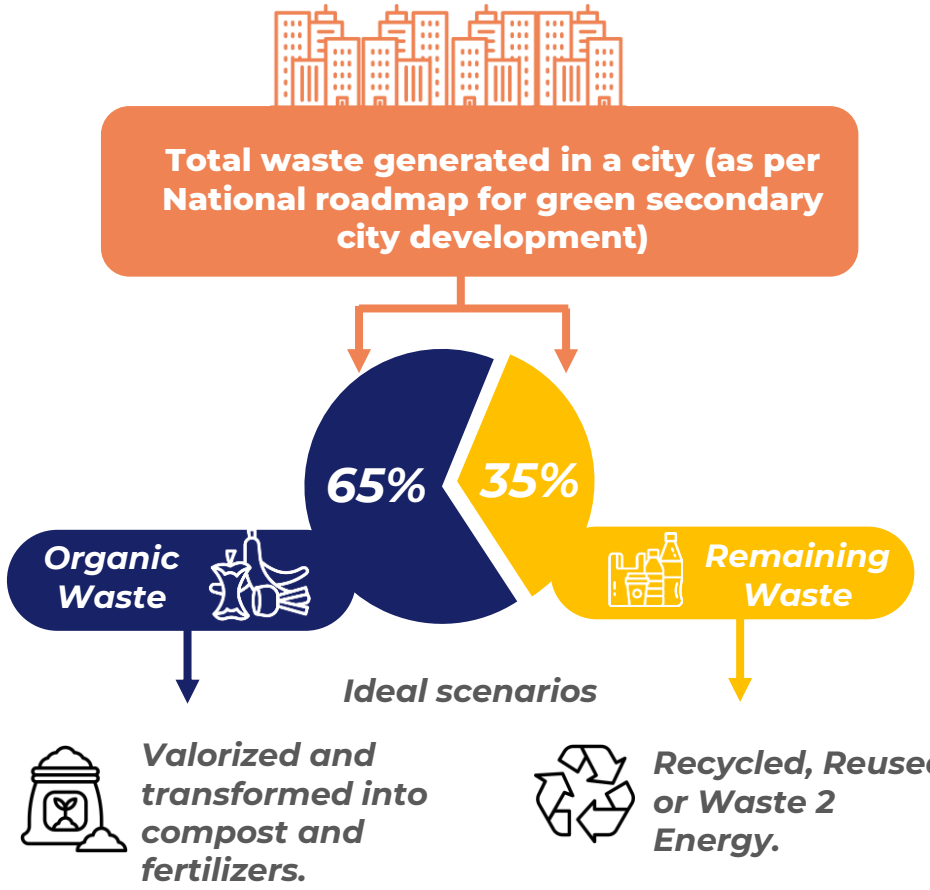
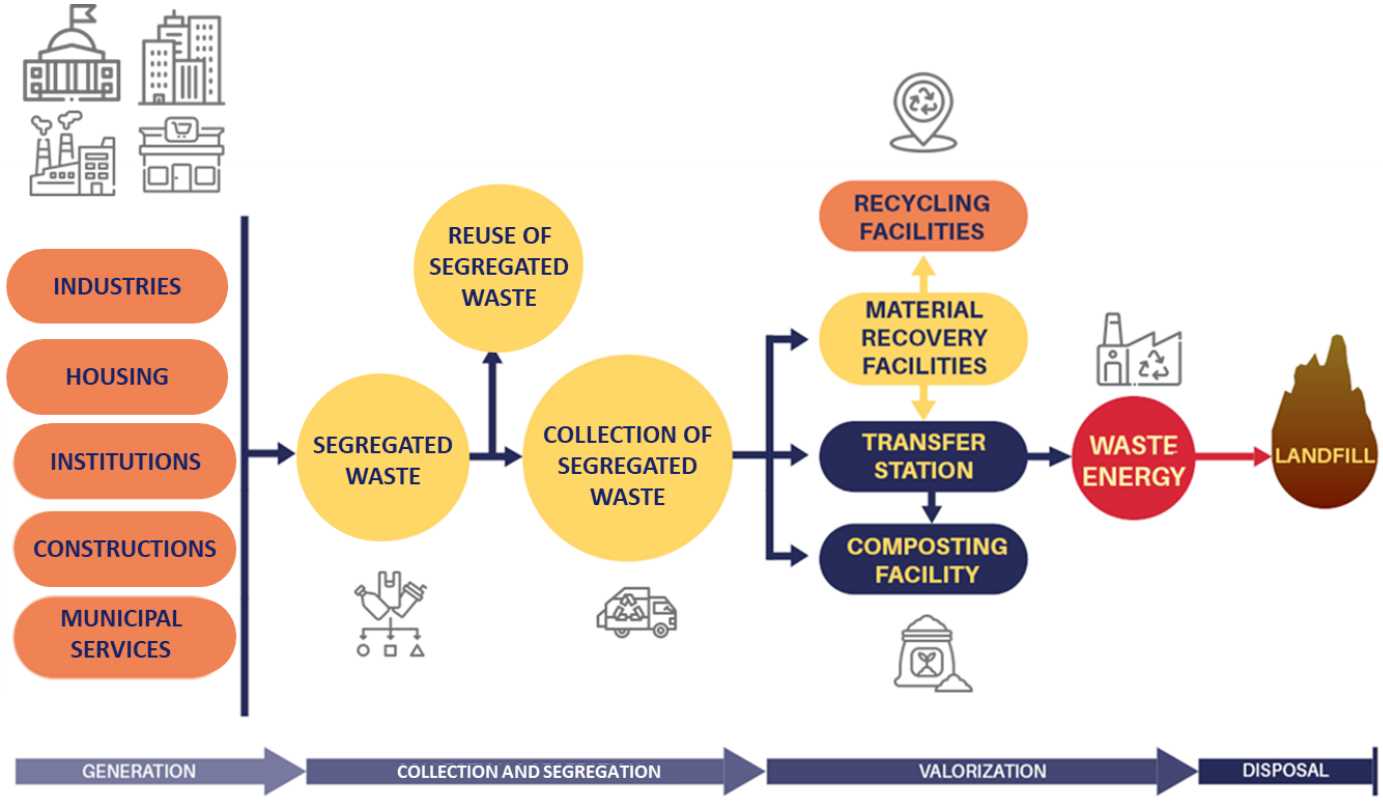
Waste value chain- good practice

Understanding the current waste flow in the city and planning its management is an important step towards green growth.



To determine a strategy to manage the flow of waste in order to attain green city concept following is our proposed waste flow which principally focusses on segregating the collected waste into appropriate categories and sending them to correct recycling streams.



Source _ https://gggi.org/site/assets/uploads/2017/12/National-Roadmap-for-Green-Secondary-City-Development.pdf\

2.7

Case study Indore vs Kigali

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Indore vs Kigali

INDORE

Population
3.1 million

Per Capita Waste
0.36 Kg/Person/Day

GDP per capita
USD 1,487

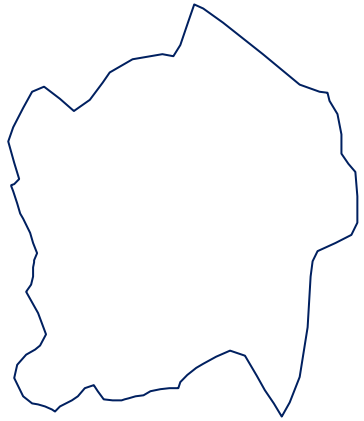
Area
276 KM^2

Population
1.1 million

Per Capita Waste
0.57 Kg/Person/Day

GDP per capita
USD 2,865

Area
730 KM^2



KIGALI

Case study: Indore the cleanest city in India

- ✓ Segregation at source
- ✓ MRF segregates dry waste sending to recycling
- ✓ Rejuvenation of landfills
- ✓ Composting / Biogas of wet waste
- ✓ Opportunities and income generation for informal waste collectors

https://www.youtube.com/watch?v=Ic9wTGo-iCM

2.8

Initial recommendations for guidelines

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Initial recommendations for EPR guidelines

A study with regards to scouting and benchmarking of regulations/rules in different countries as well as other relevant working models with respect to EPR and Plastic waste management has led to a set of initial recommendations which are tailor made from a Rwandan perspective are presented below:

- Local Government (LG) should have the lead responsibility to set up and maintain adequate collection, segregation and sorting of plastic wastes
- Hybrid models to boost more involvement i.e., combination of PRO based, and Fee based models depending on quantity of produce per year (less than or more than one ton)
- Educate and incentivise consumers for sorting their waste (Penalty amount to be determined by PTF with industry consultation).
- EPR model should incentivise keeping waste plastics in circulation in the economy at the highest value and for as long as possible in accordance with the waste management hierarchy: **Reduce> Reuse > Recycle > Recover > Dispose**
- To set up intermediate material recovery facilities (Dry waste collection centre to segregate & recover before the material goes to landfill)
- Long term financial viability (model should be self-sustaining in 2-3 years)
- Initial infrastructure (capex) and 2-year operational expense (opex) can be funded through grant/subsidy
- Infrastructure to be developed for recycling of high value plastics (rigid – PET, PP, HDPE to begin with). Infrastructure funding can happen through money collected under chosen EPR model
- Low value plastics to be processed for Energy recovery / RDF for Cement kiln/ Waste to electricity/ Pyrolysis as transition options

Section - 3

Building an EPR guideline for Rwanda

3.1

Methodology to develop guidelines

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Methodology for developing the guidelines

A. Baseline and data collection

- Review of EPR regulation
- Conducted 17 stakeholder consultations
- Benchmarking of global EPR Frameworks
- Analyzing Waste Generation & Management data (urban areas)
- Draft EPR guideline and feedback from stakeholders.
- Calculate pricing contributions, size of investment required for the sustainable program and conducted a feasibility study for EPR.
- Identify optimal model for Rwanda's EPR guidelines and present draft EPR guideline to key government stakeholders for feedback

B. Develop EPR guideline roadmap

- Developing administration and implementation processes, organization structure (PRO), one EPR Governance structure, PPP Models

- Develop a proposed timeframe for execution of key steps (EPR targets and timelines).

C. Develop monitoring and evaluation framework for EPR

- Identified key metrics defining performance of each stakeholder (e.g., E-portal, 3rd party Audits and Plastic traceability).

- Developed value proposition and incentives (e.g., setting up of an MRF, PPP model)

3.2

Stakeholder responses with respect to EPR in Rwanda

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Stakeholder responses

Organization	Outcomes of EPR policy	What's working	What's not working	Comments / Suggestions
COPED	**An environment free of problematic types of waste** like plastics and toxic waste -This will be achieved when **all producers** are aware of their responsibility beyond the use of those products and **commit to cover the cost of collection and recycling** /disposal of the generated wastes	The **privatization** of the service and the **collection** in general is working well though improvements are needed The **licensing mechanism** is working well	The **valorization part** is not working well The **sorting from the source** is not working	**EPR fee** should add enough value to the waste (PET) so that people will be motivated to collect as much as possible and sell to the collection centres. Reverse vending machines system in Europe (Germany) is a good concept
PSF	**Clear guidance** on how companies should ensure protection of environment but also protecting the companies from collapsing due to some extra cost associated with the policy Policy should be designed in a such a way that Rwandan Manufactures are disadvantaged**. Some of the existing policies and guidelines prevent Rwandan manufacturers from using certain types of materials while importers stills has the possibility to import them** (imported products packaged in materials that are not allowed in Rwanda)	**Waste collection** is well managed in communities **Efficient transport**	**Waste separation at source**	The environment authorities should - - Make policies that helps users to adjust and acquire **new technologies that are environmentally friendly** -**develop funding mechanism** that are accessible to SMEs -ensure that SMEs which represent more than 90% of our economy are catered for
MINISTRY OF TRADE & INDUSTRY	**Responsibility** of the manufacturer, importers and **retailers in waste management** **Quantifiable waste in Rwanda**	**Earmarked landfills** **Private companies involved in waste collection**	**Waste collection services are still poor** **Waste are not sorted**	-

Stakeholder responses

Organization	Outcomes of EPR policy	What's working	What's not working	Comments / Suggestions
RDB	To provide **comprehensive guidance** for the efficient and effective **management of discarded plastic materials** through appropriate legal and regulatory instruments **development of a business** niche in the waste management and recycling industry, and creation of **employment for Rwandans** To **manage PET plastic product value chain**, and the responsibility of manufacturer/distributor/consumer in the environmental protection	NA	NA	to **conduct this survey** from waste collection and recycling companies, waste management experts, the District authority and the regulatory body **which are dealing with waste collection/management activities.**
RURA	Waste generators play a critical role in waste management especially for plastic waste	Collection – Transportation is well organized	Recycling is basic	-
MOE	1. Key stakeholders are understanding the EPR principle and when and where it applies 2. **Role of private sector** in for designing viable schemes for improved end-of-life collection of waste and environment sound treatment and/or disposal/valorization 3. **Nature of incentives** and in which ways to provide incentives for manufacturers to design resource efficient and low impact products.	The whole value chain from **collection, transport and dumping** is working very well countrywide	**Sorting at source, valorization at landfill, safety of staff , waste management/collation fee collection** are areas that need improvement	-

Key takeaways from stakeholder responses

Clear Roles & responsibilities

The Government (Policy development, awareness) , Producers & Importers (follow design principles, scheme for waste collection valorisation), waste collectors (sorting), Recyclers (recycle available quantities) and Consumers

Private Partnership for waste collection

In some urban areas the local authority has partnership/agreement with waste collection companies to collect all the waste form the households to the disposal centers.

Challenges in waste collection

No segregation at source, No specialized ways of handling industrial waste, High collection and transportation costs which affect recycling, lack of financing /investment in waste

Post waste Collection

Transported and disposed to landfill (at Nduba)

Waste getting processed / Recycled

Estimate is 5-10% (no specific data)

3.3

Purpose and scope of guidelines

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Purpose and scope

- The purpose of this document is to establish guidelines for the implementation of an EPR for Rwanda, covering plastic waste exclusively. The guidelines will build on the existing REMA-PSF Single Use Plastics (PET) project and on existing legislation pertaining to the regulation of plastic waste in Rwanda.

- In the long term an EPR Law should be put in place, with clear definition of its scope, obligations of all parties etc. The EPR guideline was developed to manage the time needed to build the EPR legal framework.

- The guidelines suggest a framework for environmental levies on plastic packaging based upon the Polluter Pays Principle.

- The guidelines also states roles and responsibilities of every stakeholder under an EPR model and provide an overview of the concepts and procedures to be followed by stakeholders for successful implementation of EPR..

3.4

Material classification under EPR

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Material Classification under EPR program

Material Classification under EPR program

Categorization of plastic

Material Classification

Easy to Recycle

Bottles

Caps

Difficult to Recycle

Shrink Sleeves

Pumps

Blisters

Non-Recyclable

MLP Packets

Opaque PET

PVC Blood bags

Types of packaging

Types of Plastics

1 PETE

Water bottles, soft drinks etc.

2 HDPE

Detergent, shampoo bottles, buckets

5 PP

Bottle caps, take-out food containers

Labels, Shrink Films, Pumps

Paper lined with plastic – (Labels, Blister packs)

MLP – (Food packets, shampoo & oil packets)

1 PETE

Opaque PET
PVC – Blood bags

03 PVC

Blood bags

3.5

Proposed waste flow for plastic in Rwanda

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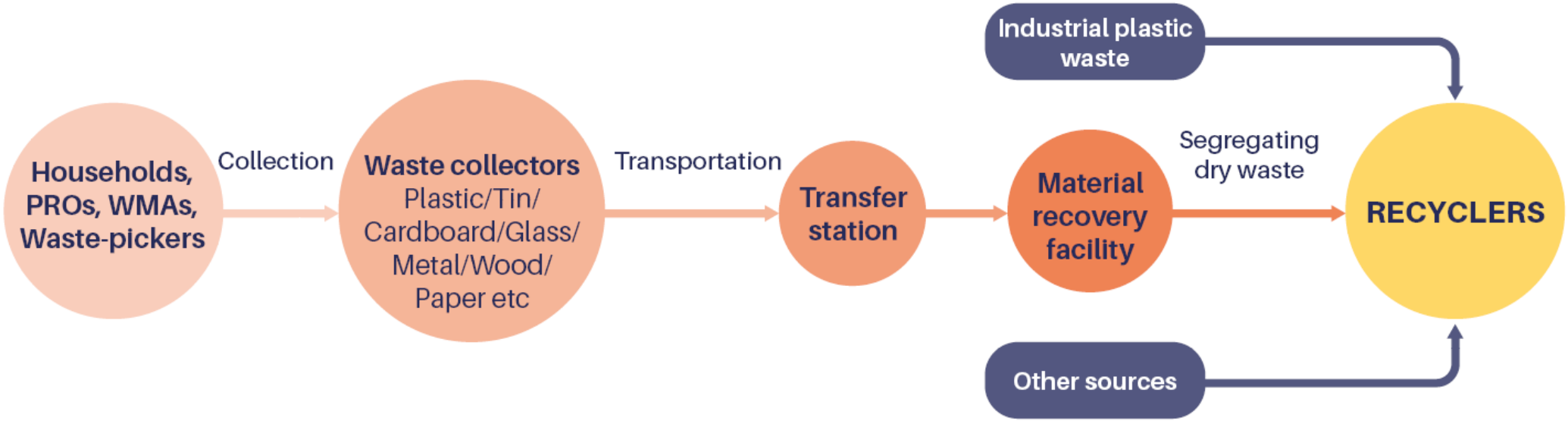
Proposed waste flow of plastic in Rwanda

Process flow of plastic waste for Rwanda



Source Segregation

Primary emphasis is laid on source segregation in order to sort the collected waste via a colour coding bin system.

Segregation at MRF

A detailed secondary segregation is done at transfer stations or MRFs where plastics are further segregated based on their recyclability.

Final Disposal

Equal emphasis is laid upon End-of-Life (EOL)/Disposal techniques to ensure complete energy recovery.

Zero Waste to Landfills

Strategically divert recyclable/energy recoverable plastic waste from ending up into landfills.

3.6

Proposed EPR payment model

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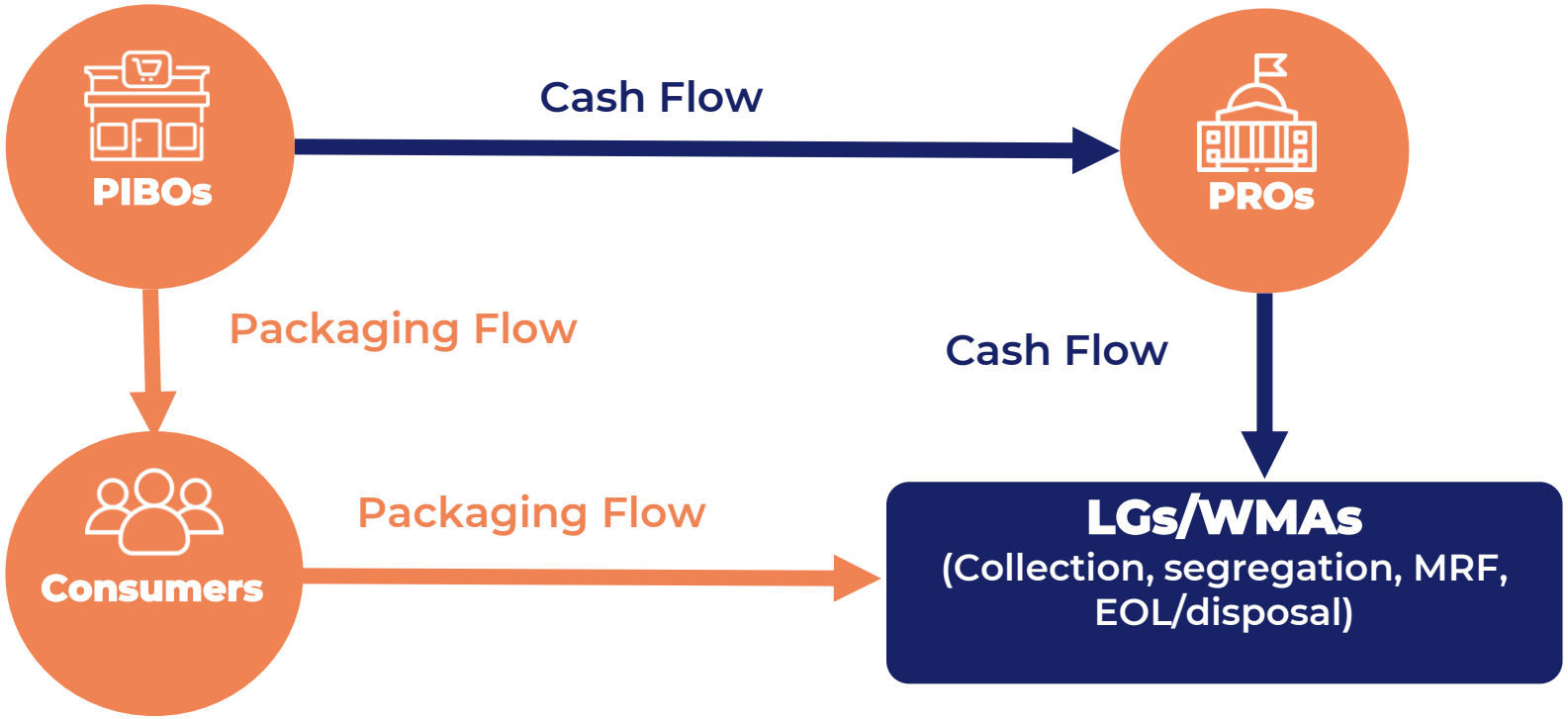
EPR payment model- PRO



Benefits

A PRO collectively takes back the plastic waste (instead of each producer taking it back individually which is strategically difficult)

Added benefit of industry experience (PIBOs), it can lead to more efficient and cost-effective model

A PRO comprised of PIBOs will be established to:

- Accurately generate and declare data
- Increase industry participation
- Manage finances
- Allocate funds
- Provide documentary evidence and verification

Recommendations for EPR fee

Recommended EPR fees based on material type

Material Category	EPR Fees
Category I: Easy to recycle	90 frw/kg
Category II: Difficult to recycle	180 frw/kg
Category III: Non-recyclable	270 frw/kg

Trends in SA/European countries have been benchmarked for EPR fee recommendations in Rwanda.

As per international best practices it's been observed that the fee of non-recyclable plastics is more than others (e.g., France). The same has been recommended for Rwanda.

The PET project was used as a reference to benchmark and arrive on the recommended EPR fees.

Reference of Costs in various EPR systems for packaging waste (prices are per tonne in 2018)

Packaging Type	Belgium	France	Netherlands	Spain
Paper packaging	25.30€	**163€**	22.0€	68.0€
Glass	27.30€	**14.20€**	56.0€	21.2€
Beverage cartons	316.40€	**247.4€**	180€	323€
plastic bottles	327.50€	**312.3€**	640€	472€
All (other) plastics	316.10€	**312.3€**	640€	472€
Non -Recyclable plastic	316.10€	**624.6€**	640€	472€

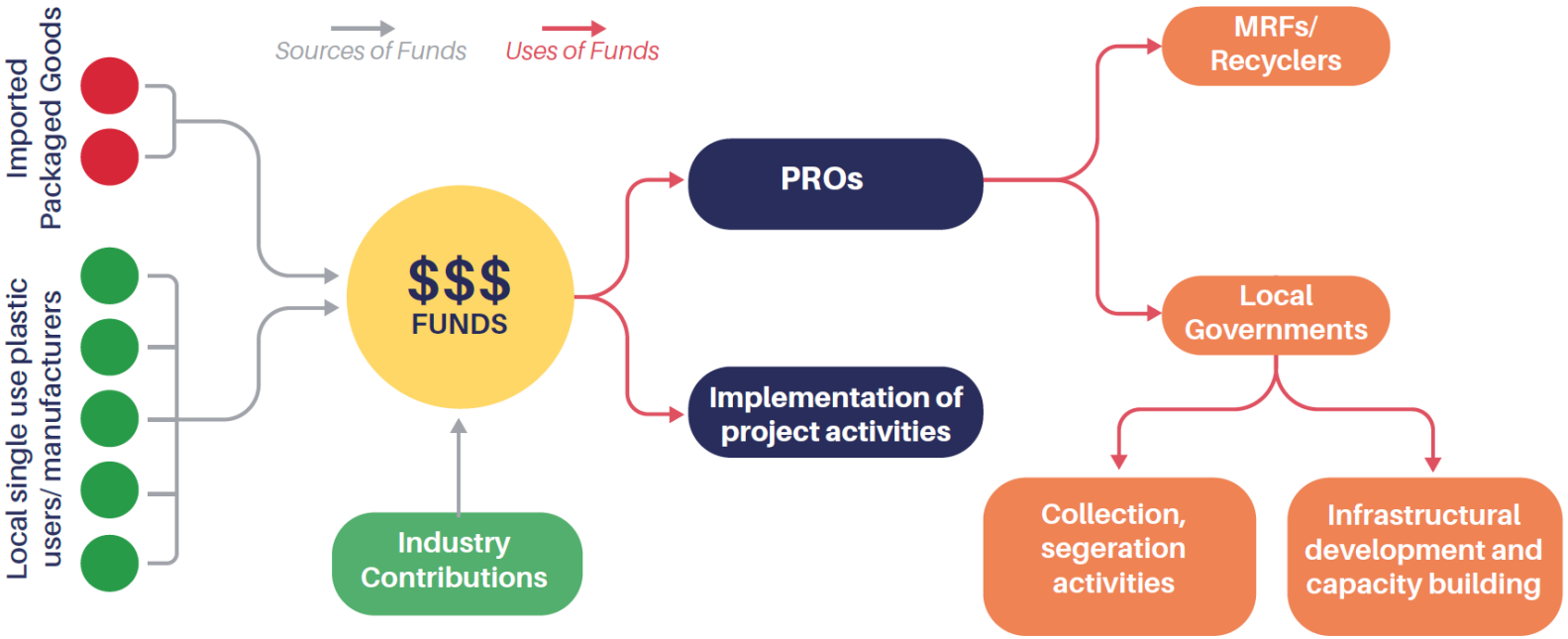
Reference costs SA

Reference of Costs in SA EPR system for packaging waste (Prices as per 2018)

ERP FEES (RAND PER TONNE)						
Material	Categories (If applicable)	2019	2020	2021	2022	2023
PET	Total EPR Fee Bottles	R 521	R 711	R 710	R 708	R 706
	Total EPR Fee edible oil	R 253	R 388	R 548	R 767	R 872
	Total EPR Fee thermoforms	R 376	R 510	R 575	R 807	R 1126
Polyolefins	Rigid and flexible	R 250	R 265	R 280	R 295	R 310
	Multi layer	R 420	R 440	R 460	R 480	R 500
	Carrier bag					
	Recyclate	R 100	R 100	R 100	R 100	R 100
	Cullet	R 41.36	R 41.37	R 43.05	R 44.98	R 46.68
	Steel	R 70	R 74	R 77	R 81	R 85
	Aluminium	R 48	R 50	R 53	R 56	R 58
Polystyrene		R 200	R 210	R 221	R 232	R 243
Vinyls		R 200	R 210	R 221	R 232	R 243
Paper & paper packaging		R 3.20	R 7.59	R 8.23	R 8.92	R 9.63
Liquid board packaging (including cups)		R 75	R 82.50	R 90.75	R 99.83	R 109.81

EPR cost distribution

Allocation of funds



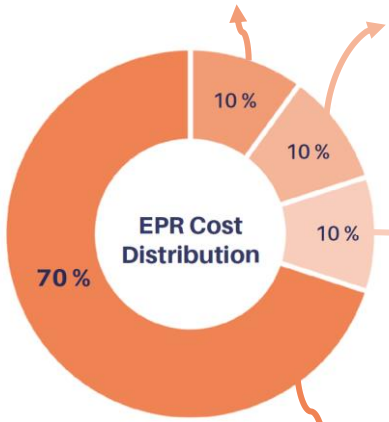
EPR funds are usually sourced from PIBOs

Funds are utilized by PROs for implementation of project activities.

PROs assign these funds to Local Government

The fund is assigned by PROs to MRFs & Recyclers/EOL disposal

Percentage contribution



As Running cost for PRO.

For IEC activities on source segregation & other training programs

With REMA/Board for activities like sponsoring programs, finding recycling alternatives etc.

For Infrastructure development.

The above mentioned are based on proposals, validation will be done on the basis of Pilot Results

Strategic framework for utilization of EPR fees

How to Utilize EPR Funds?

+/-

Impact created due to regulation of fee:

+ Less fee, Easy to recycle

- More fee, unrecyclable or difficult to recycle

Channelization of fee via PROs to LG, recyclers/EOL to fulfil EPR targets

Categorization of every packaging material- assigning EPR fee to every material

The funds can be focused to increase recyclability

Where to Utilize EPR Funds?

Basic cost criteria

Operational costs – involve costs to collect, manage and dispose of packaging waste.

Support costs in achieving scheme outcomes and targets,

- IEC
- efficiency reviews
- data gathering and reporting,
- performance incentives
- supporting local authorities in contract negotiations

EPR Advanced cost criteria

Infrastructural development and capacity building

Exploring advanced chemical recycling technologies.

Further technological developments can be made in terms of chemical recycling

Enhancing/ Improvising the current mechanical recycling technologies

Costs of additional downstream activities

3.7

Proposed EPR design for Rwanda

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Proposed EPR design for Rwanda- recommendations

Key principle element	Description
Circular economy	❖ Incentivise keeping waste plastics in circulation in the economy : Reduce> Reuse > Recycle > Recover > Dispose. ❖ Incentivise segregating waste at source. ❖ Aim to become zero plastic waste to landfill by 2030– ZWTN: Zero waste to Nature Program.
Stakeholder roles and responsibilities	❖ LG should have the lead responsibility to set up and maintain adequate collection, segregation, and sorting of plastic waste. ❖ An EPR task force shall be launched in order to monitor the on-ground .EPR Task Force = Plastic Task Force (PTF) + User Industries.
Implementation Model	❖ Effective and efficient implementation of EPR guidelines through the PRO model as it has a structured allocation of responsibility onto each stakeholder.
EPR fee and its utilization	❖ Fund initial infrastructure (capex) and 2-year operational expense (opex) through grant/subsidy. ❖ Ensure long-term financial viability (model should be self-sustaining in 2-3 years). ❖ Develop newer alternatives such as Energy recovery/RDF for Cement kiln/Waste to electricity/Pyrolysis in order to manage and extract value from Low value plastics (MLP, opaque PET etc).
Infrastructure and capacity building	❖ Set up MRFs (dry waste collection centre should segregate & recover the material before it goes to landfill). ❖ Develop infrastructure for recycling of high value plastics (rigid – PET, PP, HDPE to begin with). Infrastructure funding can happen through money collection under EPR program. A phase-wise approach for plastic waste recycling and recovery has been proposed.
Monitoring and traceability/transparency	❖ Request mandatory declaration of footprint by PIBOs.
Spreading awareness (IEC activities)	❖ Educate and incentivise consumers for sorting their waste. Areas/societies where sorting is not done should be charged penalty or denied waste collection. (Penalty amount would be determined by Plastic Task Force (PTF) with industry consultation).

3.8

Proposed targets and timelines

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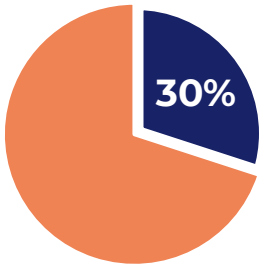
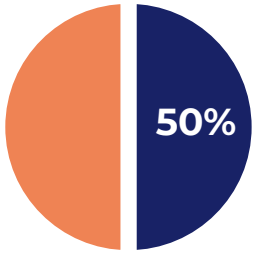
Proposed EPR targets and timelines in Rwanda

STAGE I



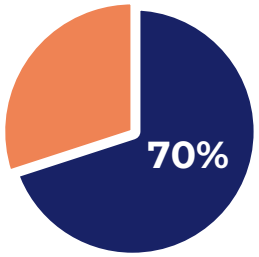
2022-2024

STAGE II



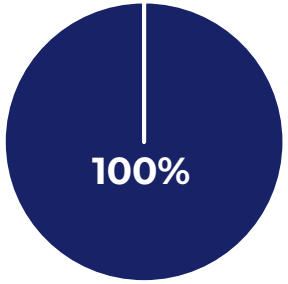
2024-2026

STAGE III



2026-2028

STAGE IV



2028-2030

Phase 1

Scoping

Identify the **total amount of plastic generated** and who the **generators** are.

Collect the **data** about the **quantity of obligated plastic collected, segregated, and recycled/reprocessed** prior to the beginning of EPR program.

Estimate a consolidated **recycling and recovery target** for packaging formats **based on the collected data**.

Set **EPR Targets** aligned with **industry body consultation**.

Phase 2

Implementation

Lay out **mandatory regulations** to ensure recovery of recyclable and energy recoverable plastics.

Emphasize source segregation by IEC activities, providing incentives and imposing penalties.

Develop the infrastructure of MRFs and recycling facilities.

Section - 4

Roadmap for implementation

- 4.1 Implementation roadmap
- 4.2 Conduct a baseline assessment of waste in Rwanda
- 4.3 Define roles and responsibilities
- 4.4 Set up EPR task force
- 4.5 Setup and register PROs
- 4.6 Agree fees and targets
- 4.7 Setting up MRFs
- 4.8 Setting up E-portal
- 4.9 Developing an EPR monitoring mechanism
- 4.10 Develop and execute communication plan

4.1

Implementation roadmap

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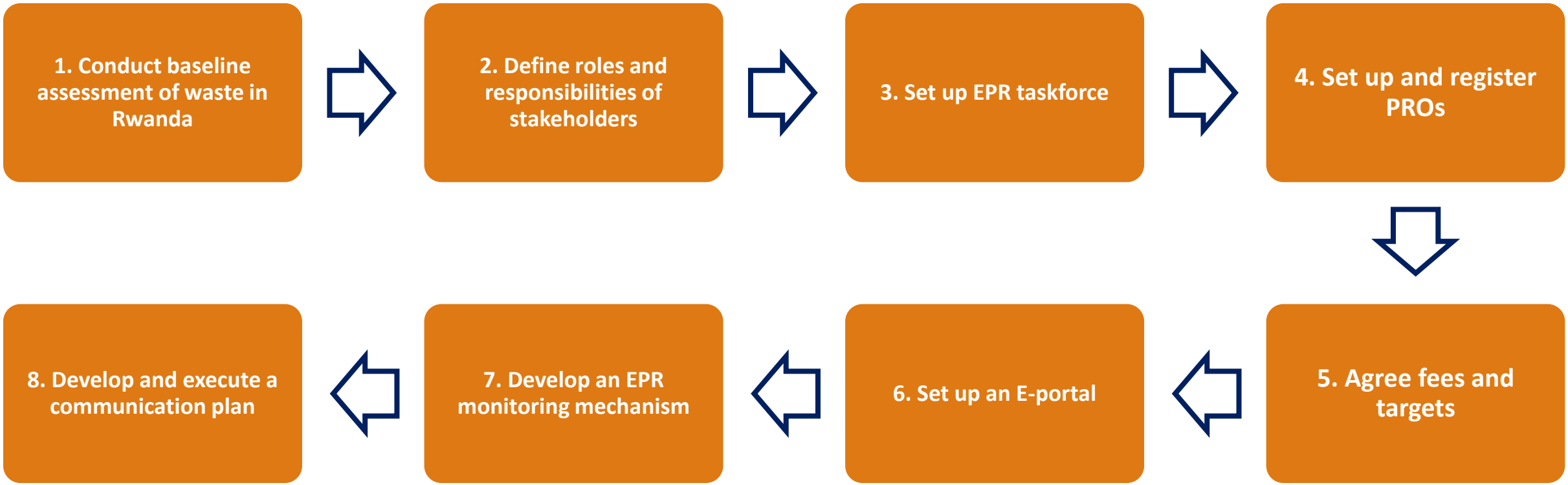
Implementation roadmap



4.2

Conduct a baseline assessment of waste in Rwanda

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Baseline assessment

Responsible authorities: REMA / MININFRA, contracted auditor

Audit of primary and secondary cities in Rwanda

The baseline assessment will help with the following data such as:

- Amount of plastic waste generated in each primary and secondary cities.
- Type of plastic waste generated in these cities.
- Already existing waste management practices in these cities.
- Additional required infrastructure to manage the generated plastic waste in these cities.
- Investment required to set up the additional infrastructure and capacity building.

Audit should be contracted to a third-party agency, e.g., a waste management company. Audit should consist of total waste generated, plastic waste as a percentage of total waste, and categories of plastic waste generated (PET, PP etc.)

Detailed mapping by the auditor of the complete lifecycle of plastic waste up to the EOL stage.

4.3

Define roles and responsibilities

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Roles and Responsibilities

Responsible authorities: REMA, Stakeholders involved

Producer Responsibility Organization

- Register all obligated PIBOs & collect data on types and qualities of obligated plastics supplied into the market.
- Provide EPR Task Force with details of PIBOs & specifics of plastics introduced into the market.
- Establish and maintain national specific registry of obligated plastics generated and plastic waste management mass balance report.
- Develop a city/district specific waste management plan.
- Develop and maintain guidelines available to producers for sustainable packaging design.
- Collect EPR fees from producers

Manufacturer and PIBO

- Manufactures- Companies engaged in manufacturing of plastic.
- PIBOs- Companies using plastic packaging (primary and secondary packaging e.g., bottles, pouches, sachets, pockets, jars, tubes, etc.) as well as industry using bubble wraps and other similar plastic material for wrapping.
- Report details of plastic introduced into the market.
- The EPR/recycling targets need to be met either individually or collectively through PROs/WMAs and submit annual reports to REMA/EPR task force.
- Contribute to EPR fund.

Recycler

- Includes collection agencies, cement co- processors, waste to energy plants, road construction on mixers
- Register with EPR Task Force and PRO and provide periodic reports and data as required.
- Submit proposals and bids to the PRO to provide services.
- Manage plastic waste in a manner consistent with guideline and the PRO program requirements.
- Approach the PROs with an efficient plan to recycle /recover plastic and get funds from the EPR fee, to waste management scheme proposed.

Roles and Responsibilities

Responsible authorities: REMA, Stakeholders involved

Waste management agencies

- NGOs, LG, & waster picker associations are individually responsible for meeting targets for the PRO, Manufacturers, and Producers.
- Establish support from LG for the allocation of space for setting up infrastructure and capacity building.
- Take primary responsibility for plastic waste generated in their facilities
- Plan with LG for collection and segregation of their plastic waste.
- Register with and provide reports to REMA and PRO.
- Engage WPs and create the opportunity for them in formalized waste management systems.

Local government

- LG retain accountability for contracting waste collection services.
  - promoting source of segregation
- LG is accountable for creating delivery of waste to the Dry Waste Collection Centres (DWCCs)/MRF.
- Set up and maintain adequate capacity for collection, segregation, and sourcing of plastic waste consistent with the approved country plan.
- Provide access to sorting equipment and technologies to WPs.
- Provide reports to the EPR monitoring board and PRO.

Pollution Control Authority/REMA

- Register /authorise the PRO.
- Approve an integrated national & local PRO implementation plan.
- Identify and take enforcement action against PIBOs that have not registered.
- Undertake independent audit of PIBOs
- Prepare annual report on the use and management of plastic waste.

4.4

Set up EPR task force

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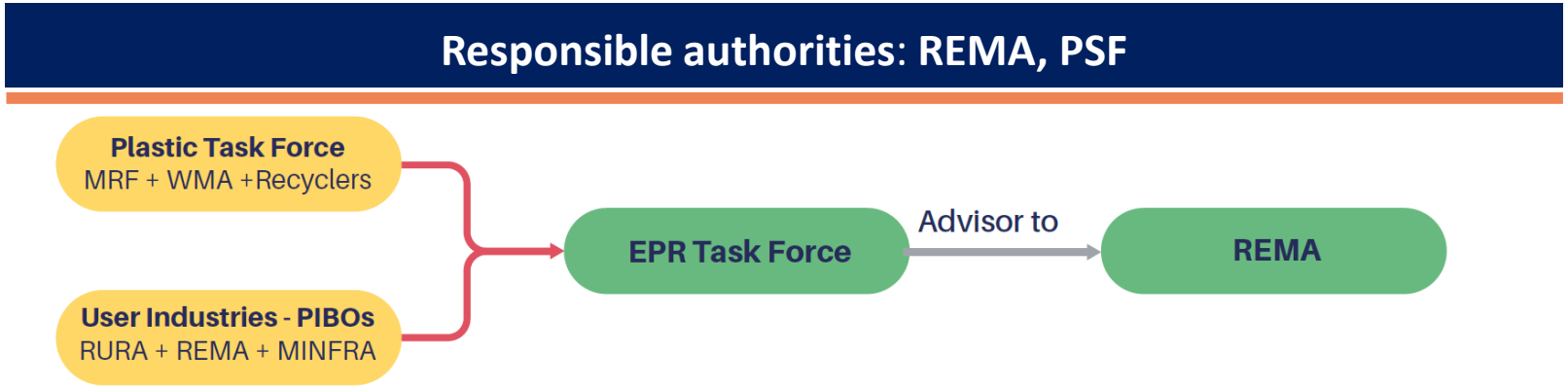
Setting up EPR task force



- The current PET steering committee can be built on and used as a benchmark to set up the EPR task force while initiating more involvement from all types of stakeholders (User industries/PIBOs)
- The Plastic Task Force will consist of Material Recycling Facilities, WMAs, Recyclers.
  - The Plastic Task Force will provide inputs basis the groundwork happening for waste collection and also to increase collection and recycling rate of plastic waste.
- User industries will include PIBOs & Rwanda Utilities Regulatory Authority, Rwanda Environment Management Authority, Ministry of Infrastructure.
  - The User industries will provide inputs on infrastructural development and capacity building required for waste management, recyclability of different packaging formats, EPR fee and targets.

1. Lead on implementation and ensure strategic guidance
2. Have members from PIBOs, government officials and WMA to support plastic waste management
3. Validate EPR targets of PIBOs who have registered in the National Portal.
4. Provide inputs and strategy for infrastructural development and scaling up of technologies.
5. Validate the data/reports from external audits.
6. Suggest improvements

4.5

Set up and register PROs

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Setup and register PROs

Responsible authorities: REMA, EPR task force

To start the implementation with a single PRO (PSF) and going forward to select multiple PROs in the future.

PROs will be registered in REMAs E-portal to carry out the legal requirements on behalf of their member companies.

PRO registration will provide information on experience of PRO, its interest, capacities in terms of manpower net worth, its willingness to work in a specific State/ area etc.

Its registration may be divided into 3-4 groups based on their experience in the field. However, start-ups can also register on the website as PRO.

- Group 1 PRO: PRO who have experience in waste management sector more than 10 years
- Group 2 PRO: PROs who have an experience of 5 years
- Group 3 PRO: PROs with experience of 2 years
- Group 4 PRO: Start-ups or PROs with less than 2 years of experience

4.6

Agree fees and targets

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Agree fees and targets

Responsible authorities: PROs

Agreeing on EPR fee and targets based on **Industry Consultation.**

Industry consultation will revolve around agreeing on implementation plan for EPR which would involve:

- Agreement of PIBOs on the yearly EPR targets set.
- Agreement on the EPR fees on all three categories

The EPR fee is modulated based on type of material, the ease of collection, sorting to recycling process.

As environment levy is in pipeline (no mandatory levy currently) - an EPR fee structure should be followed where PIBOs are charged as per the material categorization (Easy to recycle, Difficult to recycle, Non-recyclable)

Similarly, EPR Targets too are based on consultation with industry (PIBOs).

4.7

Setting up MRFs

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Setting up an MRF

MRFs are integrated waste management facilities required in a city to extract the recyclables from the inflow of MSW.

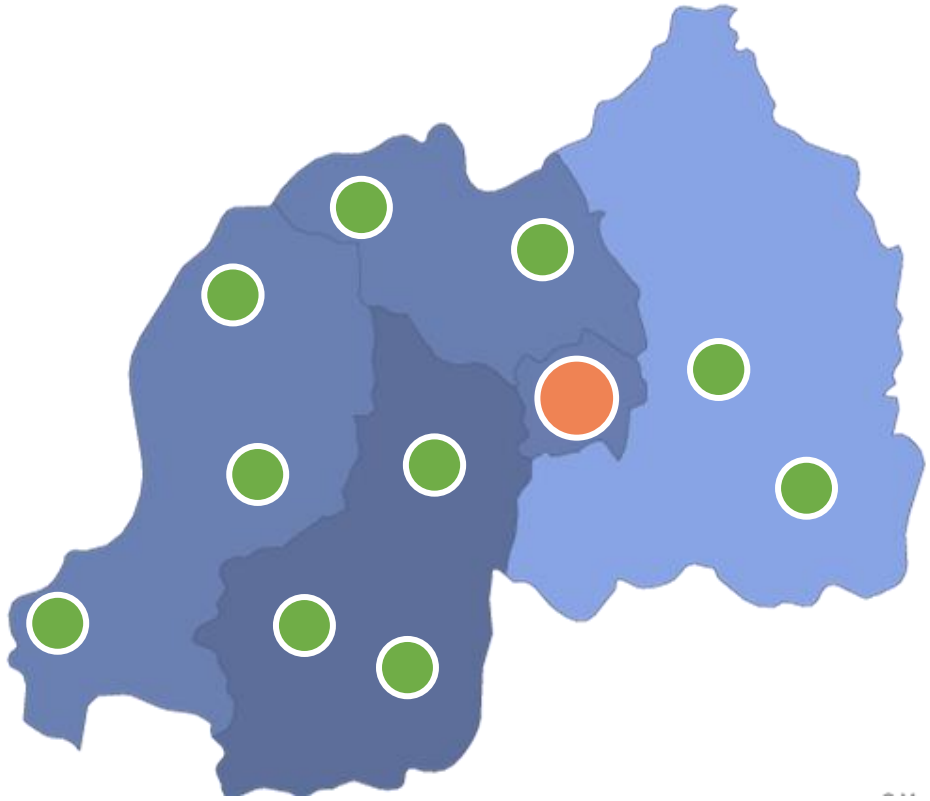
Backed by advanced machinery and waste pickers to recycle all kinds of plastic waste along the value chain.

Size

MRFs are designed based on two important criteria

i. Population to be catered
ii. Quantum of waste generated

Sr.No.	Population	Per day capacity of the MRF (max.)	Required space
1	**Less than 50,000**	15 MTs of dry waste	2,000 sq. ft.
2	**50,000 to 150,000**	30 MTs of dry waste	3,000 sq. ft.
3	**Above 150,000**	Centralized processing centre with multiple decentralized dry waste collection centres	5,000 sq. ft. and above



Example of a MRF in Uttarakhand India

https://www.youtube.com/watch?v=2p1AfmF9Ipg

Waste process flow at MRF

1. Waste Inflow from:
- Dry Waste Centres
- Aggregators Bulk
- Generators (Hotels, Companies, Market)
- Pre-Consumer Waste from PIBOs.
- Educational and Commercial Places

2. Weighing In
Weighing in the incoming waste and record it.

3. Sorting/ Segregation:
The conveyor belt eases the process of sorting/ segregation & reduces the workload on the workers.

4. Air Blower
Machine removes dust and other contaminants

5. Shredder:
Involves shredding up of dusted plastic into flakes, hence preparing them for recycling

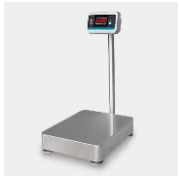
6. Baling Machine
Compressing high volume of plastic waste into rectangular bales which helps to bind them.

7. Forklift
Transport of baled plastic waste from one place to another within the MRF.

8. Weighing out
Weighing out of the outgoing waste and recording the same.

9. Waste Outflow To:
Recyclers Waste to Energy Plants
Cement Kilns Road constructions and bricks.

Required process/equipment at MRF

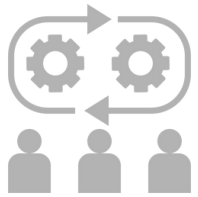
PROCESS	EQUIPMENTS NEEDED	PROCESS DETAILS
Waste Inflow and Weighing Machine		The inflow waste carrying vehicle is first weighed at the weighbridge or weighing machine depending on the quantity of waste. The incoming waste is recorded daily in manual and digital systems.
Segregation and Sorting		The plastic is segregated and separated
Air Drying Machine		The sorted/segregated waste is cleaned using an air blower to remove the soil from the plastic.
Shredding Machine		The cleaned plastic films/multi-layered plastics (MLPs) are baled or shredded for value addition and for ease of storage and transportation.
Forklift		The forklift will safely transport the baled plastic materials from one point to another inside the MRF and help in loading of plastic waste for transport to end of life processes
Baling Machine		The baled plastic is stored or sent to cement kilns for co-processing

Cost to setup an MRF

Total estimated cost to set-up the MRF

€15,000-20,000

COST INCURED	AMOUNT (EUROS)
MACHINERY/EQUIPMENT	
WEIGHING SCALE	2200
AIR BLOWER	3500
SHREDDER	3400
BALER	6400
FORKLIFT	300



COST INCURED	AMOUNT (EUROS)
OPERATIONAL EXPENSES	
REJECT WASTE DISPOSAL	480
VEHICLE FUEL & MAINTENENCE	290
TOOLS & EQUIPMENTS	40
SAFETY EQUIPMENT	65
MISCELLANEOUS	200

COST INCURED	AMOUNT (EUROS)
OTHER ONE TIME EXPENSES	
OFFICE SET-UP	240
COMPUTER/LAPTOP	600
FIRE EXTINGUISHERS	125
FIRST-AID KIT	65
UNIFORMS & SAFETY GEAR	140

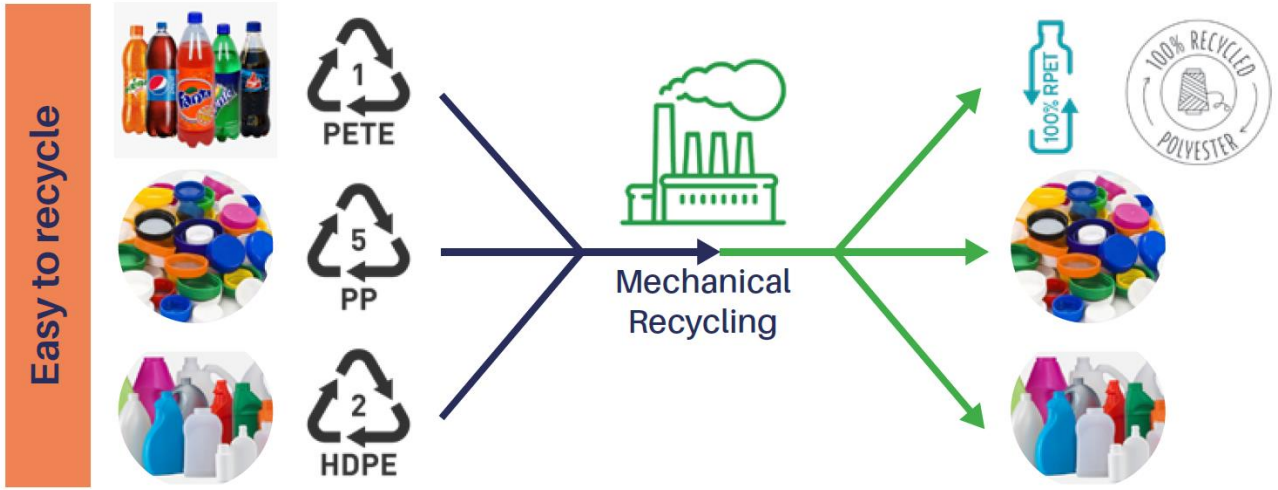
All costs above are estimated and may differ from the exact value. The suggested MRF is for medium scale operations that can handle waste up to 30 metric tons.

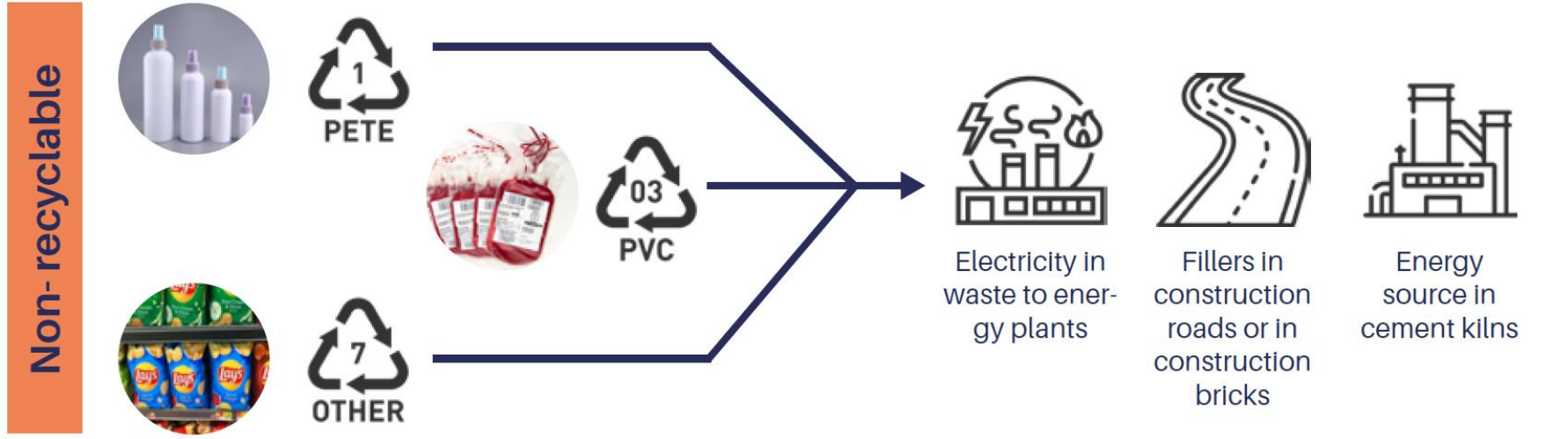
Phase wise approach for waste processing

PHASE I : Involves development of basic recycling technologies for conversion of waste and giving a second life to it, hence promoting the circularity of plastics

Phase I- Focus more on already existing recycling technologies and capacity building for increasing the volumes of recycling.

Also, handling non-recyclable plastics by employing energy efficient end-of-life disposals.





Phase wise approach for waste processing

PHASE-2 : Involves development of more advanced recycling technologies for conversion of waste back into its original state.

Phase II- Develop technologies for managing Difficult to recycle packaging materials specifically towards chemical recycling.

Difficult to Recycle

5 PP

4 LDPE

5 PP

4 LDPE

5 PP

7 OTHER

These difficult to recycle packaging materials can be recycled via:

- Pyrolysis
- Hydrogenation
- Gasification

Further phasing out of plastics that are non-recyclable/non-energy recoverable

4.8

Setting up E-portal

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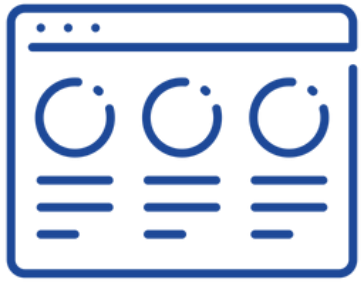
Setting up E-portal



Introduction:

An E-portal is a digital platform which is brand and product category neutral . As there are multiple stakeholders involved in EPR, an E-portal system can facilitate data management and the operationalization of EPR, as well as ensure transparency and end-to-end traceability of waste.

Obligation:

All PIBOs designated under the Guidelines must report on the quantities of all types of plastics supplied into the market, both domestic and imported onto the E-portal. PIBOs shall submit the returns to the REMA on half-yearly basis.

Setting up E-portal

Responsible authorities: REMA

Stakeholders	Data Declared
Waste generators (PIBOs, Bulk generators, Industrial Waste)	Amount of plastic waste generated
PRO will declare the data after receiving the supporting data from the below stakeholders, namely	
Collection & Pre-processing (MRF, Aggregators)	Amount of plastic waste collected, segregated, and disposed
Recyclers	Amount of recyclable plastic that can be reused and sent for recovery
Cement kilns, Waste to Energy plants	Amount of non-recyclable plastic

A user-friendly interface

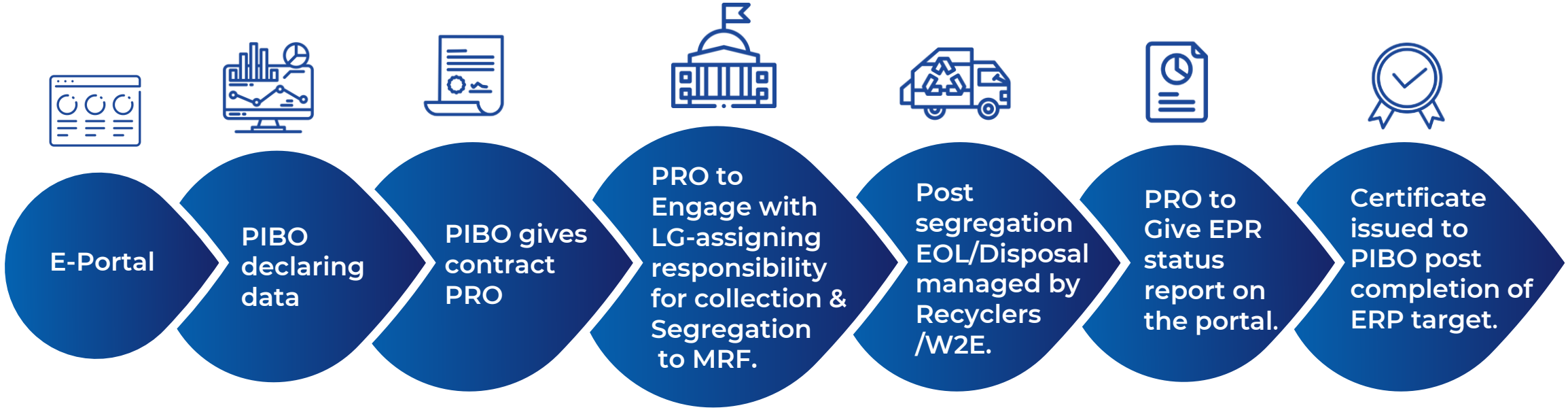
Actionable alerts regarding the progress of EPR activities in order to track fulfillment progress in real time

PIBOs can declare the completed targets which can be backed by PROs documentation.

PIBOs can protect their individual data from other PIBOs.

Setting up E-portal

Steps to describe functionality of the E-portal:



Step 1:

REMA sets up an E-portal with an easy user interface.

Step 2:

PIBOs register themselves on the E-portal and then declare their data.

Step 3:

The E-portal allows for PIBOs to engage with one/many PROs.

Step 4:

E-portal enables PRO to plan material channelisation (via LG, MRF, Recyclers/Co-processors).

Step 5:

PROs can form an action plan and engage with LG.

Step 6:

All the data related to collection segregation and EOL/disposal will be uploaded onto the E-portal post the completion of EPR targets by PROs.

Step 7:

A certificate will be issued by REMA to the PIBOs post the data submission.

4.9

Developing an EPR monitoring mechanism

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Developing monitoring plans

Responsible authorities: REMA and EPR Taskforce

Guidelines to setup a monitoring system:

- Reporting of Packaging material that are introduced or placed onto the market by PIBOs
- Flow of packaging material involving collection, sorting, recycling/W2E data onto E-Portal
- Ensure the quality of the data reported – by conducting annual audits
- Setting up a quantitative baseline of volume of plastic being recycled
- Methodology to monitor the effectiveness of the plastic waste recovery system.
    i. No. of PIBOs and WMAs registered
    ii. No. of PROs or WMAs working in each LG level
    iii. Quantity of waste collected against target
    iv. Establishing a periodic monitoring system
- Free riding is prevented (via E-portal and conducting annual 3rd party audits)
- All stakeholders, particularly producers and PROs, are fulfilling their EPR obligations effectively and fairly.
- EPR fees are paid by producers and used appropriately by PROs.

Reporting

A half-yearly or annual report should be generated by the EPR Taskforce and submitted to REMA. The report should include information on:

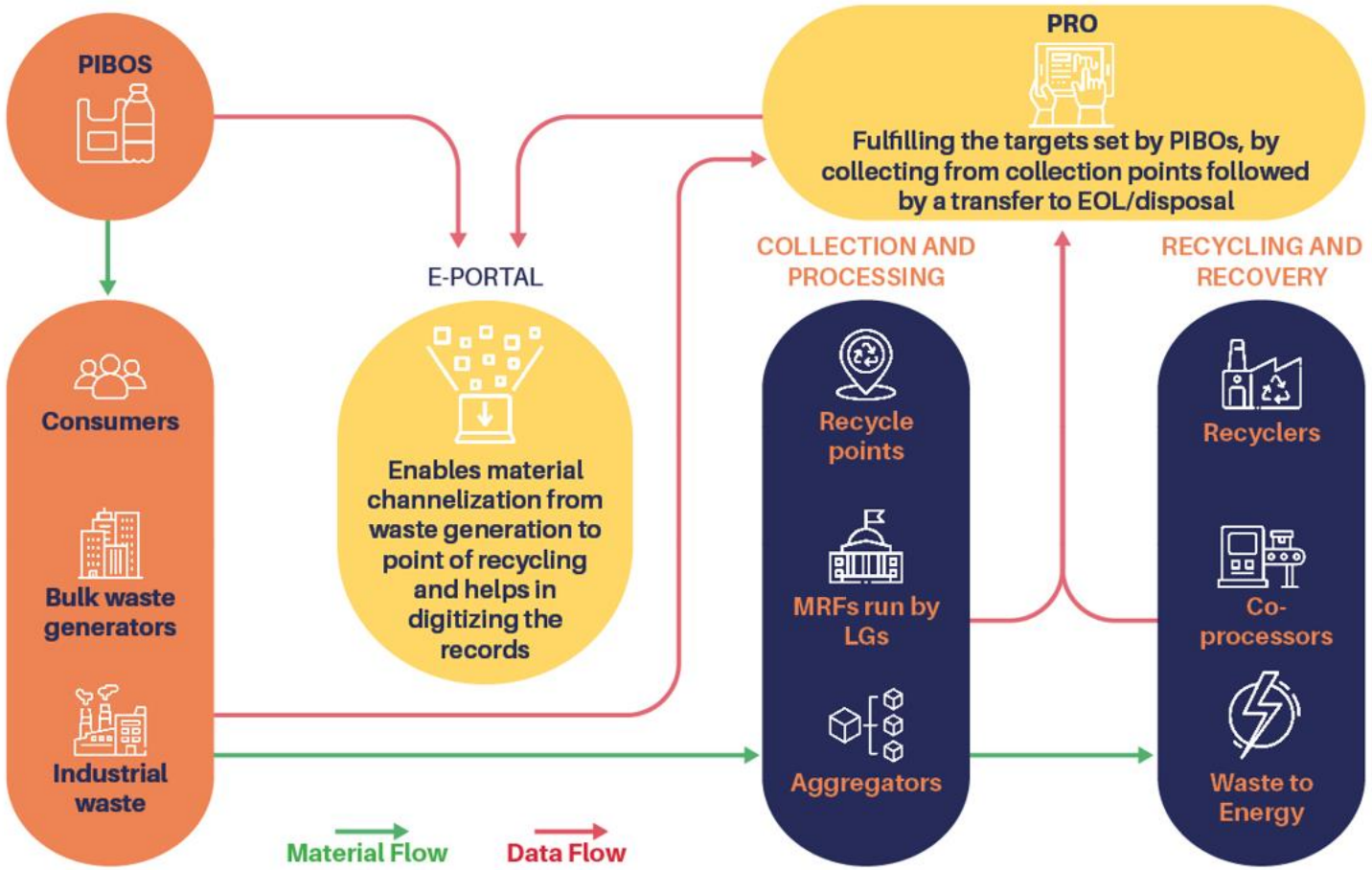
a. How programme costs have been shared across the waste management supply chain and with local government.

b. What incentives are being provided (e.g. no/reduced fee) for all producers to make changes in plastic packaging design by opting for sustainable materials.

c. Progress monitoring at each LG level through the E-portal.

d. Suggestions from PROs, LGs and WMAs, based on the field experience, on ways to improve plastic waste recovery

Monitoring and traceability via E-portal



Material Flow:

- **PIBOs will sell their products to the consumers**, who become waste generators after utilisation of the product and this **waste is transferred to the LGs for collection**.
- **Segregation** activity occurs **at transfer stations** and/or **MRFs**.
- After segregation, the **waste is transferred to the appropriate recycle streams** and/or to **cement kilns** or **W2E plants**.

Data Flow:

- **PIBOs** will **register** and **declare** their **data** on the **E-portal.**
- The declaration of data by PIBOs helps in **setting up their EPR targets.**
- Once the PIBOs assign a PRO, the **PRO will submit the appropriate documentation** to indicate the **progress of achieving EPR targets.**

Monitoring via audit system

- First step of monitoring activity, done post declaration of the data by PIBOs.
- Necessary step in order to certify/authorize if the data declared is authentic.

WHAT IS AUDITED?	WHO IS AUDITING?	WHY IS AUDITING REQUIRED?
Audit of PIBOs	3rd Party	To verify data generated by PIBOs
Audit of WMAs	3rd Party	To verify the credibility of work done by PROs
PRO (Finance Audits)	3rd Party	Ensure collection and distribution of waste & also complete traceability of how much waste is being reduced in landfills.
Waste Collectors	3rd Party	To quantify the total amount of plastic waste collected & segregated from the total waste collected.
MRF	3rd Party	
Recyclers	3rd Party	To know the total amount of recyclable plastic processed which can be reused.
Energy Recovery Facilities	3rd Party	To know the total amount of Non-recyclable plastic processed from the total collected plastic waste.

All the above entities need to be registered with REMA & declare their data on E-portal. REMA will be responsible for carrying out periodic reviews based on the data declared on E-portal.

4.10

Developing and execute communication plan

This study has been funded by UK aid from the UK Government; however, the views expressed do not necessarily reflect the UK government's official policies

Develop and Execute Communication Plan

- Awareness drives for waste segregation under EPR must be held across Rwanda by all stakeholders.
- Efforts should be made for cooperation between the LGs, Manufacturers, PIBOs, PROs, and WMAs for increasing awareness among the public on their responsibility to segregate waste at the household level and the benefits of waste segregation at source
- Educate consumers through sustained and ongoing education programmes on how to sort waste properly. Provide feedback to consumers (residential, commercial, bulk generators etc.) on their actual performance.
- Specific communication and training activities may be undertaken together with LGs for raising awareness / influencing behavioural change on waste management.
- Encourage the mainstreaming, inclusivity, and formalisation of the unorganized sector of waste pickers. The PROs themselves (or in partnership with WMAs) should make investments in raising the dignity and respect of these individuals (e.g., helping them get identity cards, opening accounts, bank linkages, getting health cards, pensions etc.) This will improve waste pickers' welfare and human capital valuation.

An industry example- Source segregation by Unilever

https://www.youtube.com/watch?v=uMd8pHjab-M&t=8s

Section - 5

Pilot in Rwanda

- 5.1 Aims and objectives/ Key focus areas
- 5.2 Building an EPR program from PET pilot
- 5.3 Recommendations for pilot

5.1

Aims and objectives/key focus areas

This study has been funded by UK aid from the UK Government; however, the views expressed do not necessarily reflect the UK government's official policies

Aims and objectives/ Key focus areas

Objectives/Aims of the Pilot

To demonstrate the viability of the proposed EPR in Rwanda, the core of this pilot is to include all the types of plastic waste to develop an integrated national waste management strategy where waste processing centre to be established at Kigali via country wide fee collection.

To develop a multi-stakeholder partnership which can serve as a blueprint for further replication in primary and secondary cities of Rwanda.

Key focus areas for pilot in Rwanda

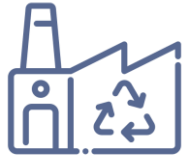
Source Segregation

Segregating plastic waste into ascertained categories for effective recycling/EOL

Effective Waste Collection

Collecting all categories of plastics being introduced into the market by PIBOs

Setting up MRFs



Collected dry waste comes to MRF where it is segregated, baled and sent to recycler for recycling, non recyclable waste sent to cement / energy recovery
% of recyclables and % of non recyclables can be ascertained

Strategic Planning

Planning the number of MRFs, Recycling plants and W2E plants strategically in such a way that the logistical cost for transportation of the waste should be bare minimum

5.2

Building an EPR program from PET pilot

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Building an EPR program from the PET pilot

Baseline Data

PET Project

PET Project aims to develop an inventory of waste resources

Expansion of PET project via EPR Guidelines

- Expansion of the waste resource inventory by conducting audits. Audit should consist of land-mining/waste generation studies with the following data assessed: total waste generated, plastic waste as a percentage of total waste, and categories of plastic waste generated (PET, PP etc.)

Collection of plastic waste

PET Project

ENVIROSERVE has initiated the collection of plastic waste at a capacity of 40 tons/month.

Expansion of PET project via EPR Guidelines

- Identifying WMAs who can work in co-ordination with LG/PRO for collection of waste, along with mapping the EOL/Disposal processes.
- The collection of waste should consist of the collection of all types of plastic waste.

Governance Structure

PET Project

PET Project's Governance Structure – Steering Committee

Expansion of PET project via EPR Guidelines

- Leveraging the experience of current steering committee and utilizing it for the pilot's steering committee.
- For the pilot the steering committee may include members from private sector eg: PIBOs.

Building an EPR program from the PET pilot

Contribution of PIBOs towards funds

PET Project

Till now private manufacturers have contributed more than 150 million Rwandan francs towards the PET project fund.

Expansion of PET project via EPR Guidelines

- EPR Guidelines can help in structuring contribution of every PIBO and laying down a monitoring mechanism to ensure that every PIBO declares their data and collects equivalent amount of plastic waste they introduced into the market.
- The funds can further be used for Infrastructural development, capacity building, IEC activities to promote source segregation.
- Currently in PET Project, Importers are not contributing towards the funds, however under EPR Guidelines all obligated PIBOs have to pay EPR Fee without exceptions.

Fund mobilization

PET Project

The PET project fund is operational. The fund mobilization from private sector is now effective with manufacturers such as INYANGE and other local contributors.

Expansion of PET project via EPR Guidelines

- The already mobilized fund from private sector can be channelized for proper implementation of Plastic Waste Management via EPR Guidelines.
- Collected funds can be utilized for Infrastructural development and capacity building, IEC activities to promote source segregation. (Setting up MRF, recycling centers)

Monitoring and evaluation

PET Project

REMA responsible for monitoring and evaluation of the PET project along with PSF

Expansion of PET project via EPR Guidelines

- For Monitoring & Evaluation, annual progress report can be submitted
- A review meeting can be facilitated with all stakeholders to review the progress towards target completion. Similarly, a mid-term evaluation too can be conducted. REMA and PSF can jointly be responsible for the same.
- Along with this, REMA along with PSF to provide technical support and coordination of the Pilot activities.

5.3

Recommendations for pilot

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Recommendations for Pilot

Recommendations for country-wide pilot

Key design features
Responsible Authorities: REMA, PIBOs

Location: Waste processing centre at Kigali via countrywide fee collection
Pilot duration: 1 year

- PET project can co-ordinate with MININFRA, WASAC and City of Kigali to pilot end-to-end waste management.
- Enabling environment for plastic waste recycling at every LG level.
- Effective implementation of source segregation as a key waste management step.
- Collection of waste throughout Rwanda will help in understanding the total waste generated and its compositions.

Financial model and partnership arrangements
Responsible Authorities: REMA and the Private stakeholders

REMA can adopt the proposed PRO EPR fee model for the pilot

- The collected fee should be used for setting up a MRF and other training activities.

The proposed partnership arrangement is of a PPP model (Public Private Partnership) and will consist of:

Public	+	Private	+	Global Organisations	+	NGOS
(Government authorities/bodies)		(PIBOs, third party consultants)		(UNDP, GGGI)		

Technical and operational
Responsible Authorities: WMAs, LG

At every LG Level the WMA can drive the waste management activities via-

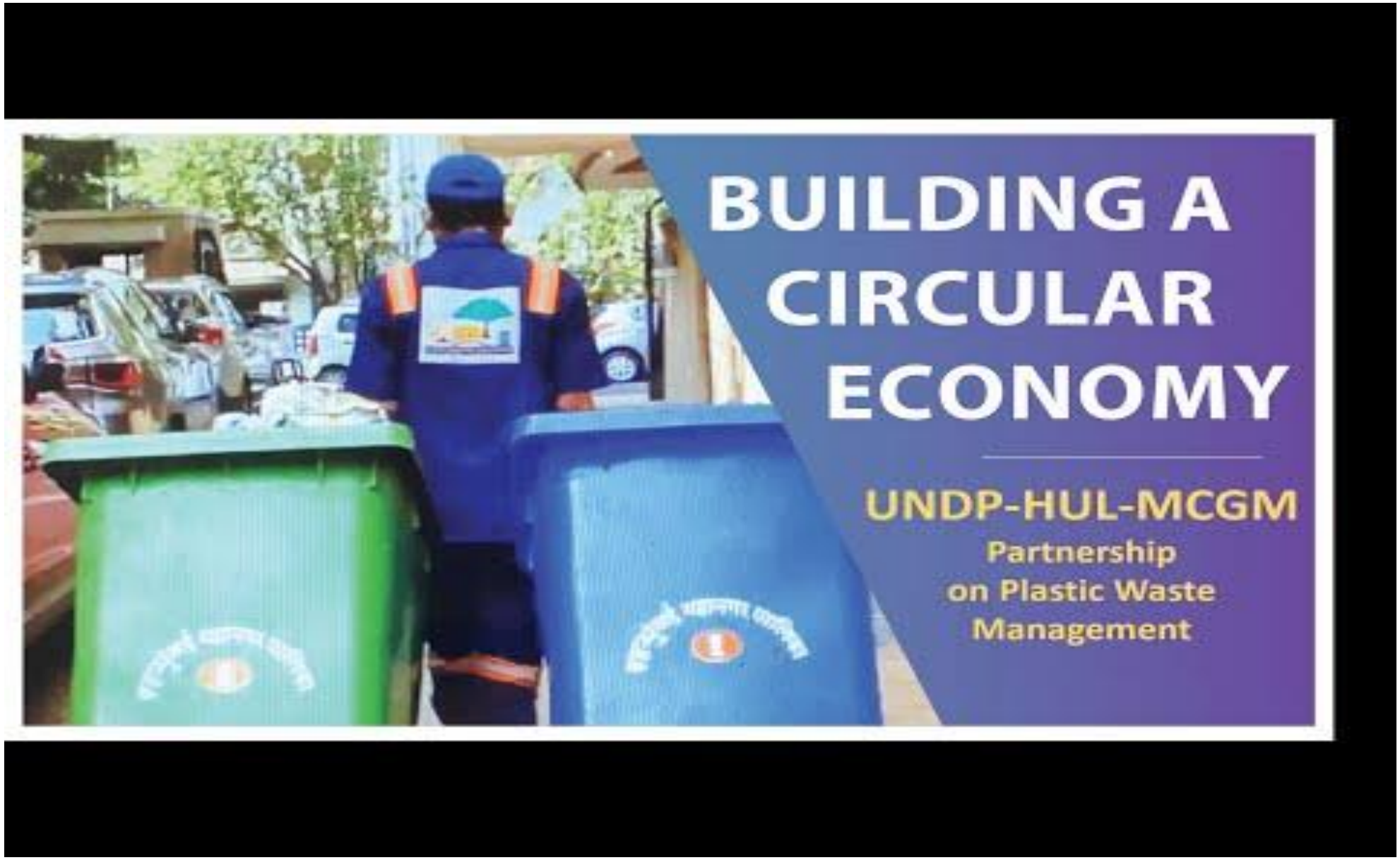
- Effective collection of plastic waste (all categories)
- Segregation at Source
- Establishing MRFs well equipped with infrastructure and equipment to segregate incoming waste into recyclables and non-recyclables.
- Channelization of segregated waste into proper recycling streams or W2E plants
- Engagement of waste-pickers and creation of opportunities for them to participate in a formalised waste management system.
- Training and/or exposure programs

An example of waste segregation could look like:

An industry example- PPP model HUL-UNDP-MCGM collaboration

BUILDING A CIRCULAR ECONOMY

- ✓ Company –Hindustan Unilever
- ✓ Global Organization - UNDP
- ✓ Municipal Body - Municipal Corporation of Greater Mumbai
- ✓ NGO – Aasra welfare association
- ✓ The technology-powered model will enhance segregation, collection, and recycling of all kinds of plastic waste along the value chain, creating resource efficiency and supporting a circular economy.
- ✓ The program has helped collect and segregate dry waste with nearly 2500 tonnes of plastic waste being collected so far. Over 500 waste collectors have been on-boarded as part of this initiative



https://www.youtube.com/watch?v=nPHP2ReyVPA&t=31s

Section - 6

Risk assessment

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Risk Assessment

Challenges	Risk
1) If PRO model is chosen- waste traceability could be a major stumbling block due to the involvement of multiple stakeholders. **Solution-** 3rd party audit to ensure seamless fund flow and implementation.	**High**
1) Laying down of an organized system for collection and segregation to streamline the end-of-life processes like recycling or W2E etc. **Solution –** This can be achieved by emphasizing more on segregation at source and equipping waste workers with proper equipment's.	**High**
1) Duplication of Safe disposability certificates that represent a false picture of an organization carrying out its expected responsibility. **Solution-** Creating a block chain mechanism/ QR code system with REMAs supervision to ensure traceability.	**Medium**
1) PIBOs not willing to declare waste disposal/collection/segregation of data on the portal. **Solution**- Mandatory regulations to be imposed by REMA.	**Low**
1) Local bodies and some regions may not have the expertise or resources to design, implement and manage effective local plastic waste management programs. **Solution**- PROs could be well equipped to step in.	**High**
1) The unavailability of up-to-date disaggregated data on waste collection, disposal, infrastructure, and recycling. **Solution**- 3rd party audit to keep up to date records	**Medium**
1) Onboarding/appointment of a PRO to operate the EPR commitments of PIBOs **Solution-** Experience based selection of PRO	**High**
1) Channelization of recyclable plastic waste to recyclers **Solution** – Encouraging small and large aggregators to register themselves with LGs and PROs to create enough infrastructure**.**	**High**

Section - 7

Concept Blocks

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Different fee models and their comparison

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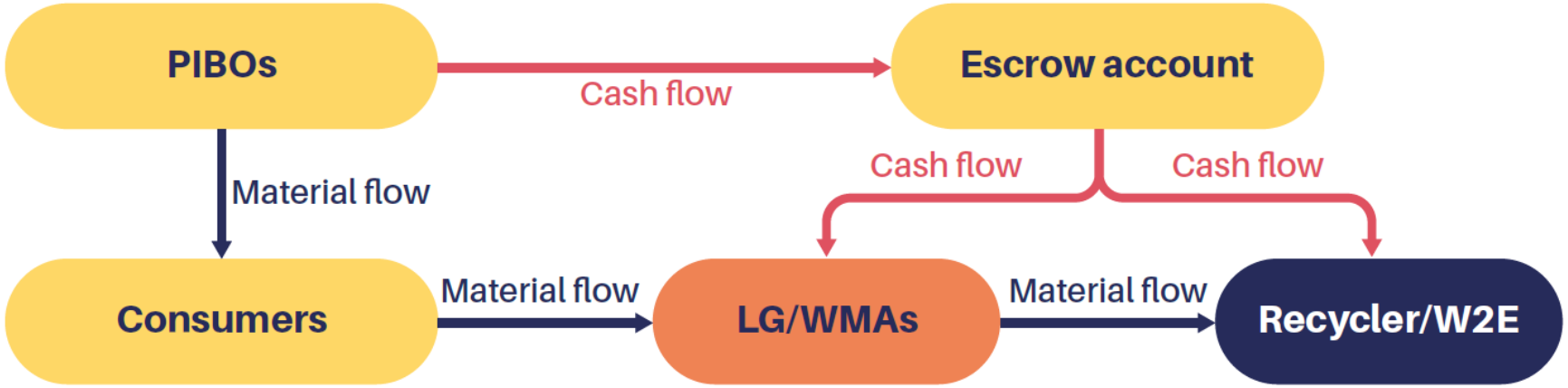
Fee based model

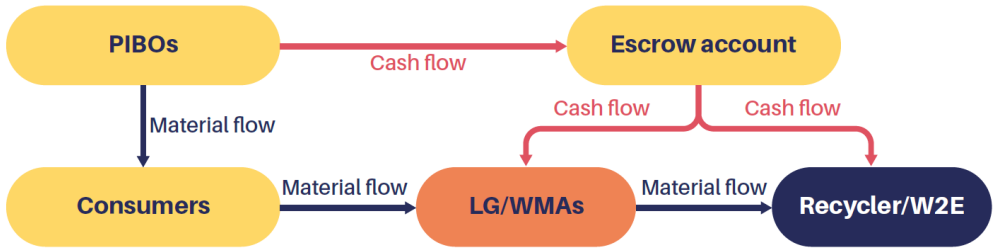
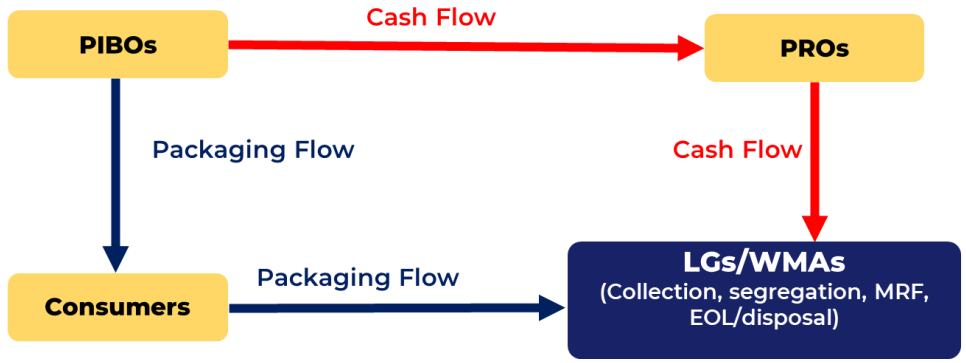
It is proposed that the producers/importer/brand owner who are using less than one ton of plastic per year for packaging would work with this model and shall contribute to the EPR fund at the corpus level. This may be an escrow account managed by EPR TASK FORCE.

The corpus is proposed to be used to provide funding to three entities in order to manage plastic waste:

- firstly, to Local Government (LGs)
- secondly, to waste collectors/assemblers/recyclers
- thirdly for spending on information, education, and communication (IEC)



Fee based vs PRO based model

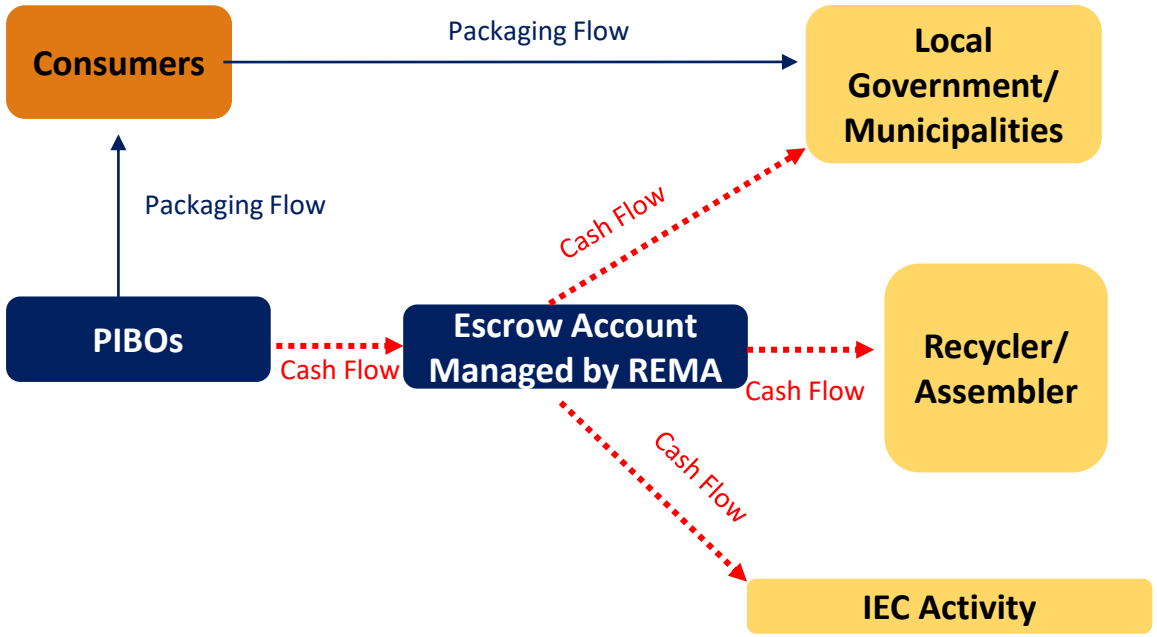
Fee-Based Model	PRO Model
• **Proposed for the PIBOs (Producer, Importer, Brand owners) who are using less than one ton of plastic** for packaging	• PROs will be carrying out the legal requirements on behalf of their member companies producing **more than one ton of plastic per year.**
• **Contribute to the EPR fund at the central level, i.e. an escrow account managed by PCA.**	• Producer Responsibility Organization (PRO) to lead on implementation and provide funding required under the Guideline on behalf of producers (including brand-owners, importers etc.) to support plastic recycling while also promoting the ease of doing business for all stakeholders.
• The amount to be contributed is based on the generation of plastic waste by PIBO and money spent by the LG to handle the plastic part of the waste.	• Producers/importer/brand owner by their own or through PRO required to ensure that an equivalent amount of plastic is being collected and processed.
• The primary responsibility of the collection and source segregation is with the LG	• PROs would be registered in the EPR Guideline to perform EPR liabilities of member companies on their behalf.
	

Fee based vs PRO based model

Fee Based Model

1.Objective : To establish direct interaction between PIBOs and waste management operators (LG)

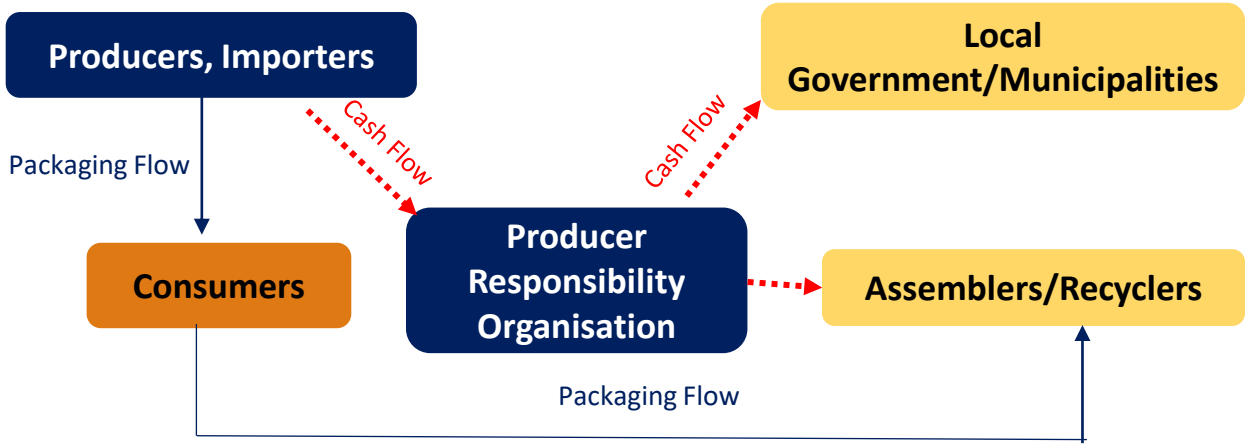
Process Flow :



PRO Based Model

1.Objective : To establish a PRO to lead on implementation and provide funding on behalf of PIBOs to support Plastic Recycling and waste management.

Process Flow :



Fee based vs PRO based model

Fee Based Model

2. WHY favourable?

- This model is preferable when waste management service lies with the local government as such model can be adopted easily.
- Small-scale Producers with limited presence in one or two states may opt for this model conveniently for a more localized approach.

3. Issues

- Lack of infrastructural development, capacity building and sufficient funds required for collection/sorting by local government
- Seamless cash flow could be a challenge

PRO Based Model

2. WHY favourable?

- A PRO collectively takes back the plastic waste (instead of each producer taking it back individually which is strategically difficult)
- In this model as the PRO has an added benefit of industry experience (PIBOs), it can lead to more efficient and cost-effective model.

  (More than 30 European Countries have implemented PRO-based EPR via legislature)

3. Issues

- Traceability can be an issue, as there are multiple stakeholders involved.
- Audit mechanism is required to ensure seamless cash flow and actual implementation

Fee based vs PRO based model

Fee Based Model

4. Case Studies

India

- It was first introduced during the initial implementation phase of EPR.
- Local governments were involved in direct collection from PIBOs.
- It was observed that the collected funds could not be channelised further for improving collection system
- Hence this model was not considered ideal for EPR system in India.

PRO Based Model

4. Case Studies

Belgium (Individual PRO Model)

- A single entity is appointed as a PRO
- All obligated PIBOs become members & pay fee.
- This fee depends on :
  -- amount of packaging introduced in market
  -- degree of recyclability
- This fee is disbursed to waste operators (LG/Municipalities) for collection

India (Collective PRO Model)

- Several PROs instead of single monopolistic PRO
- All obligated PIBOs connect through one or more PROs for EPR compliance.
- This set-up achieves good results with regards to collection, sorting & recycling.

PSF is PRO for PET project in Rwanda

- Mechanisms for collection, transportation, disposal and recycling of single use plastics was developed.
- Capacity development, research, dissemination and awareness raising programs supported.

Recycling approaches

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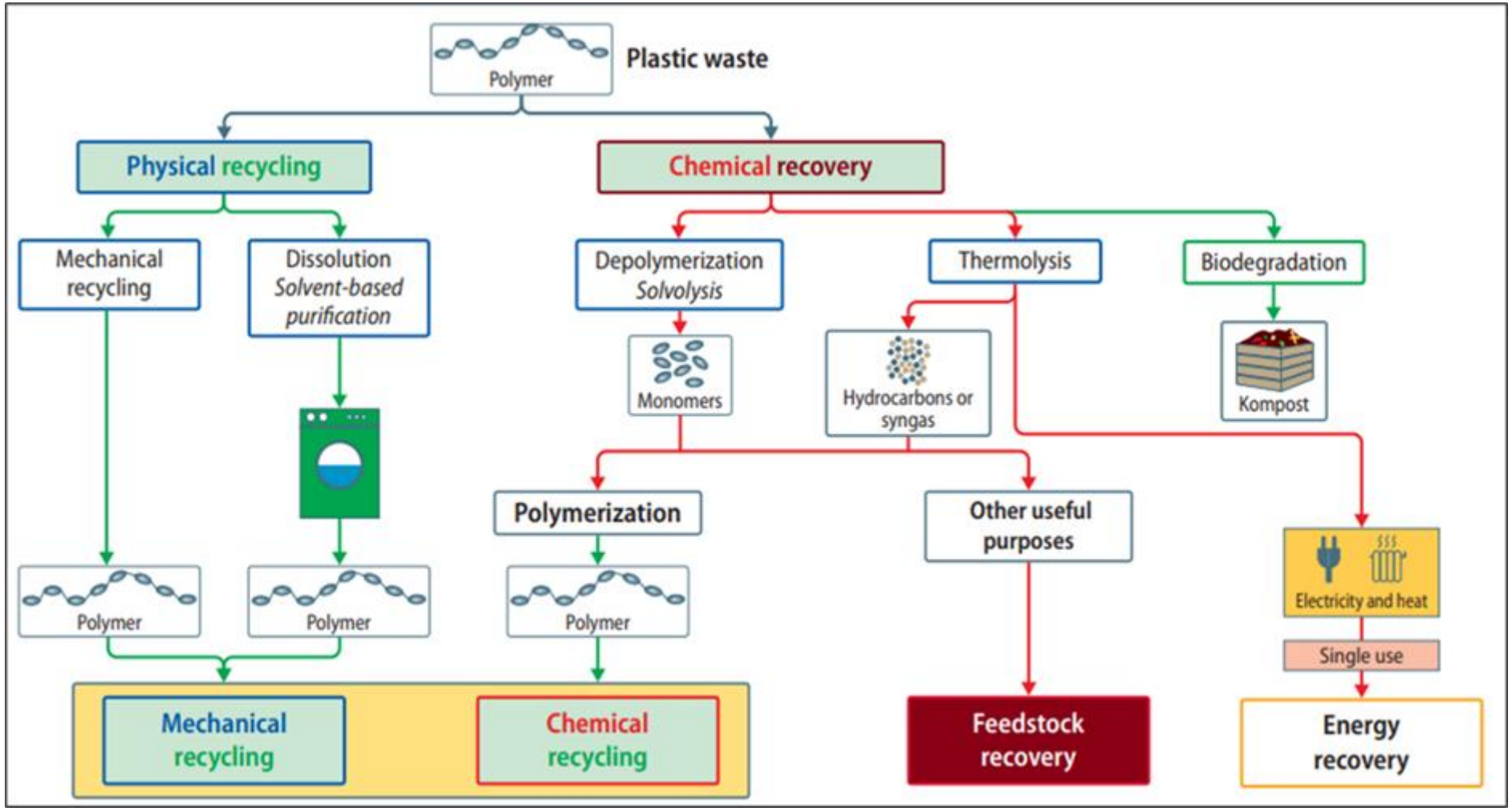
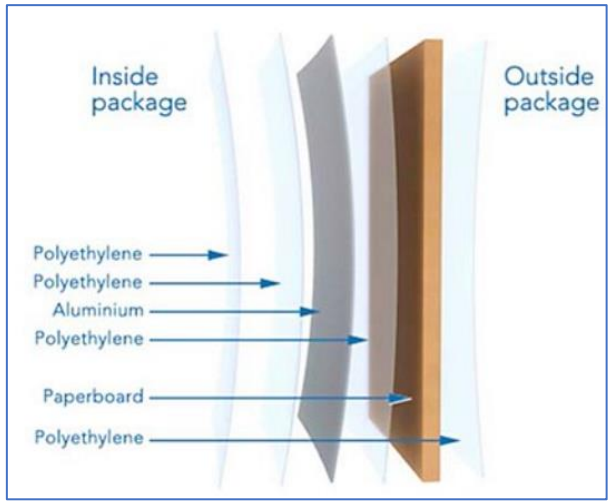
Overview on recycling techniques

The selection of methodologies and processes for the management of plastics waste available from pre-consumer sources and end-of-life products may be approached using various strategies. In general, plastics recovery technologies can be divided into two classes:
a) material recovery (mechanical recycling, chemical or feedstock recycling, and biological or organic recycling);
b) energy recovery in the form of heat, steam, or electricity generation using plastics waste as substitutes for primary fossil fuel resources.



Mechanical recycling

Tetrapack Recycling



- The paperboard (which is 75% of the carton) is recycled into paper products and the 25% remaining fraction (consisting of the polyethylene and the aluminium) can be recycled into panel boards, roof sheets and so on.
- Once the collected cartons are sorted and baled, they are sent to the recycling plant where the paper is separated from the polyethylene and aluminium via the hydra pulping process.
- it's 100% recyclable only when you send it to recyclers with the machinery to handle them. Not every recycler has the ability to handle cartons.

PET- recyclate from post-consumer waste

- The Fraunhofer IVV - Mechanical recycling of even mixed PET waste to produce materials that can be used for new bottles is hence possible. A selective solvent dissolves the target PET into its macromolecules, but does not attack the macromolecules. Inert and dissolved contaminants are then separated from the recovered polymer solution by mechanical and chemical-physical methods.
- The next stage of the process involves adding a selective precipitating agent and precipitation of the PET by altering the temperature.
- The research team has developed a special solvent formulation which from a commercial perspective also guarantees viable processing parameters. The solvents were recycled, mostly by mechanical means, and this has a favorable impact on the energy usage.

Mechanical recycling

Wonder Yarn from discarded PET bottles

Visaka Industries in India has emerged as a sustainable business enterprise over the years and has become the second-largest roofing manufacturer in the country .Visaka in 1992 had diversified and implemented synthetic yarn with revolutionary Twin Air Jet spinning technology. While the fashion industry is reeling under the tag of being the second largest polluter in the world, Visaka's Wonder Yarn, manufactured from sustainable yarn from PET bottles, understands that style must meet sustain ability. Its production has impacted about 116 million PET bottles from piling up in dump yards.

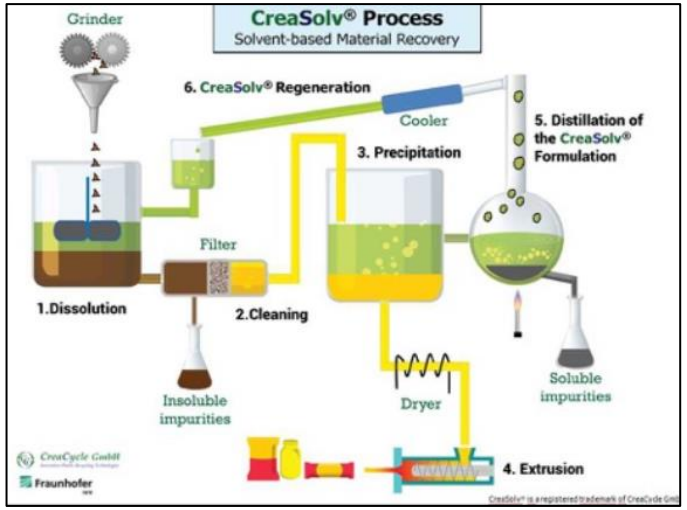
Tiles from PET plastic waste

New Marble tiles are produced from 100% recycled PET plastic waste. They can be used for wall applications like conventional ceramic tiles using conventional tile glue and grout. Its 40% lighter than normal tiles and has a warm feel that makes it a perfect fit for bathrooms and other surfaces you touch.

New marble launches in 3 colours that reflect the 3 main streams in PET bottles: blue, green and white. In the near future they will release new colours and custom colours. 1 square meter of New Marble is made with 203 old PET bottles.

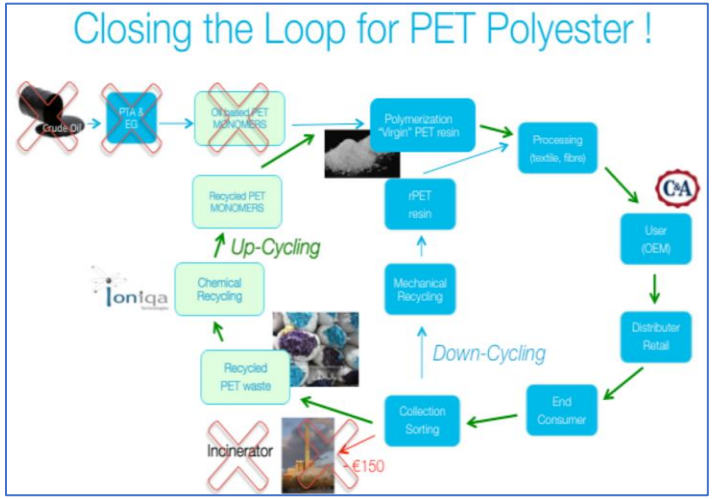
Advanced recycling

CreaSolv Process



- The CreaSolv® Process is a Solvent-based Purification (dissolution) and able to separate different thermoplastic polymer types (as used in flexible packaging) and/or imbedded (dangerous) contaminants or additives (as found in post-consumer waste streams) to enable the re-use of thermoplastics for the original purpose.
- In late 2019, Unilever Indonesia started up a CreaSolv Pilot plant (1000T/a) for the recycling of Polyolefins sourced from landfilled post consumer multilayer film packaging.

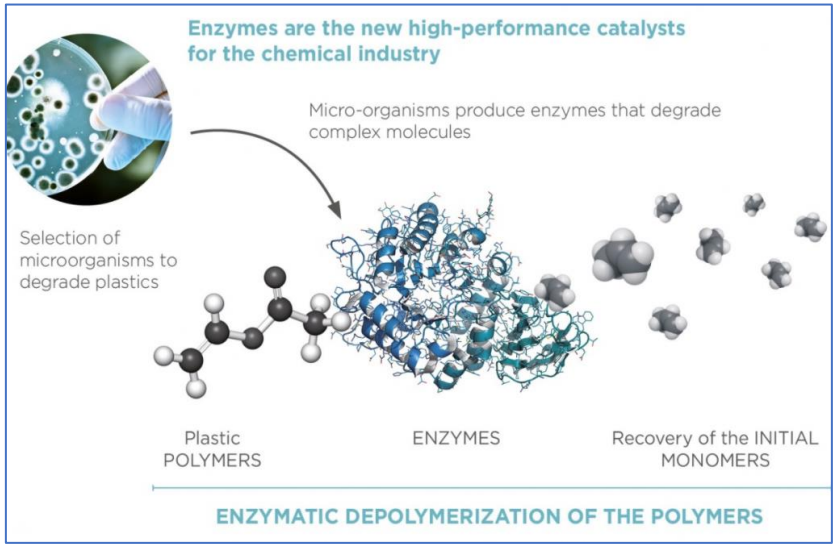
Ioniqua Technology



- Ioniqa has developed a process in which all kinds of colored plastic can be reduced to pure raw material or virgin quality plastic.
- During the process the polymers are broken down and impurities such as color are removed from the plastic, leaving behind a white powder which can be recycled endlessly.
- Through a partnership between Ioniqa Technologies, Indorama Ventures, Mares Circulares (Circular Seas) and The Coca-Cola Company, about 300 sample bottles were made using 25% recycled marine plastic1 retrieved from the Mediterranean Sea and beaches.

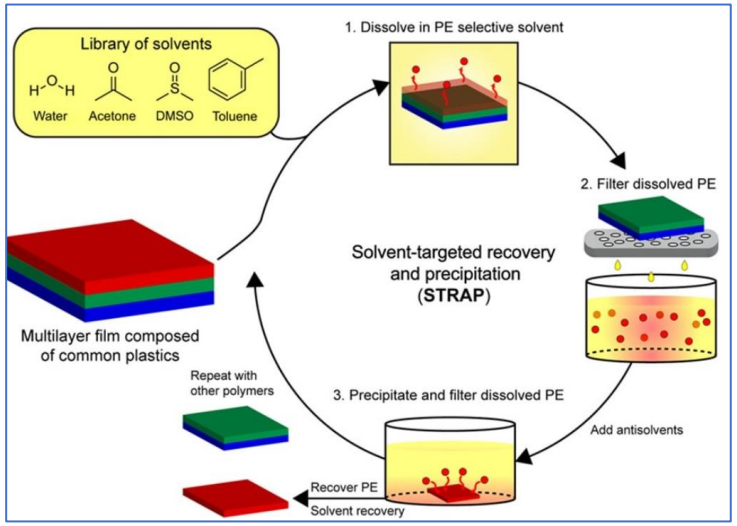
Advanced recycling

Enzymatic Recycling



- enzymatic recycling process uses an enzyme capable of specifically depolymerizing the PET contained in various plastics or textiles –
- The monomers resulting from the depolymerization process are purified in order to be re-polymerized into a PET of a quality equivalent to the virgin PET obtained from the petrochemical industry.
- Nestlé Waters, PepsiCo and Suntory Beverage & Food Europe join Consortium founded by Carbios and L'Oréal to support the world's first enzymatic technology for the recycling of plastics.

STRAP Technology



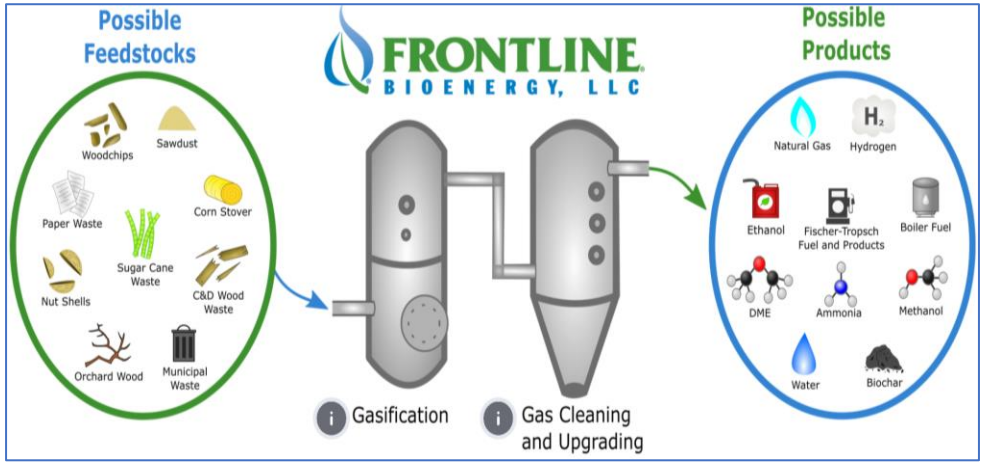
- STRAP process is to selectively dissolve a single polymer layer in a solvent system in which the targeted polymer layer is soluble, but the other polymer layers are not.
- The solubilized polymer layer is then separated from the multilayer film by mechanical filtration and precipitated by changing the temperature and/or adding a cosolvent (an antisolvent) that renders the dissolved polymer insoluble. The solvent and antisolvent are distilled and reused in this process, and the targeted polymer layer is recovered as a dry, pure solid.
- This process is repeated for each of the polymer layers in the multilayer film, resulting in a number of segregated streams that can then be recycled

Waste to energy

Agilyx – Plastic-To-Crude Oil

Converting waste plastics into raw materials has numerous benefits. Through a combination of technical expertise, operating know-how, technology platform, and partnerships with industry, USA-based Agilyx, an alternative energy company, converts plastic waste into refinery-ready crude oil with proprietary and patented technology. They are committed to a more environmentally responsible reality for plastics and polymers. Liquified waste plastic can be a substitute for crude oil, with further opportunity to be upgraded to fuels, chemicals and even new types of plastics

Frontline BioEnergy – Waste Gasification



Although the recycling rate of waste has increased over the last few years, so has the overall waste volume in landfills. Another way to decrease those high numbers in landfill trash is to use waste gasification. Using Pressurized Bubbling Fluidized Bed (PBFB) air-blown and enriched oxygen-blown gasification, followed by gas cooling and water condensation to produce a fuel gas that is free of particulate and has low tar and moisture levels. Gasification not only helps waste management, but it also displaces conventional fossil fuels while producing cleaner energy. Frontline BioEnergy from the USA designs custom systems for waste, more specifically for biomass gasification.

Mechanical recycling

Renewlogy – Plastic-to-Fuel

The statistics on plastic waste confirm it is a global problem. The US-based startup, Renewlogy offers commercial-scale systems optimized for converting low-value post-consumer plastic waste into high-value petrochemical products. They help the environment by reducing the waste that ends up in the landfills. Their systems have reduced carbon outputs compared to fossil fuels and lowered cost of operations

Rays Enserv – Plastic-to-Ultra-Low Sulfur Diesel

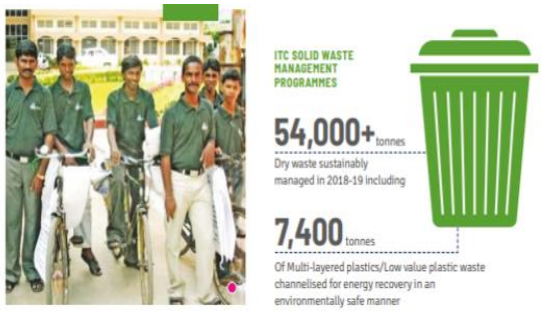
The benefits of ultra-low sulfur fuels, which is often referred to as “clean diesel”, are lowered exhaust emissions, cleaner energy, and improved air quality. When it is converted from plastic waste, it has the extra benefit of reducing plastic waste as well.
Rays Enserv, a startup from India, develops a technology where non-recyclable waste plastic is converted into Synthetic Oil and Syngas, which contains an ultra low amount of sulfur and other heavy metals.

Post industrial and consumer waste recycling

P&G's Baddi plant has adopted various innovative ideas to transform 575 tons of scrap material into useful daily needs. The melted plastic is used for making chairs while the metal laminate is being applied as mixture with cement for construction. 380 tons of shampoo production waste has been converted to car washing agent..

5.5 tons of manufacturing scrap of skin product has been turned into tire polishing material. The plant has achieved 40% reduction in carbon footprint over the last 3 years

P&G's Goa plant has recycled and reused over 4000 tons of scarp, which equates to the daily paper & plastic waste generated by 12 times the population of a major Indian metro.



ITC has introduced the country's first MLP collection and recycling initiative in Pune, tying up with a waste-pickers co-operative (Swach) at one end and recyclers such as Shakti Plastic at the other to ensure sustainable plastic waste management.
ITC, is to scale up the project to more cities, including places such as Bengaluru and Hyderabad.

Why the project is of significance is because MLP is difficult to recycle and has posed a huge challenge to all stakeholders, including companies, consumers and policymakers in the war on plastic.

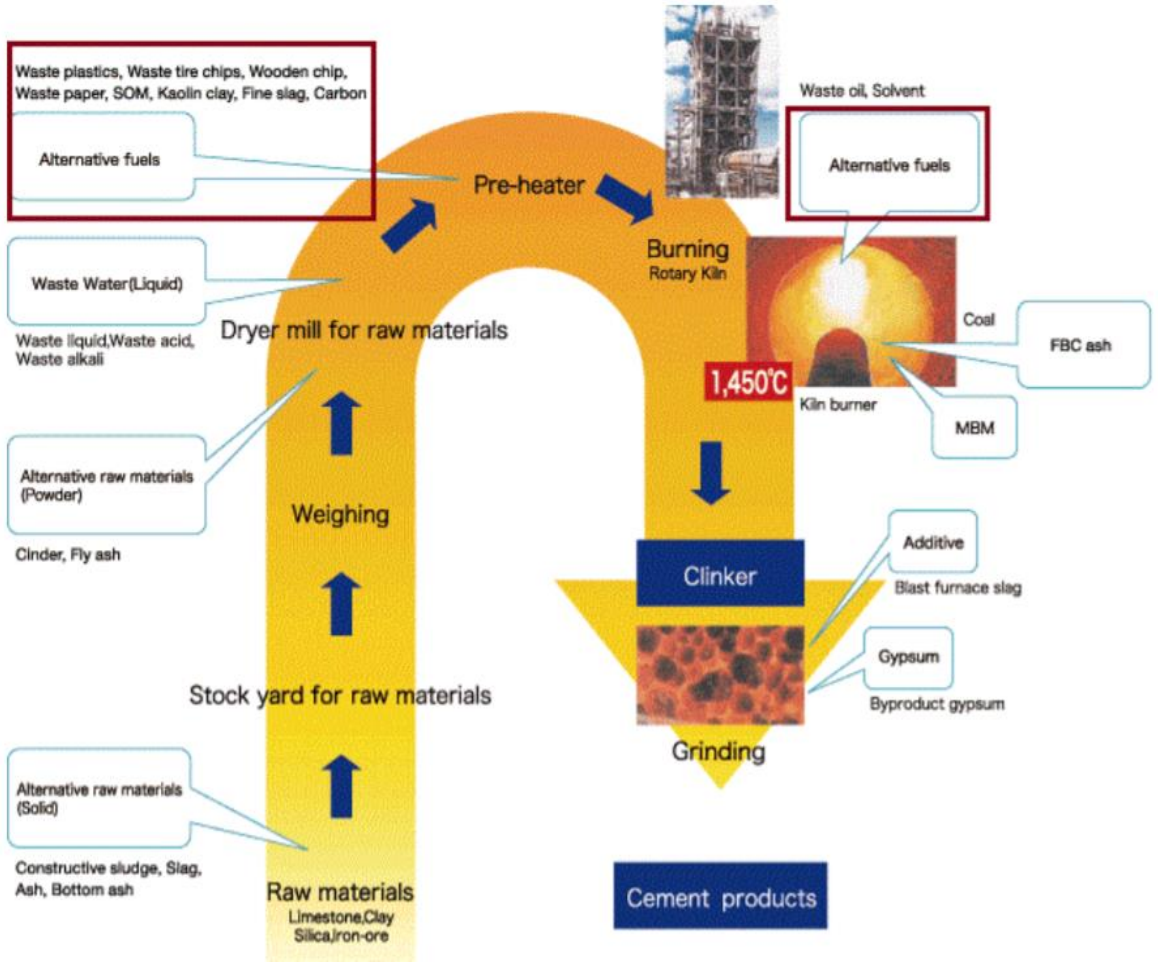
The company said the pyrolysis operation, which has the capacity to process 6 tons a day of waste from the factory's film and packaging lines, is in line with the government's Plastics Waste Management Rules 2016. Those rules call for responsible disposal of plastic waste and put producers and generators of such waste under an extended producer responsibility plan.

India's Uflex opens pyrolysis plant, plans recycling factory

PLASTIC EXPRESS Nestlé India, in collaboration with Gati Foundation, launched a mobile van named Plastic Express will travel around these shops collecting Maggi wrappers and other dry plastic waste from these outlets. The collected dry waste will be disposed responsibly by Nestlé Under Extended Producers Responsibility initiatives to recover post consumer waste by converting multi-layered plastic waste to energy.

A gasolyser pilot unit at Tahliwal has also been installed to convert our factory plastic waste to fuel.

Co-processing of plastic waste in cement kilns



Key features

Most of the countries including BASEL CONVENTION have provided the BAT status to the cement kiln co-processing technology for effective and environmentally sound management of wastes

Co-processing provides the waste management solution without any waste to worry about in future.

It has been demonstrated globally and also in India (through >75 successful coprocessing trials) that co-processing provides environmentally sound and ecologically sustaining disposal of a variety of wastes starting from simple ETP sludge to most complex POPs including the hazardous ones

To encourage this kind of investment, cement kilns be provided the same grants and subsidies that are extended to the waste management project operators.

Use of Refused Derived Fuel (RDF) by cement plants will not only help reduce the waste management problem but also it will help reduce GHG emissions, reduce foreign exchange outgo on account of reduced coal imports and conserve the coal reserves of the country.

Cement plants need to analyse and define the quantum of RDF that they can co-process in their cement kiln with minimum changes in their process & infrastructure

Sustainability acceptance of waste material for coprocessing

Selection of waste streams for co-processing should be done based on scientific analysis of the waste streams.

- Waste should either have an energy content to use as a fuel or material value to use as a raw material.
- Quality of the waste is key parameter in deciding the suitability of material for coprocessing. Physical and chemical properties of the waste has to be tested including heavy metals, mineral composition and other parameters, since it has impacts on environment, product quality and operational stability of cement kiln.
- The Segregated Combustible Fraction (SCF) i.e. plastic, paper, leather are handed over to the cement kilns which are then used as Refused Derived Fuel (RDF) and residue materials are taken to sanitary landfills.
- Waste segregated from electrical and electronic equipment's are also considered as segregated combustible fraction & can be used as Alternative Fuel and Raw Materials (AFR)

S. No.	Sources	Uses
1	Food packaging	Multilayered films are used for packing of biscuits, namkeen, chips, edible oil, juices etc.
2	Pharmacuetical& cosmetics products	Multilayered packing for packing of medicines, tablets and cosmetics etc.
3	Electrical and electronic goods	Multilayered films such as bubble raps, laminates are used for packing of electrical and electronic items, housing, fuses, switchgear, MCB boxes etc..
4	Item used for food storage & serving	Thermocol products such as plates, cups etc. are used for serving food, tea, coffee etc. Also used as fillers in packing of goods/items etc.
5	Automotive industry and mass transportation	Cars, trucks and other commercial and agricultural vehicles, trains, trams, light railways and monorail (body parts, structure and engine parts)
6	Building & construction	Civil engineering and household fixtures etc.
7	Domestic appliances	Coffee machines, toasters, irons etc.
8	Sanitary	Bathroom suites and hygienic surfaces etc.

Materials used as Alternative Fuel and Raw Materials (AFR) for co-processing (cement kilns)

Waste to energy

Energy recovery from waste means the conversion of (non-recyclable) waste into usable heat, electricity, or fuel through a variety of processes;

- Incineration
- Gasification
- Pyrolysis

Because plastics have a higher energy value than other garbage (or “municipal solid waste”), they help increase the efficiency of the energy recovery process in traditional waste-to-energy facilities.

Incineration

- Incineration of waste is a technology which reduces the amount of solid material to be landfilled.
- Waste incineration plants can be used to produce electricity, steam and heating.
- Waste can also be used as fuel in certain industrial processes. The technology is also called thermal recovery or incineration with energy reclamation.
- Incineration can be done in two different ways
- Mass burn approach- input is unsorted without any pre-treatment
- Refused derived fuel systems- input is pre-sorted & treatment is done before feeding to the system

Gasification

- Plastics also can be converted into a gas fuel that can be used to produce electricity or turned into liquid fuels and even raw materials (chemicals) for manufacturing.
- The primary output of gasification is combustible synthesis gas (syngas), which is valuable as a fuel or intermediate. Syngas can be used to produce power, converted into liquid fuels.

Pyrolysis

- Pyrolysis is a common technique used to convert plastic waste into energy, in the form of solid, liquid and gaseous fuels.
- Pyrolysis is the thermal degradation of plastic waste at different temperatures (300–900°C), in the absence of oxygen, to produced liquid oil.

Benefits-

- The process can treat mixtures of plastic waste that are hardly recyclable otherwise (e.g. contaminated materials, small volumes that make separation economically unattractive or multilayer-materials).
- Energy recovery from plastic waste can contribute to resource saving by substituting emissions from oil / coal / gas firings for energy and heating purposes.
- In the case biobased plastics are incinerated with heat recovery, renewable energy is produced, since the carbon is coming from a renewable resource similar to using wood for renewable energy production.

Guideline documents

Guidelines for Co-processing of Plastic Waste in Cement Kilns - INDIA

- The document has guidelines for cement coprocessing issued by Indian Government involving both Ministry of Environment and Central Pollution Control Board.
- Cement coprocessing is one of the predominant method of disposal of non-recyclable waste in India. The document was issues after extensive local work done across India
- Refer the case studies which talks about the finances and what changes to be made in cement kilns and also how pre-processing can be done

Co-processing_Guidelines_Final.pdf

Guidelines on Co-processing of Hazardous Waste in Cement Kilns - BASEL CONVENTION & UNEP

- The documents has technical guidelines on the environmentally sound co-processing of hazardous wastes in cement kilns
- International best practices for cement kilns approved as per or recommended by Basel convention and considerations when selecting wastes for co-processing
- Refer Page 20 & 21 of the document which clearly articulates that what are the conditions of using the waste in cement kilns

tg-cement-e.pdf

Guideline documents

Guidelines on co-processing Waste Materials in Cement – GEOCYCLE & GTZ

- Geocycle & GTZ has compiled this report which talks about the lessons of their experience and offer it particularly to developing countries that need to improve approaches to waste management which Industry is following this (Geocycle part of holcim cement group)
- Industry best practice, use of AFR, traceability from reception up to final treatment
- Refer Case study 2 for An integrated waste management concept – The example from Cartago, Costa Rica

co-processing_supporting_document_giz-holcim_guidelines.pdf

Pre-Processing and Co-Processing Municipal Solid Waste and Sewage Sludge in the Cement Industry - BERKELEY LABS

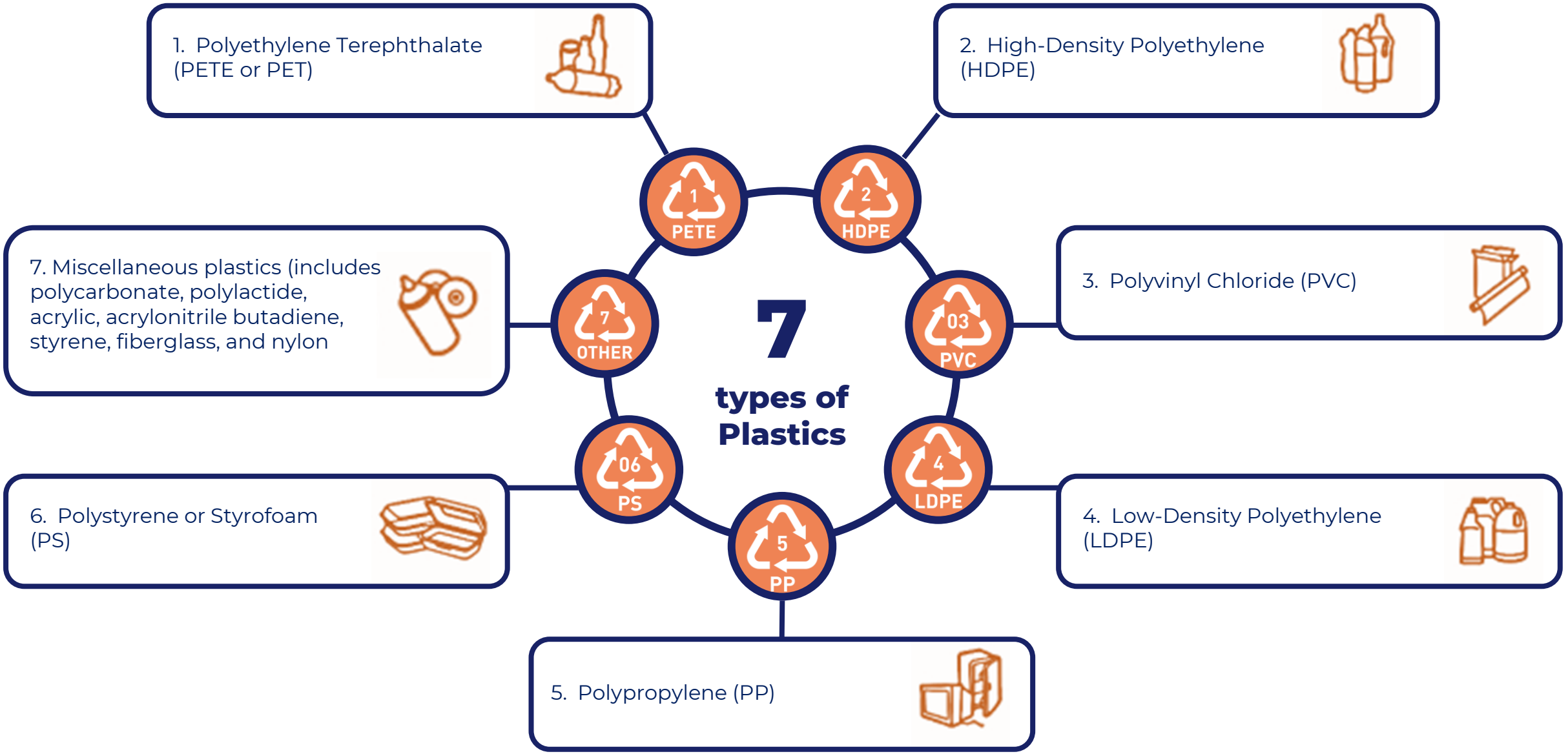
- The documents has International Best Practices for Pre-Processing and Co-Processing Municipal Solid Waste and Sewage Sludge in the Cement Industry
- Refer Pg. 7 table on five principles to be considered before implementation and for Rwanda the same should be validated by local authorities along with cement factories
- Refer Page 9-11of the document which clearly articulates the reasons and Motivations for Co-processing

Berkeley Lab.pdf

Material identification of Plastics

This study has been funded by UK aid from the UK Government; however, the views expressed do not necessarily reflect the UK government's official policies

Material identification



Other Monitoring mechanisms

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Monitoring via Waybill system

Waybill system:

Another approach to monitor the EPR mechanism is through the Waybill system. In this system, a Waybill with Unique Identification Code (UIC) is generated for every transaction of waste, from its collection to EOL/disposal. The waybill will consist of data such as type and quantity of plastic waste, date, and time of transaction. Each waybill has its own expiration period; this feature ensures that no falsification of documents can happen for other transactions.

Monitoring via QR traceability

- This is done post the declaration of EPR targets.
- Once PROs start the collection of plastic waste, the traceability mechanism prevents any chance of falsified documents

1 Source generators of waste

Initial data generation of collection of waste at the source (residential, societies, bulk generators etc.),

2 Collection point

Initial data generation of collection of waste at the source (residential, societies, bulk generators etc.),

3 Driver 1

GPS location tracking while transferring waste to MRF

4 MRF

Data generated includes segregation of waste, no. & wt of bales of recyclables, non-recyclables

5 Driver 2

GPS location tracking while transferring to EOL.

6 EOL

Data generated includes type & quantity, date & time of recyclable/non-recyclable waste

The E-portal shall verify the output through an encryted block chain technology/QR codes ensuring traceability.

Point of generation: Source generator of waste

End point of QR code. End of life/disposal of plastic waste

Information/data encrypted in QR code;

1)Source generator of waste

2)Type of plastic waste

3)Weight of plastic waste

4)End-Of-life disposal

- Traceability apps to be created at every step to trace the flow of data generated at collector's end.
- While transporting the collected waste, the drivers are marked with geo-location to map out the path/route taken till the end-of-life disposal.

QR code generated at source generators (I) is carried till EOL via encrypted block chain mechanism. Hence traceability (inclusive of date, time, weight, type, location.) of waste is ensured at every stage

Section - 8

Key deliverables

GREAT for GROWTH
BRITAIN & NORTHERN IRELAND
UKaid
from the British people

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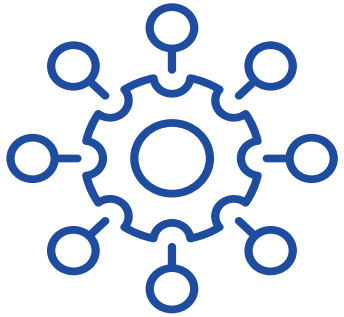
Key areas explored while formulating guidelines

While drafting the guidelines, we deep dived into multiple topics, here is a gist of our proposals and deliverables during this time period.

- PHASE WISE APPROACH TO HANDLE PLASTIC WASTE
- MONITORING PLANS
- WORKING PRO MODEL
- MATERIAL CLASSIFICATION
- PRPOSED EPR FEE AS PER INTERNATIONAL PRACTICES
- PATHWAY FOR IMPLEMENTATION OF EPR
- DETAILS TO SETUP AN MRF
- PROPSED EPR TARGATES
- BEST SUITED PILOT MODEL

Key deliverables in Steercoms

Based on the interactions with the team various steercoms were designed to expand more on the following concepts below;



STEERCOM 1

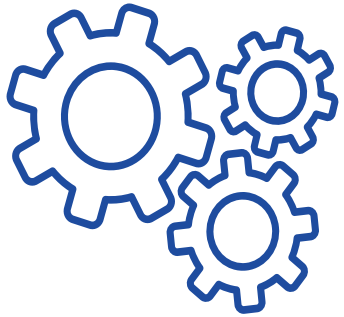
Topics delivered:

- More focus on EPR as a concept
- Benchmarking of countries/ working models
- Initial recommendations Rwanda after scouting of working models/countries and exploration of current situation in Rwanda.

STEERCOM 2

Topics Delivered:
Brief insights from previous steercom

- Proposed EPR model(s)
- Proposed EPR targets
- Proposed Roles and responsibilities
- Proposed EPR fees
- Immediate steps to be taken by REMA
- Monitoring mechanism



STEERCOM 3

Topics delivered:

- Working model i.e. Pilot in Rwanda
- Roadmap for implementation
- Initial revised topics as per latest suggestions.

Key Interactions

McKinsey & Company

McKinsey & Company

Our learnings and in-depth knowledge with respect to EPR and Plastic Waste Management across nations were shared with McKinsey & Company for their EPR Program in Kenya.

REMA

REMA
OUR ENVIRONMENT OUR FUTURE

We also presented our learnings in a stakeholder consultation meeting that was organized by REMA to understand better the current situation and build on the guidelines keeping in mind these remarks.

Key institutions

COPED

THE WORLD BANK

Global Green Growth Institute

In addition, here are a few key institutions that we interacted with during our initiative to formulate these guidelines.

Section - 9

Glossary

GREAT BRITAIN & NORTHERN IRELAND for GROWTH

UKaid from the British people

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Acronyms

1. **BRALIRWA:** Brasseries et Limonaderies du Rwanda
2. **COPED:** Company for Environment Protection and Development
3. **CPCIP:** Cleaner Production and Climate Innovation Centre
4. **DWCC:** Dry Waste Collection Centre
5. **EIA:** Environmental Impact Assessment
6. **EIS:** Environmental Impact Statement
7. **EOL:** End of Life
8. **GGGI:** Global Green Growth Institute
9. **GoR:** Government of Rwanda
10. **HDPE:** High Density Polyethylene
11. **HIC:** High Income Status
12. **IEC:** Information, Education and Communication
13. **LG:** Local Government
14. **MIC:** Middle Income Status
15. **MINICOM:** Ministry of Trade and Industry
16. **MININFRA:** Ministry of Infrastructure
17. **MoE:** Ministry of Environment
18. **MRF:** Machine Recycling Facility
19. **MSW:** Municipal Solid Waste
20. **NGO:** Non-Governmental Organisation
21. **NST:** National Strategy for Transformation
22. **PET:** Polyethylene Terephthalate
23. **PIBO:** Producers, Importers and Brand Owners
24. **PIBO:** Producers, Importers, Brand Owners
25. **PIC:** Prior Informed Consent
26. **POP:** Persistent Organic Pollutants
27. **PP:** Polypropylene
28. **PPP:** Public Privat Partnership
29. **PRO:** Producers Responsibility Organisation
30. **PSF:** Private Sector Federation
31. **PVC:** Polyvinyl Chloride
32. **QR:** Quick Response
33. **RAM:** Rwanda Association of Manufacturers
34. **RDB:** Rwanda Development Board
35. **REMA:** Rwanda Environment Ministry Authority
36. **RRA:** Rwanda Regulations Authority
37. **RSB:** Rwanda Standards Board
38. **RURA:** Rwanda Utilities Regulatory Authority
39. **SUP:** Single Use Plastics
40. **UNDP:** United Nations Development Program
41. **W2E:** Waste to Energy
42. **WASAC:** Water and Sanitation Corporation
43. **WMA:** Waste Management Agencies
44. **WP:** Waste Processors
45. **ZWTN:** Zero Waste To Nature

Key terms

1. **Authority:** The Agency which oversees protection of environment in Rwanda (REMA)
2. **Brand owner:** A person or company who sells any commodity under a registered brand label/trademark.
3. **Dry Waste Collection Centre (DWCC):** DWCCs are typically small facilities (< 5 Tonnes per day) set up and managed by the waste collectors/waste management agencies/PROs/Local Bodies ("LB") for dry waste.
4. **Environment Impact Assessment (EIA):** A systematic examination conducted to determine whether a project will have any adverse impacts on the environment.
5. **Environmental Impact Statement (EIS):** The written report which presents the results of an Environment Impact Study.
6. **Environmental Impact Study:** the study conducted to determine the possible environmental impacts of a proposed policy, project or activity, and measures to mitigate any such impacts.
7. **Environmental Monitoring:** The continuous determination of the actual and potential effects of any activity or phenomenon whether short or long term.
8. **Extended Producer Responsibility:** EPR is a policy approach in which all industry players introducing packaging to the market are given responsibility – financial and/or physical – for the collecting and processing of their packaging after its use. As well as a funding mechanism, EPR provides incentives to reduce waste, promote environmentally friendly product design and encourage recycling.
9. **Recyclers:** Are entities who are engaged in the process of recycling of plastic waste.

Key terms

10. **Importer:** A person who imports plastic packaging product or products with plastic packaging or multi-layered packaging
11. **Manufacturer:** Include an individual, unit, or agency, company engaged in production of plastic raw material to be used as raw material by producer.
12. **Material Recovery Facility (MRF):** a facility where non-compostable solid waste can be temporarily stored by the local body or any other entity or any person or agency authorized by any of them to facilitate segregation, sorting and recovery of recyclables from various components of waste by authorized informal sector of waste pickers, informal recyclers or any other work force engaged by the local body or entity for the purpose before the waste is delivered or taken up for its processing or disposal.
13. **Multilayered packaging:** Any material used or to be used for packaging and having at least one layer of plastic as its main ingredients in combination with one or more layers of materials such as paper, paperboards, polymeric materials, metalized layers of aluminum foil, either in the form of a laminate or a co-extruded structure.
14. **Plastic:** Material which contains as an essential ingredient a high polymer such as polyethylene terephthalate, high density polyethylene, Vinyl, low density polyethylene, polypropylene, polystyrene resins, multi-materials like acrylonitrile butadiene styrene, polyphenylene oxide, polycarbonate, polybutylene terephthalate.
15. **Producer:** Person engaged in the manufacture or import of carry bags, online retail, multilayered packaging or plastic sheets and include industries and individuals who use the above mentioned for packaging or wrapping the commodity.

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