

Strategy paper for strengthening implementation of EPR for plastics packaging in India

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List of Acronyms:

APCO - Australian Packaging Covenant Organisation
AUD - Australian Dollar
CAGR - Compound Annual Growth Rate
CO2 - Carbon Dioxide
CPCB - Central Pollution Control Board
CSIR - Council of Scientific and Industrial Research
CSR - Corporate Social Responsibility
EEE - Electrical and Electronic Equipment
EOL - End-of-Life
EPR - Extended Producer Responsibility
FMCG- Fast Moving Consumer Goods
EU - European Union
FICCI - Federation of Indian Chambers of Commerce and Industry
FSSAI - Food Safety and Standards Authority of India
GDP - Gross Domestic Product
GEF - Global Environment Facility
GPP - Green Public Procurement
GWP - Global Warming Potential
HDPE - High-Density Polyethylene
HSE - Health, Safety, and Environment
IPR - Intellectual Property Rights
IUCN - International Union for Conservation of Nature
IWM - Integrated Waste Management
LCA - Life Cycle Assessment
LCIA - Life Cycle Impact Assessment
LDPE - Low-Density Polyethylene
LRS - Local Recycling Schemes
MNC - Multinational Corporation
MoEF&CC - Ministry of Environment, Forest and Climate Change
MRF - Materials Recovery Facility
MSW - Municipal Solid Waste
NAAQS - National Ambient Air Quality Standards
NGO - Non-Governmental Organization
OECD - Organisation for Economic Co-operation and Development
PCC - Pollution Control Committee
PET - Polyethylene Terephthalate
PLA - Polylactic Acid
PP - Polypropylene
PRS - Plastic Recycling Symbol
PS - Polystyrene
PSU - Product Stewardship Unit (Australia)
PVC - Polyvinyl Chloride
PWM - Plastic Waste Management
R&D - Research and Development

SDG - Sustainable Development Goal
SPCB - State Pollution Control Board
SWOT - Strengths, Weaknesses, Opportunities, Threats
UN - United Nations
UNEP - United Nations Environment Programme
WBA - Waste-Based Alternatives
WEEE - Waste Electrical and Electronic Equipment
WPB - Waste Packaging Board
WTO - World Trade Organization
WWF - World Wide Fund for Nature

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1. Introduction

Growing plastics production, its unsustainable use and inadequate waste management has led to threatening levels of its leakage into the environment including oceans. UNEP's report "From Pollution to Solution", presents a sharp growth in plastic waste emissions, or leakage, into aquatic ecosystems, which is expected to almost triple by 2040¹. Plastic pollution impacts are not limited to oceans, and there is growing evidence of significant ecological, economic, and social impacts across the entire plastics value chain. Preventing plastic waste from entering nature requires both upstream and downstream solutions. Specifically, it requires eliminating unnecessary plastic use, encouraging reuse, refill mechanisms, recycling, and setting up and operating effective waste management systems. Packaging application continues to be the dominant user of plastic, and accounts for about half of the world's plastic waste.²

While plastic pollution is a global problem, recent studies show that more than 1000 rivers account for 80% of global riverine plastic emissions into the ocean which range between 0.8 million and 2.7 million metric tons per year, with small urban rivers among the most polluting.³ This goes on to suggest, smaller rivers that pass through more heavily populated urban areas would have more plastic than larger rivers. At a global scale the study further suggests urban rivers in Southeast Asia and West Africa as main hotspots for plastic emission. Research studies and literature from around the world⁴ have also established a strong link between land based and marine pollution. Therefore, a holistic approach to address marine and riverine plastic pollution would involve fixing the municipal solid waste management with an aim to curb land-based sources of leakage.

The key to prevent the leakage of plastic waste into our environment is to conceptualize and develop circularity in plastic waste management. This closes the loop of plastic production and creates more circular systems from beginning to end, focusing on reducing use, redesigning packaging, increasing reuse, and recycling, and using sustainable alternative materials where appropriate. Currently, today only 14% of plastic packaging is recycled and only 2% achieves circularity⁵. The low recycling levels are majorly attributed to lower price of virgin plastic, limited demand for recycled plastic, lower quality of recycled plastic and the lack of funding to support effective recovery and recycling systems.

Over the past few years, extended producer responsibility (EPR) is increasingly recognised worldwide as an efficient circularity and waste management policy tool to help improve recycling and reduce landfilling of products and materials.⁶ EPR was first introduced in the 1990s by Germany, Sweden, and France (OECD 2014)⁷ and since then, it has been continuously adopted by several countries across Europe. As of 2014, the World Bank recorded a total of 106 legally binding EPR schemes under implementation by EU Member States (then 28), mainly in the area of waste electrical and electronic equipment (WEEE), waste packaging, waste batteries and end-of-life vehicles (Kaza 2018). Since then, the EU has undergone significant institutional and legislative changes, but EPR has remained at the centre

¹United Nations Environment Programme (2021). From Pollution to Solution. A global assessment of marine litter and plastic pollution Nairobi.

²UNEP. 2018. Single-Use Plastics: A Roadmap for Sustainability <https://www.unep.org/resources/report/single-use-plastics-roadmap-sustainability>

³ Science Advances (2021) <https://www.science.org/doi/10.1126/sciadv.aaz5803>

⁴UNEP (n.d.). Marine Litter and Plastic Pollution | Coordinating Body on the Seas of East Asia (COBSEA). [online] Available at: <https://www.unep.org/cobsea/what-we-do/marine-litter-and-plastic-pollution>.

⁵Ellen McArthur Foundation. 2015. The New Plastics Economy – Rethinking the future of plastics.

⁶ Science Direct (2020) <https://www.sciencedirect.com/science/article/pii/B9780128178805000165>

⁷Analysis of Extended Producer Responsibility Schemes (2021) https://erp-recycling.org/wp-content/uploads/2021/07/adelphi_study_Analysis_of_EPR_Schemes_July_2021.pdf

of its waste management policies.⁸ Various studies⁹ ¹⁰ also suggest that EPR has played an important role in financing a *circular plastics economy* by holding manufacturers financially accountable for managing their plastic products and packaging's end-of-life impacts, as well as incentivizing holistic eco-design in the business sector.

The basic feature of EPR is that producers, importers and brand owners take the responsibility for managing the waste generated by their products introduced into the market. As per a Worldwide Fund 2020 report, EPR can enable governments to solve a multitude of environmental issues while promoting economic development, ensuring social safeguards, and removing the financial burden of running waste management systems from municipalities. Businesses can gain a head start in the transition towards the circular economy, thus mitigating reputational and regulatory risks while ensuring the roll-out of cost-efficient waste management systems.¹¹

India like many developing countries also deal with issue of plastics pollution and its management. Despite low per capita consumption of about 11 kg in India compared to global average is (28 kg), plastic waste in India constitutes to about 7% of total MSW and is about ~4 mt/yr (CPCB). In order to address the issue, Government of India brought in the EPR policy for plastics packaging in 2022. In this paper, we focus on the specific challenge of managing plastic packaging waste in India and how implementation of EPR can be strengthened from experience across the world to deal with this issue.

1.1 Objectives and approach

This paper is conceptualized to understand the challenges in implementing EPR system in India under the Plastic Waste Management (PWM) Rules 2016¹² and to document practices followed across the world on designing and implementing similar EPR guidelines.

This paper highlights the case studies of different EPR models for plastic packaging and identifies actions that India can take to further strengthen implementation of EPR on plastic packaging. The paper explores the EPR policy guidelines for plastics packaging in India and in other countries and identifies strategies for strengthening EPR implementation in India. It attempts to document similar EPR models from across the world and identifies relevant models that could be implemented under the current EPR mechanism in India.

The methodology adopted for the study is based on a literature review and desk-based research on existing EPR policy framework for plastics packaging in India, followed by in-depth analysis of case studies on specific EPR schemes from different countries. The challenges and gaps in the system were identified and delineated in the different sections. This was done with an intention to gather evidence on the level of preparedness of the system to address the PWM issue in general and the problem of EPR implementation of plastics in particular. We looked at

⁸Analysis of Extended Producer Responsibility Schemes (2021) https://erp-recycling.org/wp-content/uploads/2021/07/adelphi_study_Analysis_of_EPR_Schemes_July_2021.pdf

⁹ Ellen Macarthur Foundation (2021) <https://emf.thirdlight.com/link/cp8djae8ittk-xo55up/@/#id=0>

¹⁰WWF (2020) 15 Basic Principles

https://wwfint.awsassets.panda.org/downloads/wwf_15_basic_principles_2020_final_with_layout_1130.pdf

¹¹WWF (2020) How to implement EPR

https://wwfint.awsassets.panda.org/downloads/how_to_implement_epr_briefing_for_government_and_business.pdf

¹²MDPI Plastic Waste Management in India: Challenges, Opportunities, and Roadmap for Circular Economy(2022)<https://www.mdpi.com/2071-1050/14/8/4425>

policy instruments in different countries such as regulations, institutional mechanism, implementation as well as operational modalities for analysing the same.

1.2 Limitation of the Paper

In an attempt to capture the global best practices, the paper has analysed a select few EPR models from a mix of developed and developing nations. The paper does not delve into the analysis of EPR mechanisms for waste streams other than plastic packaging.

1.3 Definition of Extended Producer Responsibility (EPR)

The concept of EPR aims to ensure that the manufacturers of products are made responsible for various parts of the entire life cycle of their product, including take-back, recycling, and final disposal at the end of a product's useful life.¹³

EPR has been 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 to the take-back, recycling and disposal of the product” (Lindhqvist, 2000). EPR therefore includes an upstream (design and production) stage and a downstream (recovery and collection) stage (Kaffine and O'Reilly, 2013).

In 2001, the *Organisation for Economic Co-operation and Development (OECD)* defined 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.¹⁴ In practice, EPR involves producers taking responsibility for collecting end-of-life products, and for sorting them before their final treatment. EPR schemes can allow producers to exercise their responsibility either by providing the financial resources required and/or by taking over the operational and organisational aspects of the process from municipalities. They can do so individually or collectively.

As per *United Nations Basel Convention* guideline, 2019, EPR is defined as an environmental policy approach in which a producer's responsibility for a product is extended to the waste stage of that product's life cycle.¹⁵

As per UNEP report (2020)¹⁶, EPR has two principle environmental goals:

- To provide incentives for manufacturers to design resource efficient and low-impact products (referred to in this report as “eco-design”)
- To ensure effective end-of-life collection, the environmentally sound treatment of collected products and improved rates of reuse and recycling.

¹³Lindhqvist, T. 2000. Extended Producer Responsibility in Cleaner Production: Policy Principle to Promote Environmental Improvements of Product Systems. PhD thesis, the International Institute for Industrial Environmental Economics, Lund University, Sweden <https://lup.lub.lu.se/search/files/4433708/1002025.pdf>

¹⁴ OECD iLibrary <https://www.oecd-ilibrary.org/sites/9789264256385-4-en/index.html?itemId=/content/component/9789264256385-4-en>

¹⁵EPR for packaging waste in Vietnam (2020) <https://www.expertisefrance.fr/documents/20182/778216/Extended+Producer+Responsibility+Policy+Brief+-+English/2b933407-2da4-4682-b0a5-d7f8ababa64e>

¹⁶ UNEP (2020) Tackling Plastic Pollution: Legislative Guide for the Regulation of Single-Use Plastic Products <https://wedocs.unep.org/bitstream/handle/20.500.11822/34570/PlastPoll.pdf.pdf?sequence=3&isAllowed=y>

The Government of India defines EPR as “The responsibility of a Producer for environmentally sound management of the product until end-of-life”.¹⁷

1.4 EPR in context of Polluter Pays Principle

Several studies and experts suggest that EPR is based on the “*polluter pays principle*” and extends the responsibilities of the producer (obliged company) to all parts of the life cycle of their product or packaging, with a particular focus on end-of-life management, where the collection, sorting, reuse, recycling and/or final disposal of the product is achieved in a sustainable manner.¹⁸

EPR policy is also consistent with the *polluter pays principle* in so far as financial responsibility for treating end-of-life products is shifted from taxpayers and municipalities to producers and, ultimately, consumers. Most importantly literature suggests that EPR has a broader purpose which is to improve the environmental sustainability of products, packaging, and production systems across their entire life cycles, therefore, recognising EPR as a cornerstone policy principle for the transition to a circular economy.¹⁹ In case of packaging, it means that whoever introduces packaging or packaged goods into a country’s market remains responsible for its collection and processing after use. Generally, the legal framework leaves it optional to companies to fulfil their responsibility individually, by putting in place their own collection, sorting, and recycling system, or collectively, by joining efforts to establish a shared system. The latter is the most common approach for packaging, in which collective responsibilities are fulfilled in partnership with waste management companies.

These waste management companies assume the responsibilities of an obligated party as outlined in government regulations regarding the collection and recycling of products, collect and recycle plastic waste on behalf of the obligated producers and reports to the regulator on their behalf.

1.5 Key benefits of EPR

EPR programs, if implemented effectively, are able to provide a number of benefits such as sustainable consumption and production, including increased collection and recycling rates, reduction of public spending on waste management, reduction in overall waste management costs, and design for environment innovations thereby increasing the durability (or compatibility) and reusability of products.²⁰ There is now some evidence available that allows assessing the environmental and economic performance of these EPR approaches. Some of the probable benefits are identified in the following:

¹⁷ Plastic Waste management Rules

[https://eprplastic.cpcb.gov.in/plastic/downloads/Plastic%20Waste%20Management%20Rules,%202016,%20\(First%20Amendment\),%202018.pdf](https://eprplastic.cpcb.gov.in/plastic/downloads/Plastic%20Waste%20Management%20Rules,%202016,%20(First%20Amendment),%202018.pdf)

¹⁸ Arp, R. *Extended Producer Responsibility for plastic packaging in South Africa: A synthesis report on policy Recommendations*. (2021) WWF South Africa, Cape Town, South Africa. Available online at https://wwfafrika.awsassets.panda.org/downloads/epr_synthesis_report.pdf?34924/Extended-Producer-Responsibility-for-plastic-packaging-in-South-Africa

¹⁹ Arp, R. *Extended Producer Responsibility for plastic packaging in South Africa: A synthesis report on policy Recommendations*. (2021) WWF South Africa, Cape Town, South Africa. Available online at https://wwfafrika.awsassets.panda.org/downloads/epr_synthesis_report.pdf?34924/Extended-Producer-Responsibility-for-plastic-packaging-in-South-Africa.

²⁰ Science Direct (2020) <https://www.sciencedirect.com/science/article/pii/B9780128178805000165>

Environmental benefits: Reduced waste disposal and increased recycling helps to mitigate a range of environmental problems traditionally associated with waste management such as air pollution from waste dumps or incinerators, and contamination of land and water.²¹ It supports effective **end-of-life collection** and **environmentally sound treatment** of collected waste products. It also helps *reducing waste disposal and increasing recycling*. Despite data limitations and methodological challenges in attributing trends to specific policy initiatives, there is evidence that levels of waste disposal have decreased, and recycling has increased in OECD countries due to a EPR mechanism.

Case Study 1: Tangible Benefits of EPR Policies

OECD 2016 report cites that between 1995 and 2001, the amount of municipal waste generated per capita per year in the OECD area increased from 520 kg to 530 kg (OECD 2015). However, from 2001 it shows a decreasing trend, owing to the increase level of material recovery in OECD countries increased from 19% in 1995 to 33% in 2010. Energy recovery also increased from 17% to 18% in the same period. The report also indicates that the levels of material recovery varied widely among OECD countries. This suggests that there is further scope in many OECD countries to increase recycling levels. Well-designed EPR systems could contribute to this regard. Another study focused on EU Member States also concluded that EPRs had helped to achieve variable but reasonably high recovery targets. Evidence from Japan also suggests that EPRs contributed to increased rates of recycling of containers and packaging waste; a 27% increase between 1997 and 2000 from 1.25 to 1.59 million tonnes (OECD, 2014).

Source: <https://www.oecd-ilibrary.org/sites/9789264256385-4-en/index.html?itemId=/content/component/9789264256385-4-en>

As per WWF 2020 report, EPR has contributed to increased packaging waste recycling rate in France from 18% in 1993 to 68% in 2016. Italian recycling rates for plastic packaging also increased from 9.6% in 1997 to 38% in 2014, and for all packaging from 3% to 65.4% over the same time period. In 2016, the Belgian Fost Plus scheme achieved a recycling rate of 80.6%. The Korean scheme set up in 2003 helped to increase recycling of packaging material by 74%.

Source: https://wwfint.awsassets.panda.org/downloads/how_to_implement_epr_briefing_for_government_and_business.pdf

Another environmental aspect of the EPR schemes is that they incentivize producers towards green design or eco-design, creating more resource efficient products with lower environmental impacts e.g., standardizing plastic packaging, using fewer or less harmful materials and then finally contributing to the transition towards a circular economy.²² Moving towards a circular economy is imperative but will require rising above the conventional ‘recycling approach’. It is notable that it is impossible to recycle infinitely and eventually plastics form part of leakages into the environment. This in a way also compels us to drive Design for Environment (DfE) changes and boosting initiatives such as refill and reuse.

Financial benefits: EPR can provide financial benefits, by moving financial responsibility for (parts of) waste management away from public authorities and municipalities onto producers. The fees paid by producers to participate in EPR schemes can be used to help make waste collection and management infrastructure and processes more efficient. For example, since the creation of the French packaging EPR scheme (formerly EcoEmballages, now CITEO), producers have paid €8 billion in fees to support the functioning of the scheme, and resold

²¹ OECD iLibrary <https://www.oecd-ilibrary.org/sites/9789264256385-4-en/index.html?itemId=/content/component/9789264256385-4-en>

²² WWF (2020) How to implement

EPR https://wwfint.awsassets.panda.org/downloads/how_to_implement_epr_briefing_for_government_and_business.pdf

recycled materials have generated €193 million of revenue for local authorities.²³In addition, it can reduce cost of using recycled material relative to virgin materials, by ensuring more effective collection of sorted waste materials and thereby providing higher quality secondary raw material.

Social benefits: EPR also places greater social responsibility on producers by applying the *polluter pays principle*. Furthermore, it reduces potential health risks from mismanaged waste, including hazardous waste such as WEEE and batteries (e.g., pollution of water sources, health risks from pests attracted to dumped waste). It leads to new job opportunities eg: in Germany, around 290,000 people work in the waste management and secondary raw materials sector. EPR may also offer opportunities for integration of informal sector for collection of waste, which should eventually lead to improved social status of the people involved.

1.6 Plastic Value Chain

The **plastic value chain** is complex, touching most businesses sectors globally. It spans from the extraction of raw material for plastic production over several steps to the end-of-life management and disposal of plastic waste.²⁴

The plastics sector engages a broad spectrum of stakeholders from the public, private, and civil sector at the national, state, and local levels. The key stakeholders involved across different stages of plastic value chain are plastic producers and processors, consumers, and waste managers. They are supported by connected stakeholders: industry associations, waste management companies, transporters, and importers/exporters. The common stakeholders across the entire value chain include financial institutions, civil society organizations, and regional, national, and international governmental and non-governmental institutions.

²³ WWF (2020) How to implement EPR https://wwfint.awsassets.panda.org/downloads/how_to_implement_epr_briefing_for_government_and_business.pdf

²⁴ Principles for Responsible Investment (2019) <https://www.unpri.org/download?ac=10258>

2. **EPR in PWM Rules 2016 and its amendments**

MoEF&CC notified the Plastic Waste (Management and Handling) Rules, 2011 on 4th February 2011, which featured the mention of EPR, where the municipal authority may ask the manufacturers, either collectively or individually to provide the required finance to establish the plastic waste collection centres. They further notified the Plastic Waste Management (PWM) Rules, 2016, in which, producers, and importers of plastic as well as brand owners called the obligated entities to be financially and physically responsible for handling their post-consumer plastic waste. The minimum thickness of plastic carry bags was increased from 40 microns to 50 microns and further amendments mandated the thickness to seventy-five microns from 30 September 2021 and one hundred and twenty (120) microns from 31 December 2022. Further amendments were introduced in 2018 and was called PWM Amendment Rules 2018.²⁵

The section 13(2) now requires all brand owners and producers to register or renew registration with the concerned State Pollution Control Board (SPCB) or Pollution Control Committee (PCC) if operational only in one or two states or union territories. They have to do the same through the online portal developed by Central Pollution Control Board. Provision for registration shall be made on the Extended Producer Responsibility portal. EPR targets have to be accounted for at the national level, irrespective of which state the products are sold or consumed in.

Amendment of PWM Rules, August 2021 - Ban on selected SUPs commodities

- Non-woven plastic carry bag shall not be less than 60 Grams Per Square Meter (GSM) with effect from the 30th of September 2021.
- The manufacture, import, stocking, distribution, sale, and use of following single-use plastic, including polystyrene and expanded polystyrene, commodities shall be prohibited with effect from the 1st July 2022 such as earbuds with plastic sticks, plastic sticks for balloons, plastic flags, candy sticks, ice-cream sticks, polystyrene [Thermocol] for decoration; plates, cups, glasses, cutlery such as forks, spoons, knives, straw, trays, wrapping or packing films around sweet boxes, invitation cards, and cigarette packets, plastic or PVC banners less than 100 micron, stirrers.
- However, the above provision will not apply to compostable plastics.

Amendment of PWM Rules, September 2021-Use of Recycled Plastics

Carry bags made of recycled plastic or products made of recycled plastic can be used for storing, carrying, dispensing, or packaging ready to eat or drink foodstuff subject to the notification of appropriate standards and regulations under the Food Safety and Standards Act, 2006 (34 of 2006) by the Food Safety and Standards Authority of India.

Amendment of PWM Rule, February 2022- Introduction of EPR Guidelines

The Ministry notified comprehensive guidelines on EPR for plastic packaging on 16th February 2022 which came into force with immediate effect. The guidelines provide a framework to strengthen the circular economy of plastic packaging waste and promote alternatives to plastic. They provide a roadmap for businesses to move towards sustainable plastic packaging.²⁶

²⁵ Down to Earth (2018) <https://www.downtoearth.org.in/news/waste/centre-amends-plastic-waste-rules-2016-but-still-60084>

²⁶ Press Information Bureau Government of India (2022) <https://pib.gov.in/PressReleasePage.aspx?PRID=1799170>

Main provisions under the rules are highlighted below:

- The Guidelines provide the roles and responsibilities of Producers, Importers, Brand Owners, Central Pollution Control Board, State Pollution Control Board or Pollution Control Committees, recyclers, and waste processors for effective implementation of Extended Producer Responsibility.
- Entities that are covered under EPR obligations and provisions:
 1. Producer of plastic packaging.
 2. Importer of all imported plastic packaging and/or plastic packaging of imported products.
 3. Brand Owners including online platforms/marketplaces and supermarkets/retail chains other than those, which are micro and small enterprises as per the criteria of the Ministry of Micro, Small and Medium Enterprises, Government of India.
 4. Plastic Waste Processors

Note: The above entities shall have to register on the centralized portal developed by CPCB. No entity shall call out business without registration and is not allowed to deal with any other entity that is not registered through an online portal.

- **Categories of plastic packaging under EPR:** The new rules classify plastics into four categories:
 - ✓ **Category 1** will include rigid plastic packaging.
 - ✓ **Category 2** will include flexible plastic packaging of single layer or multilayer (more than one layer with different types of plastic), plastic sheets and covers made of plastic sheet, carry bags, plastic sachet, or pouches.
 - ✓ **Category 3** includes Multi-layered plastic packaging (at least one layer of plastic and at least one layer of material other than plastic) and
 - ✓ **Category 4** includes plastic sheet or like used for packaging as well as carry bags made of compostable plastics.
- **Registration:** With respect to plastic packaging, the EPR covers reuse, recycling, use of recycled plastic content and end of life disposal by producers, importers, and brand-owners. According to the new rules, the producers, importers, and brand-owners shall have to provide the details of recycling certificates only from **registered recyclers** along with the details of quantity sent for end-of-life disposal, by June 30 of next financial year while filing annual returns on the online portal. The details provided by producers, importers and brand-owners and registered plastic waste processors will be cross-checked by the **centralised online portal**.
- **Targets for EPR and obligations of Producers, Importers & Brand-Owners:** The regulation mandates EPR targets based on the average weight of virgin plastic packaging material (category-wise purchased and introduced in market in the last two financial years (A) plus average quantity of (B) of pre-packaging in the last two financial years.

Extended producers' responsibility target:	
Year	EPR Target (%)
2021-22	25
2022-23	70
2023-24	100

Source: Ministry of Environment, Forest & Climate Change

The guidelines mandate PIBOs with recycling targets of collected plastic packaging to the tune of 30-50 percent in the first year of its implementation i.e., 2024-25 which will

gradually go up to 60-80 percent depending upon the variety and applications of plastics in packaging from the financial year 2027-28 onwards.

Minimum level of recycling (excluding end of life disposal) under extended producers' responsibility target (%)				
Plastic packaging category	2024-25	2025-26	2026-27	2027-28
I. Rigid plastics packaging	50	60	70	80
II. Flexible plastics packaging	30	40	50	60
III. Multilayer plastics with different materials	30	40	50	60
IV. Sheets made of compostable plastics	50	60	70	80

Source: Ministry of Environment, Forest & Climate Change

End of Life Disposal: Only those plastics, which cannot be recycled will be sent for end-of-life disposal such as road construction, waste to energy, waste to oil, cement kilns (for co-processing), etc. as per relevant guidelines issued by Indian Road Congress or Central Pollution Control Board. The Brand Owner shall ensure the end-of-life disposal of the plastic packaging waste only through methodologies specified in Plastic Waste Management Rules, 2016,

Obligation for reuse: The BO using Category I (rigid) plastic packaging for their products shall have minimum obligation to reuse such packaging as given below.

Provided the reuse of Category I rigid plastic packaging in food contact applications shall be subject to regulation of Food Safety and Standards Authority of India.

	Rigid Plastic Packaging (Year)	Target (as percentage of Category I rigid plastic packaging in product sold annually)
A	less than 4.9 litres or kg.	
I	2025 – 26	10%
II	2026 – 27	15%
III	2027-28	20%
IV	2028-29 and onwards	25%
B	more than 4.9 litres or kg.	
I	2025 – 26	70%
II	2026 – 27	75%
III	2027-28	80%
IV	2028-29 and onwards	85%

Obligations for Use of Recycled Plastic Content: The Brand Owner shall ensure the use of recycled plastic in plastic packaging category-wise

Mandatory use of recycled plastic in plastic packaging (% of imported plastic for the year)

Plastic Packaging Category	2025-26	2026-27	2027-28	2028-29 and onwards
Category I	30	40	50	60
Category II	10	10	20	20
Category III	5	5	10	10

Source: Ministry of Environment, Forest & Climate Change

2.1 Challenges for implementation of EPR

a) Registering PIBOs and PWPs to sign up on the portal.

In the pursuit of establishing an effective Extended Producer Responsibility (EPR) framework, one of the significant challenges encountered revolves around the necessity for all Producers, Importers, Brand Owners (PIBOs), and Producer Waste Producers (PWPs) to register on the centralized portal established by the Central Pollution Control Board (CPCB) for tracking EPR-related transactions. The success of any EPR system hinges upon the active and coordinated participation of all stakeholders, and it is evident that securing the buy-in of PIBOs and recyclers to sign up on the portal is a major task ahead. This challenge is rooted in a complex web of factors that encompass varying levels of awareness, divergent technical capacities, and a lack of uniform understanding about the benefits and intricacies of EPR implementation.

b) Informal sector integration

Informal sector operates in a major way in the post-consumer section of the plastics value chain. They are organized as scrap dealers, itinerant buyers, aggregators, stockist, and recyclers depending on their financial and technical skills / capacity. The present EPR regime although do not mention directly on the role of informal sector but gives an opportunity to informal sector to scale up their operations and possibly become/support registered waste management agency and get integrated to the EPR ecosystem at the same time. For this there is a need for capacity building in terms of documentation and skills to meet the EPR requirements.

There have been a number of good examples for instance in Indore where, informal sector has been integrated in the Material Recovery Facilities setup in the city providing them with a daily wage and also utilizes their knowledge and expertise in the waste identification and sorting service. The Swachh Pune model is a well-known model that has been a flag bearer from India. Today we are also seeing multiple platforms that working with mobile based interfaces to integrate the services of informal sector and provide them with immediate payments for the services being rendered.

c) Handling low value plastic

Since the recycling market already exists for high value plastic waste, the majority of the informal waste workers are already integrated in the value chain of these material, supporting the current ecosystem of collection and segregation of high value plastic waste. However, a gap exists for low value plastic waste (e.g., multi-layer plastics), which are not easily and economically collected. Informal sector also stands to ignore the low value plastic items owing to their low market value, hence, leading to littering or ending up in the dumpsites. While the EPR rules identify these as one of the important categories of plastics packaging and put onus on the relevant PIBOs using

these types of packaging, but on ground collection and segregation of low value plastics packaging still remains a challenge.

d) Lack of standards for recycled plastics:

India's recycling industry boasts a remarkable achievement, with approximately 60% of plastic waste generated being effectively recycled. The informal sector plays a pivotal role in driving this high recycling rate, which is comprised of self-employed individuals, along with small and medium-scale enterprises, which often lack legal recognition. These entities operate on a low-cost basis, with a primary focus on securing basic livelihoods. Consequently, concerns related to the quality of recycling processes might not be prioritized. Standards regarding recycled plastic in India are issued by the Bureau of Indian Standards. The document IS 14534:1998 titled “Guidelines for Recycling of Plastics” indicates the step-by-step procedures for the recovery and recycling of plastic waste. It documents in detail the procedures to follow for the selection, segregation and processing of waste/scrap that are suitable for recycling. Further, recycled plastic manufacturers usage rules were introduced in 1999. While there have been multiple technological and policy advances post this, standards must aim to address practical aspects relating to quality, number of cycles of recycling, acceptable additives to improve the standards of recycling.

e) Limited number of industrial composting facilities

The push to find sustainable alternatives to conventional plastic packaging has brought compostable and biodegradable plastics into the spotlight as promising options. EPR rules of India also recognise them as the 4th category under the types of plastics packaging considered. However, it is essential to acknowledge a critical challenge associated with compostable plastics—the requirement for industrially controlled conditions to ensure proper end-of-life disposal. As of the latest available data, there are only 18 industrial composting plants spread across 9 states and Union Territories, with a combined installed capacity of 18,568 tons per annum (TPA). Gujarat leads the way with 6 industrial composting plants, followed by Maharashtra and Tamil Nadu, each with 3, while the remaining regions have only one plant each. Considering the sheer volumes of compostable plastics that may enter Indian market, there is a requirement for setting up an adequate number of industrial composting facilities to treat this waste. Details of industrial composting facilities are show below.

S.No	State	Total Installed Capacity (TPA)
1	Gujarat	10,140
2	Madhya Pradesh	4,500
3	Maharashtra	2,535
4	Delhi	1,000
5	Tamil Nadu	348
6	Kerala	25
7	Haryana	12

8	Uttar Pradesh	8
9	Himachal Pradesh	0.145
Total		18,568.15

Source: CPCB's EPR Portal

f) Labelling guidelines for compostable and biodegradable plastics

Clear labelling of compostable and other biodegradable plastics emerges as a pivotal factor for ensuring effective identification of these alternatives. There is a need for clear guidelines or on-ground practices employed to distinguish between conventional plastic streams and proposed alternatives such as compostable plastics. This is essential, not only to ensure the scientific disposal of these distinct waste streams but also to facilitate their seamless recognition and segregation at the city-level collection and sorting stages. In the context of India, where informal waste sector activity plays a significant role, the implementation of clear and standardized color-coding systems becomes indispensable. The incorporation of color-coding into this labelling system holds immense promise, given its simplicity and accessibility, especially in the context of the informal waste sector that thrives in many Indian cities. Clear and standardized colour codes can provide immediate visual cues, enabling even individuals with limited literacy to differentiate between various types of plastics effectively. This not only streamlines the collection and segregation processes but also enhances the overall efficiency of waste management systems. In this regard, recently the Plastic Waste Management Rules, 2016 (Amendment 2023) was introduced by MOEF&CC on 30th October, 2023, according to which a carry bag or plastic packaging made from compostable and biodegradable plastic must bear the label 'compostable only under industrial composting' and 'Biodegradable in [number of days] only in [recipient environment such as land, landfill, water, etc.]', respectively.

g) Need for improving recycling infrastructure in states

At the national level, total installed recycling capacity is estimated to be about 6.5 million TPA (based on CPCB's EPR portal till Sep23). India's recycling infrastructure is developing and still at an early stage. Some states have better recycling infrastructure whereas some states/UTs are still in their nascent stage to develop recycling infrastructure. States such as Gujarat, Madhya Pradesh, Maharashtra, Uttar Pradesh, and Telangana are leading states having the largest recycling infrastructure in place. Gujarat is the leading state in India in terms of plastic recycling, accounting for about 20% of the country's total plastic recycling capacity, followed by Madhya Pradesh with 12% and Maharashtra (Figure 1). But some states/UTs such as Chhattisgarh, Meghalaya, Nagaland, Sikkim, Lakshadweep, Ladakh and Andaman & Nicobar need to enhance the recycling infrastructure in their relevant states/ UTs to cope up with the plastic waste generation in their state. Figure 1 depicts states the percentage share of different states in the total installed recycling capacity in India.

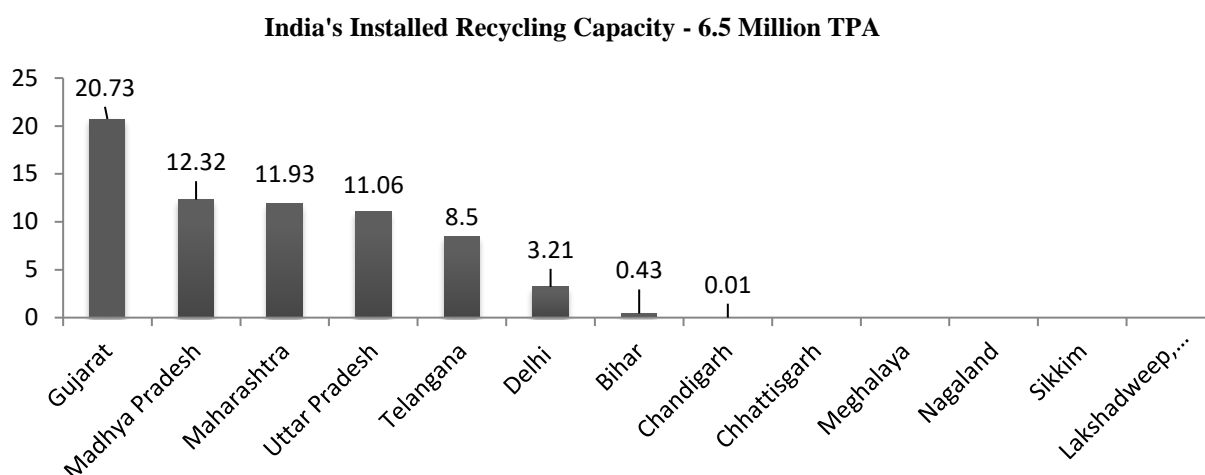


Figure 1 Percentage share of different states in the total installed recycling capacity in India

Source: CPCB annual report 2020-21 & EPR Portal

h) Need to enhance emphasis on product design standardization

The absence of standardization in plastic packaging especially in Fast Moving Consumer Goods (FMCG) represents a formidable challenge within the ambit of Extended Producer Responsibility (EPR) and sustainable waste management. The lack of uniformity in packaging design, shape, size, and colour in the Indian context has led to a complex web of issues that reverberate across the entire lifecycle of plastic materials. These issues encompass challenges in collection, sorting, resin identification, and recycling capacity limitations. Standardization in packaging design offers a multifaceted solution with the potential to streamline the management of plastic waste. A harmonized approach to packaging can simplify the identification of materials, making it more efficient for consumers, waste collectors, and recycling facilities to distinguish between different types of plastics. This, in turn, can significantly enhance collection rates, as well as the effectiveness of sorting processes, leading to a reduction in contamination and improved recycling outcomes.

i) Implementation related challenges in difficult terrains (including mountains)

The current Extended Producer Responsibility (EPR) framework promotes a geography-neutral and brand-neutral dealing of the plastic packaging waste. While the intent behind this approach is to ensure a fair and equitable distribution of responsibility, there are disparities in operational costs for waste collection and management programs across diverse geographical terrains within India. Specifically, regions characterized by rugged and challenging terrains, such as the mountainous and Northeastern states, face substantially higher costs associated with waste collection and program operations compared to more urbanized and accessible metropolitan areas. Consequently, this could create a disincentive for stakeholders to actively engage in waste collection and management programs in such regions and may lead to a disproportionate concentration of EPR activities in areas with lower operational costs.

j) Need for emphasis to regulate chemicals in plastics

More than 13,000²⁷ chemicals are used in the manufacturing of plastics, 7,000 of which have been screened for their potential harm. Of these 7,000 compounds, more than 3,200 have been recognized as substances that may be of concern due to their potential hazard. Despite additives being useful, they have the potential to migrate and contaminate soil, air, water, food and be released from plastics during the various recycling and recovery processes and from the products produced from recyclates²⁸. Among these are phthalates and flame retardants that are being studied extensively for their impact on the environment²⁹. The Globally Harmonized System of Classification and Labelling of Chemicals (GHS) and the Classification, Labelling and Packaging Regulation of the European Union both classify hazardous properties as carcinogenicity, mutagenicity, reproductive toxicity, endocrine disruption, and ecotoxicity to aquatic organisms. Furthermore, found that over 1,000³⁰ different chemicals can migrate from plastic food contact materials into food or food stimulants. In 2022, the Food Safety and Standards Authority of India (FSSAI) amended³¹ its Food Safety and Standards (Packaging) Regulations to limit the overall migration of antimony from plastic packaging to 0.04 mg/kg food.

3. EPR related policy instruments in different countries

Based on the “Polluter pays” principle a number of countries adopted and implemented EPR approach considering their national regulatory and domestic requirement. Conceptually, the EPR mechanism adopted follows the life cycle approach of the product with design for environment considerations. The largest group of countries which have adopted this approach is European Union (EU), a union of twenty-seven countries in Europe. The general principle remains uniform for all these countries while each country devises its own regulatory and financial mechanism to implement them. Other countries in Europe and other parts of the world design their own system like EU countries with differences in the business and financial model. The mechanism evolved support the existing waste management system. *The following sections describe the EPR mechanism, which is practised in major countries in Europe, Asia, and Africa.*

3.1 Case Studies on EPR for plastic packaging

i) Australia

Australia has implemented a form of EPR known as Product Stewardship (PS) which establishes a shared responsibility for reducing environment impact of products. Management of plastic packaging Australia sets out a regulatory base through the National Environment Protection (use packaging material) Measure 2011, which obligates industry selling or producing packaged goods to design more recyclable, reusable and compostable packaging.

²⁷ Chemicals of concern in plastic toys. Environment International (2021)

<https://www.sciencedirect.com/science/article/pii/S0160412020321498?via%3Dihub>

²⁸ <https://www.sciencedirect.com/science/article/pii/S030438941730763X>

²⁹ https://link.springer.com/referenceworkentry/10.1007/978-3-031-16101-8_33

³⁰ Taylor and Francis Online (2022) Systematic evidence on migrating and extractable food contact chemicals <https://www.tandfonline.com/doi/full/10.1080/10408398.2022.2067828>

³¹ FSSAI (2022)

[https://www.fssai.gov.in/upload/notifications/2022/09/631067fe88a44Gazette Notification Plastic 01 09 2022.pdf](https://www.fssai.gov.in/upload/notifications/2022/09/631067fe88a44Gazette%20Notification%20Plastic%2001%2009%2022.pdf)

The measure also speaks about Australian Packaging Covenant Organisation (APCO)³² that aims at reducing the environmental impacts of Consumer Packaging through a shared responsibility. The obligation provides for companies that are brand owners exceeding an annual turnover of AUD 5 million in a year parallelly allowing companies below the threshold to join voluntarily³³. The following are the national targets set by Australia for brand owners:

- 100% packaging entering Australian market to be recyclable, reusable, and compostable by 2025
- 70% of plastic packaging should be recycled, reused, or composted by 2025
- 50% of average recycled content use to be used across all packaging by 2025.
- Phase out of problematic and unnecessary single-use plastic packaging by 2025

There are 3 different types of PS established in Australia, a mandatory, a voluntary and a co-regulated PS, together with the respective industrial group. Plastic packaging is co-regulated PS where the government sets out a legal framework while the industry is responsible for delivering targets laid out. Under this, producers only have the obligation of contributing to designing packaging (for instance, not using a particular resin that is not recyclable) leading to achieving of targets. There are no contributions made to manage the waste. In addition, Australia also has published a list of problematic & unnecessary SUP in 2022-23 to be phased out. The idea is to rationalize polymers to PET, HDPE and PP, with the phase out of PVC, PS, EPS and unnecessarily complex composite materials which have poor recoverability, which will greatly improve recovery rates and efficiencies for reprocessing³⁴.

- i) Non compostable plastic packaging products containing additive (by June 2022)
- ii) Polyvinyl chloride (PVC) packaging labels, films and rigid packaging (by Dec 2022)
- iii) Expanded polystyrene (EPS) loose packaging (by June 2022)
- iv) Moulded EPS, EPS loose fill and EPS consumer food and beverage containers Polymer labelling (Dec 2022)
- v) Polymer labelling and sleeves for plastic products to be compatible with plastic polymers to enable recycling (Dec 2023).

ii) European Union

European Union came up with the **Directive 2008/98/EC** as amended (the Waste Framework Directive), which sets out a legal framework for dealing with waste and introduced the concepts of waste hierarchy; and “EPR”. They also brought in Directive 94/62/EC as amended (the Packaging and Packaging Waste Directive), which aims to harmonise the management of packaging waste and prevent or reduce the impact of packaging and packaging waste including by setting recovery and recycling targets. In December 2015, the Commission adopted an EU Action Plan for a Circular Economy which identified plastics as a key priority and committed itself to ‘prepare a strategy addressing the challenges posed by plastics throughout the value chain and taking into account their entire life cycle’.

³² Australian Government Dept. Of Climate change, Energy, the Environment & water
<https://www.dcceew.gov.au/environment/protection/waste/product-stewardship/products-schemes/apco>

³³ Australian Packaging Covenant Organisation <https://apco.org.au/brand-owner-membership>

³⁴ Our Packaging Future, April 2020 <https://documents.packagingcovenant.org.au/public-documents/Our%20Packaging%20Future>

The Commission adopted the Plastics Strategy in January 2018, which set out its vision for a circular plastics economy, made commitments for action at EU level and recommended measures to national authorities and industry. The Plastics Strategy includes the goal of making recycling profitable for business.

In May 2018, Directive (EU) 2018/851 was passed (the Revised Waste Framework Directive) introducing general minimum requirements for EPR schemes and outlining the measures that Member States are required to take to prevent waste generation. In February 2021, the European Parliament voted in favour of adopting the New Circular Economy Action Plan, while also calling on the Commission to direct funding towards circular economy initiatives, propose binding EU targets for 2030 to reduce material and consumption footprints, and propose product-specific and/or sector specific binding targets for recycled content. EU has set an EPR recycling target for plastic packaging as 25 % currently, 50% by 2025 and 55% by

Box 1: Innovative packaging reuse model

The **LOOP** is a private company that operates a reverse supply chain model¹ and provides reusable packaging to brands to deliver products to potential customers (Figure 2). Customers purchase their products from brands online by placing an order with any e-commerce grocery service that has a partnership with LOOP. When their goods are delivered to the customer, they are packed individually in reusable closed containers that belong to LOOP. There are no wrappers, packaging, or single-use plastics; the empty containers are stored and later collected by LOOP or authorized service providers to be cleaned and resupplied to the brands. The loop model helps in reducing the single use plastic packaging waste and contribute to sustainable and reusable packaging. Loop model has already gained attention of customers in USA, France and many other countries in EU.



Figure 2 Loop Model

2030³⁵. Some of the member states of EU have innovative reuse models in led by private sector for reducing single use packaging waste.

iii) Sweden

Svenska Retursystem: The Swedish EPR system utilizes reusable pallets and crates for grocery/food distribution. The model was jointly launched³⁶ by the Trade Association for Grocery of Sweden (SvHD) and the Swedish Food & Drinks Retailers Association (DLF). The solution serves as an option to reduce single use transit packaging such as wooden crates, pallets or cardboard boxes that often contribute to waste³⁷. Svenska Retursystem's model functions such that a customer pays a user fee and deposit for using crates and half-size pallets. This model extends to the customer pay rent and user fee for full-size pallets.³⁸ The model is known to save on CO₂ emissions compared to disposal packaging through the use of reusable crates for filling the same with products and delivering the same to wholesalers, after which the reusable crates are sent for washing/quality check to re-use them again.

iv) Germany

Germany transposed the EU Directive into different national regulations: a broad Waste Law transposing different waste-related Directives, a Single-Use Plastic Ban Ordinance and a Single-Use Plastic Labelling Ordinance which is in force since July 2021. The new German Packaging Act (Verpack G) entered into force on 1st January 2019, thus rendering invalid the Packaging Ordinance, which was in force until 31st December 2018. According to the definition of the law, a manufacturer is one who puts packaging into circulation commercially for the first time and this also applies to retailers who import packaging into Germany. A final distributor sends the packaging to the respective end consumer, who does not put the ordered goods into circulation any further. In addition to private households, trade businesses, restaurants, hospitals, and similar establishments can also be regarded as end consumers.

On separate collection, a scheme based on deposit refund exists in Germany that supports collection of PET, aluminium and glass containers with a volume of 0.1- 3 Liters. The coverage includes bottles containing beer, water, carbonated/non-carbonated soft drinks and mixed alcoholic beverages. Beverages outside the prescribed volume limits was not subject to the mandatory DRS. Reusable packaging which included cardboard and few plastic packaging was not considered under the DRS. The scheme was further extended to milk, dietary beverages for infants, mixed milk drinks and other drinkable milk products from January, 2022³⁹.

³⁵ https://environment.ec.europa.eu/topics/waste-and-recycling/packaging-waste_en

³⁶ Svenska Retursystem <https://www.retursystem.se/en/our-system/reusable-pallets>

³⁷ European Union <https://circulareconomy.europa.eu/platform/en/good-practices/svenska-retursystems-reusable-transit-packing-system-contributes-co2-and-food-waste-reduction>

³⁸ Svenska Retursystem <https://www.retursystem.se/en/our-system/reusable-pallets>

³⁹ Deposit Refund Scheme in Germany - <https://dpg-pfandsystem.de/index.php/en/the-one-way-deposit-system/useful-information/108-legal-changes/302-expansion-of-deposit-obligation-as-of-1-january-2022.html>

Accessed on 20th October, 2023

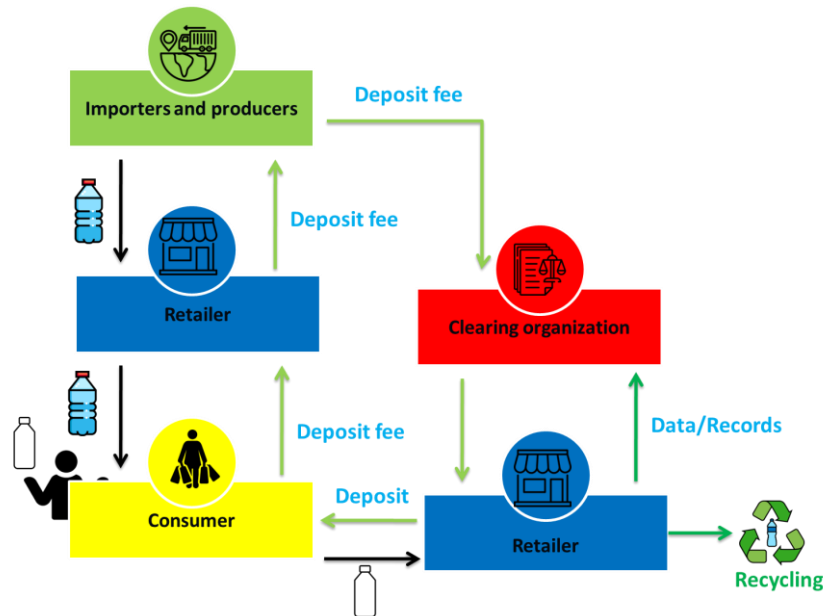


Figure 3 Flow chart of resources and revenue in the DRS model

Figure 3 depicts the flow of resources and revenue in the DRS model.

On design requirements, PET beverage bottles already contain 25% of recycled content in Germany. Fines of up to 100 00 € have been introduced in case of violation of the requirements.

On consumption reduction, Germany decided to introduce an obligation for bigger restaurants and take away establishments (bigger than 81 square meters and at least 6 employees) to offer reusable cups and food containers.

v) Norway

The Pollution Control Act and The Product Control Act are the two major laws supporting the EPR framework in Norway. In 2017, the Norwegian Ministry of Climate and Environment adopted an amendment (Regulation No. 1289/2017) to the Waste Regulation No. 930/2004 in order to introduce mandatory EPR for packaging. It provides that packaging may only be placed on the Norwegian market if it complies with essential requirements in the regulation. These essential requirements⁴⁰ relate to the design of the packaging, the re-use of packaging, and requirements for recycling.

- Packaging is manufactured by maintaining the minimum limits of volume and weight that are required to maintain the necessary level of safety and hygiene and it should be designed and commercialized that it should be recycled or reused has minimum impact on environment.
- The physical properties and characteristics of the packaging shall enable it to be re-used a number of times and it should fulfil the requirements for recyclability when it is no longer re-used and ends up as waste.

⁴⁰ Norwegian Environment Agency – Chapter 7 – Packaging Waste
<https://www.environmentagency.no/legislation/waste-regulations/chapter7-packaging-waste/>

- Packaging should be suitable for material recycling, energy recovery or composting, or for reuse if reuse is intended in compliance with EU standards (EN 13431:2004)⁴¹
-

The EU Directive bans as well as the marking requirements have been transposed into Norwegian law. In Norway national DRS system for PET bottles is functional since 1995, allowing the member state to reach a separate collection rate of 92% for bottles and cans in 2020 which is well above the target set out in the EU Directive which is 90% of single-use plastic bottles with caps and lids to be achieved by 2029. On the upstream side, packaging must be manufactured in such a way that a certain percentage of the materials used can be recycled for the production of marketable products in accordance with applicable community standards. All PET containers must have the approved labelling according to the material packaging specification and PET containers with maximum 80% mechanically recyclable content⁴².

Producers who supply the Norwegian market with at least 1,000 kg of a packaging type per year shall finance the collection, sorting, material recycling and other processing of waste packaging through membership of a collection scheme approved by the Norwegian Environmental Protection Agency. Norwegian municipalities are responsible for the collection and treatment of household waste. They finance the costs through fees paid by the households (self-cost). The EPR companies/schemes pay municipalities for net extra cost for household waste in addition to fees charged by them. For packaging waste, the EPR companies/schemes facilitate collection by municipalities and private companies. There is no competition with collectors. They rely on agreements with municipalities and private collectors.

The producer, in collaboration with other producers report annually on waste prevention efforts. This includes the extent to which the basic requirements regarding the manufacture of the packaging and its composition have been met.

vi) United Kingdom

General waste management controls in the UK that apply to plastic and packaging are found largely in waste obligations under the Environmental Protection Act 1990 (EPA 1990)—such as the Producer Responsibility Obligations (Packaging Waste) Regulations 2007 as amended and the Packaging (Essential Requirements) Regulations 2015 (“Packaging Waste Regulations”) which implement EU Directive 94/62/EC (the Packaging and Packaging Waste Directive).

In December 2020, the transition period came to an end. Various statutory instruments came into effect to amend EU-derived domestic legislation and ensure that UK environment and waste legislation continues to operate as intended. The UK government has indicated that going forward it may consider alternative approaches to plastics legislation compared to the EU. Devolved administrations will take their own approach. For example, the *Single Use Carrier Bags Charges* (England) Order 2015 and 2021 introduced a 5p and 10p charge, respectively,

⁴¹ <https://www.euopen-packaging.eu/wp-content/uploads/2021/03/CEN-QA-February-2006.pdf>

⁴² Material and Packaging Specification for beverage containers - <https://infinitum.no/media/3xcnl2q/20230401-infinitum-material-specs-ver12-2.pdf>

on all single use carrier bags in England initially for companies with 250 or more employees now applies to all English retailers.

The *Packaging Waste Regulations* require producers of packaging to be responsible for a proportion of the costs for recycling and recovery of that packaging waste. The financial contribution is determined using a formula that takes into account the producer's role in the supply and distribution chain for the packaging. The criteria which trigger producer obligations are annual turnover over £2 million; and handling more than 50 tonnes of packaging or packaging materials in the previous calendar year.

EPR schemes have gained strong political support across the UK, with commitments found in the Resource and Waste Strategy for England (2018), the Scottish Government's circular economy strategy "Making Things Last" (2016), the Welsh Government's circular economy strategy "Beyond Recycling" (2021) and Northern Ireland's Waste Management Plan (2019).

In late July 2019, the UK Government stated that it will implement EPR from 2023. However, some requirements under the legislation such as packaging fees have now been deferred⁴³ to 2025. Provisions are included in the Environment Bill granting powers to the relevant national authorities to adopt secondary legislation to implement EPR. A key focus for the UK Government is to implement a scheme which ensures regulatory consistency across the UK, bearing in mind that the Scottish Government has brought forward separate measures for a DRS.

⁴³Government of United Kingdom Portal <https://www.gov.uk/guidance/extended-producer-responsibility-for-packaging-who-is-affected-and-what-to-do>

The Deposit and Return Scheme for Scotland Regulations 2020 create the legal framework for a DRS in Scotland for drinks containers made from PET plastic, glass, steel, or aluminium, with a deposit level set at 20pence. The Regulations were approved by the Scottish Parliament on 29 April 2020 and the scheme is expected to go live by Oct 2025.⁴⁴ The UK Government set a 25-year Environment Plan that it will work involving a target of

Box 2: Reuse model for wholesale supply chain

Fill is a private company¹ that caters to wholesale stockists that deal with products such as refillable laundry, cleaning, body & hair. This model emphasizes on transporting bulk quantities of products in non-plastic, reusable containers such as wooden drums (Figure 4). These drums are then collected by Fill after use, washed and re-used multiple times. The model has been successfully working in countries like the UK and offer a good potential for replication.

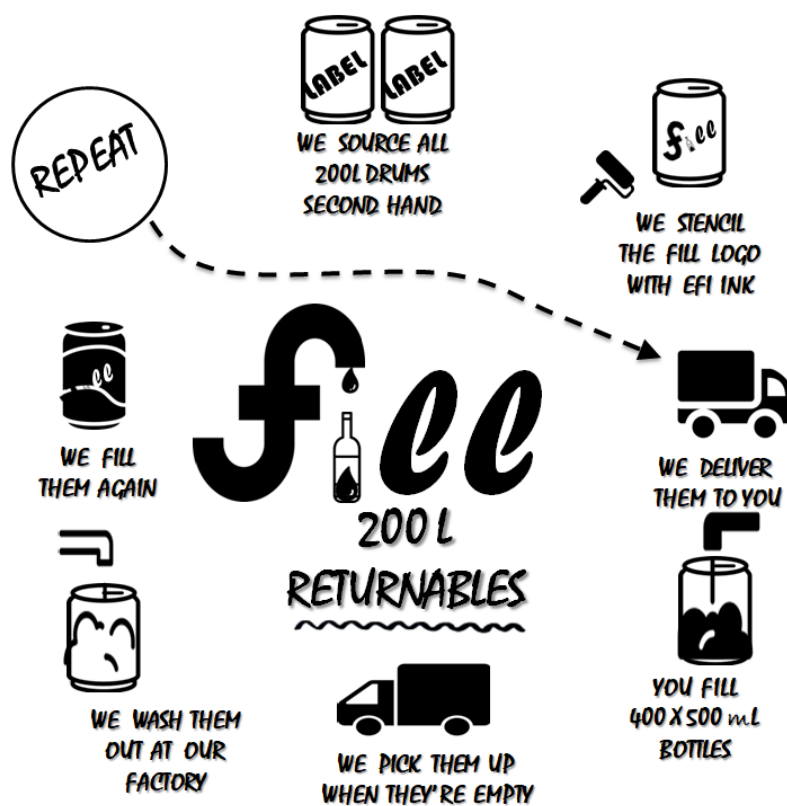


Figure 4 Fill Model for reuse of packaging in the wholesale supply chain

eliminating avoidable plastic waste by the end of 2042. The targets in its Waste and Resources Strategy, December 2018, sets the target of 90% of all plastic drinks bottles to be collected for recycling by 2029, 75% recycling rate for packaging by 2030, municipal waste to landfill at 10% or less by 2035 and eliminate avoidable waste of all kinds by 2050. Box2 presents a

⁴⁴ Scottish Government Portal <https://www.gov.scot/policies/managing-waste/deposit-return-scheme/>

potential reuse model working successfully in UK, which could possibly be replicated for promoting reuse in the wholesale supply chain.

vii) Spain

The central regulation for the implementation of the EU Packaging Directive in Spain is Law No. 11/1997 of 24 April 1997, which is substantiated by Royal Decree 782/1998, the Regulation on Packaging and Packaging Waste. The decree prescribes the obligations for the producers to arrange for recycling of the packing waste that is introduced into the market. In order to comply the producers of household packaging may establish their own deposit return scheme or join a PRO. Both the manufacturers of industrial and commercial packaging are exempt from this obligation. Ecoembes is a monopolistic non-profit PRO was established in 1996 by the producers, retailers, and packaging manufacturers. Ecoembes along with the second PRO Ecovidrio organizes the collection of waste in tandem with the support of the local authorities. The collection from the curbside and households is carried out by the local authorities and authorized agencies. After collection the waste is brought to recycling centres established with partnership of Ecoembes. After the sorting process the waste is 'sold' to Ecoembes (such as PET beverage bottle < 3L rate is 0.600 €/kg, for PET rigid packaging is 0.521€/kg, for HDPE rigid packaging it is 0.399€/kg)⁴⁵. Ecoembes in turn is responsible for identifying and assigning agencies responsible for the recovery/recycling of the various materials sorted in the plants.

viii) Japan

Fundamental Law for Establishing a Sound Material-Cycle Society (basic framework law) came into force in 2001. It is to ensure material recycling in society and to reduce consumption of natural resources to reduce environmental burden. It is aimed to promote waste management and concept of 3Rs. There are laws for waste management and promotion of effective utilization of resources. These laws are fundamentally based on EPR.

The Law for Promotion of Sorted Collection and Recycling of Containers and Packaging, known as the Containers and Packaging Recycling Law aims to promote recycling and reduce the amount of container and packaging waste produced by households, which accounts for 60% of its volume and 20-30% of its weight. Under this law, consumers, municipalities, and businesses are each required to play their part in reducing emissions and recycling waste. Further amendments were made in 2006, which include promotion of emission reductions, high quality sorted collections (contributing funds to municipalities) and altering the PET bottle category (to include containers such as noodle broth bottles).

Consumers must reduce their waste emissions through making reasonable choices of containers and packaging and sort their container and packaging waste for collection. Businesses that manufacture or use products covered by the law are required to recycle those products. Businesses may also contract out recycling work for a recycling fee to the Japan Containers and Packaging Recycling Association.

⁴⁵ <https://www.ecoembes.com/en/companies/packaging-declaration/green-dot-fees>

Municipalities must establish sorted collection plans and take the necessary measures to collect container and packaging waste separately in their areas. In order to assist sorted collection, containers and packaging are also required by law to be labelled with identification marks. Because of the wide variety of materials from which plastic products are made, it is recommended to brand owners that such products also bear a “material mark” as well as an identification mark.

The purpose of the identification markings is to facilitate the sorting of discarded items by consumers when they put out the waste and to promote selective collection by municipalities. As per revision of Law Concerning Promotion of Effective Use of Resources in April 2021, the obligation has been extended to plastic and paper containers and wrapping earlier it was for steel or aluminium cans for alcoholic or non-alcoholic beverages and PET bottles for alcoholic, non-alcoholic beverages⁴⁶.

ix) Republic of Korea

The Republic of Korea introduced its EPR system for packaging in 2003. One of the major priorities has been to minimise its use of resources while meeting the country’s high demand for energy. It is adopted as an efficient system for recovering resources from landfill and encouraging reuse and recycling.

The “Act on the Promotion of saving and Recycling of Resources (Hereinafter referred to as the ‘Recycling Act’)” states the duties of producers and importers of EPR items to collect and recycle the end-of-life products. The Recycling Act facilitates a take-back system by enabling the producers and importers to add bond money to the consumer prices to increase the collection of empty containers. The producers and importers shall refund the bond money when a consumer returns the empty containers. Producers of beverages are utilizing the system, and the level of bond money is about 40% of the cost for manufacturing a new bottle. The producers may establish a waste collection facilitating centre (Producer Responsibility Organization, PRO), which should compensate for the cost of waste collection borne by the local governments. Producers and importers of EPR items shall collect and recycle the end-of-life products or packaging materials or pay the allotted share of charges to the PROs. Also, producers or importers shall endeavour to facilitate recycling by resource efficient designing, restricting use of hazardous substances, and producing or importing easier-to-recycle products. Producers or importers may establish a PRO for recycling to carry out the obligatory recycling responsibility.

The government of the Republic of Korea introduced a number of recycling initiatives, such as a *Volume-Based Waste Fee System*, *Extended Producer Responsibility*, a *deposit refund system* and a *waste charging system*.

Waste generated in detached homes and small business premises is collected by local authorities and transferred to material recovery facilities (MRF) (public and private) for further treatment. Packaging from large apartment blocks and other buildings is collected by private

⁴⁶ https://www.jcpra.or.jp/Portals/0/resource/association/pamph/pdf/law2003_eng09.pdf

recyclers and sent to privately-operated MRFs, from which it is then delivered to recyclers and manufacturers to produce recycled products.

Every year, the Ministry of Environment announces a mandatory recycling rate for each product covered under the EPR system. The central government is responsible for drawing up and implementing regulations on EPR, while local governments are tasked with ensuring effective, responsible waste collection and improving rates of recycling and reuse. The *Korea Environment Corporation* monitors the EPR system and ensures that producers and importers comply with requirements to report their sales and import data, as well as data on waste collection and recycling. Monitoring is enhanced by a number of labelling systems for products covered by the EPR system, including information on the recyclability of packaging and how it should be disposed of. These labels are produced by importers and manufacturers.

The EPR system primarily covers Batteries, tyres, lubricants, fluorescent lamps, styrofoam. The packaging includes metal cans, glass bottles, cartons and card, PET bottles and synthetic resin packaging. These packaging are used to pack food and beverages, agricultural products, marine products, livestock products, cleansers, medicines, cosmetics, etc. It is currently being expanded to cover a total of 32 products including fluorescent lamps, packing films, mobile phones, audios, air conditioning units, PCs, and batteries.

x) United States of America (USA)

Six states in the US⁴⁷ have EPR frameworks in place, including California, Colorado, Maine, Oregon, New Jersey, and Washington. The first state that adopted packaging EPR legislation was Maine. EPR is gradually gaining momentum in the USA. More than 30 bills related to packaging and EPR have now been introduced across the USA. In order to achieve the state's recycling and climate goals and create a circular economy by 2032, California's Plastic Pollution Prevention and Packaging Producer Responsibility Act (SB 54) sets three targets: 100% of packaging in the state must be recyclable or compostable; 65% of all single-use plastic packaging must be recycled; and 25% less plastic packaging must be used. Colorado has a law called the Producer Responsibility Program for Statewide Recycling Act (HB 22-1255) that intends to improve recycling rates and minimize plastic waste in the state, which will help to reduce the quantity of recyclables discarded in landfills. The expenses associated with operating, capitalizing, educating, and promoting the recycling system must be covered by those who produce packaging and printed paper. Maine's legislation (LD 1541 bill), which only applies to packaging materials such as plastic containers, cardboard boxes, and other non-recyclable materials, transfers the responsibility and cost of managing packaging waste from municipalities and citizens to producers. The legislation's goal is to decrease the volume and toxicity of packaging waste entering landfills and increase packaging material recycling. Similar goals have been adopted by other states to achieve sustainable growth.

xi) South Africa

South Africa has recently published the Section 18 Regulations to the National Environmental Management: Waste Act on 5th November 2020. The regulations came into effect on 5th May 2021. It refers to the EPR and makes EPR mandatory for all producers and importers of packaging. It changes how producers, brand owners, retailers, and importers design, make, sell, and keep their products in the recycling loop to the maximum extent. Existing producers are

⁴⁷ <https://blog.sourceintelligence.com/packaging-epr-laws-in-the-us>

required to register with the Department of Environment, Forestry and Fisheries to join or form an EPR scheme that includes the entire value chain. Be accountable for the operation and performance of an EPR scheme. They are required to pay the appropriate fees to the EPR scheme and fulfil monitoring and reporting obligations.

South Africa's plastics industry has four voluntary, industry-led PRO's that are in operation. These PROs collect and recycle PET, polyolefins (PP, HDPE, LDPE/LLDPE and Multi-layer), polystyrene and PVC. Each of these PROs collect voluntary EPR fees from their members and use the revenue to support the collection, sorting and recycling of recyclable materials by informal waste pickers, small and medium-sized collectors, and large-scale mechanical recyclers.

xii) Chile

With the enactment of the EPR Law in May 2020,⁴⁸ the recycling of plastic is shifting from a voluntary action primarily pushed by entrepreneurs and price competitiveness of the recycled plastic resins (in contrast to virgin resins), to an obligation to which Brand Owners and sellers of consumer goods will be made responsible for the recovery of the residues generated by the packaging of their products. The EPR scheme establishes that 80% of all households in Chile will have access to curbside pickup of recyclable products whereas today the coverage hardly reaches 10% of households in the country. Additionally, the law calls for the mandatory installation of “puntos limpios” or collection points to service 75% of Chile's districts. In a four-year period, 350 new collection points will be opened. This will operate under the recycling management system in compliance with high quality standards by a private entity TriCiclos⁴⁹. The decree establishes a 24-month deadline for companies to begin meeting their targets, with 2023 being year 1. The current unutilized installed capacity for recycling means Chile can manage recycling at the present level without any problems. However, in light of the target recovery rates set out in the EPR Law, processing capacity will need to increase considerably to meet long-term recycling targets. For the same reason, a shortfall is anticipated with regard to investment in infrastructure for classification and/or valorisation plants.

Chile's recycling industry is positioning itself as a focal point for economic development and a role model in economics that has a positive impact in social and environmental areas. The new legislation, synergy between public-private stakeholders, and the dynamic ecosystem are setting up new niches for investment and entrepreneurship, especially for international recycling and revalorization companies.⁵⁰

xiii) Vietnam

The amended Law on Environmental Protection, passed in November 2020, contains specifications for separate collection and approaches for EPR. Specifically, for the requirements in solid waste management in Article 72, the law has supplemented a number of

⁴⁸ Prevent Waste Alliance (2023) <https://prevent-waste.net/wp-content/uploads/2023/06/Chile.pdf>

⁴⁹ <https://rapidtransition.org/stories/catch-chiles-waste-reduction-bus-how-behaviour-change-new-infrastructure-and-different-business-models-are-cutting-waste/>

⁵⁰ Invest Chile (2021) <https://investchile.gob.cl/wp-content/uploads/2021/09/plastic-recycling-webinar-presentations.pdf>

regulations, notably the principle of "Polluter pays" as well as responsibilities of organizations and individuals that generate waste.⁵¹

At the same time, the amended Law also introduces a new approach (Article 54 and 55) on EPR.⁵² Article 54 and Article 55 talks about *responsibility for recycling products and packaging materials*⁵³ and *responsibility for waste collection and treatment*⁵⁴ respectively.

EPR has not been fully implemented in Vietnam yet. However, legislation has been passed that provides the legal basis for the initiation of an EPR system in the country. The Law on Environmental Protection 2005 enacted in July 2006 introduced the EPR concept in Vietnam. However, this law was not brought into full play until recently.⁵⁵

In Vietnam, the new EPR approach has come into effect in January 2022, which is expected to impact business operations on plastic packaging including PET bottle, EPS, PSP, PVC, plastic container tray, and film. According to the EPR principles, producers will be in charge not only to produce such commodities but will be held responsible until the waste stage of their life cycle.⁵⁶

3.2 Key Learnings

The literature review of international experience on EPR indicated several good mechanisms, some of which could be used for further strengthening of EPR and its implementation in Indian context. The learnings from the international experience have been compiled below.

Clear Data and Information: Germany⁵⁷ presents a very good case for management of a transparent database and information in regard to EPR. With the packaging act coming into effect, all the manufacturers and distributors of plastic packaging are obliged to register with a public registry, Zentrale Stelle Verpackungsregister (ZSVR). In addition to playing the role of a registrar, ZSVR also records the quantities of packaging being placed into the market by each producer, monitoring of data submitted and quality control. The ZSVR while monitored by the German Environmental Protection Agency is financed collectively by all PROs in proportion to their respective market share.

The ZSVR also features an unambiguous catalogue of packaging that provides clear and transparent orientation to producers and distributors of packaging to categorize their products.

⁵¹WWF (2021) Assessment of EPR for Plastic Packaging waste in Vietnam https://wwfint.awsassets.panda.org/downloads/20210318_policy_brief_epr_vietnam_eng.pdf

⁵²WWF (2021) Assessment of EPR for Plastic Packaging waste in Vietnam https://wwfint.awsassets.panda.org/downloads/20210318_policy_brief_epr_vietnam_eng.pdf

⁵³Enviliance ASIA (2021) https://enviliance.com/regions/southeast-asia/vn/report_1633#:~:text=Responsibility%20for%20recycling%20products%20and,the%20required%20ratio%20and%20methods.

⁵⁴Enviliance ASIA (2021) https://enviliance.com/regions/southeast-asia/vn/report_1633#:~:text=Responsibility%20for%20recycling%20products%20and,the%20required%20ratio%20and%20methods.

⁵⁵WWF (2021) Assessment of EPR for Plastic Packaging waste in Vietnam https://wwfint.awsassets.panda.org/downloads/20210318_policy_brief_epr_vietnam_eng.pdf

⁵⁶ERIA (2022) <https://www.eria.org/events/epr-for-plastics-in-viet-nam-challenges-and-opportunities/>

⁵⁷Julian Ahlers, Morton Hemkhaus, Sophia Hibler, Jürgen Hannak- Analysis of Extended Producer Responsibility Schemes - Assessing the performance of selected schemes in European and EU countries with a focus on WEEE, waste packaging and waste batteries (2021) https://erp-recycling.org/wp-content/uploads/2021/07/adelphi_study_Analysis_of_EPR_Schemes_July_2021.pdf

This clear classification helps by informing the obliged manufacturers about the types of packaging handled by PROs.

Labelling: The Australian Recycling Labelling (ARL) scheme provides a user-friendly labelling interface for its products, which could be extremely helpful in segregated collection and adequate processing of items (Figure 5). The labels clearly identify products that would be disposed in the box, returned to store and can be recycled in the kerbside recycling programme. The labels are easy to understand and designed for the easy understanding of the customers and waste collectors.

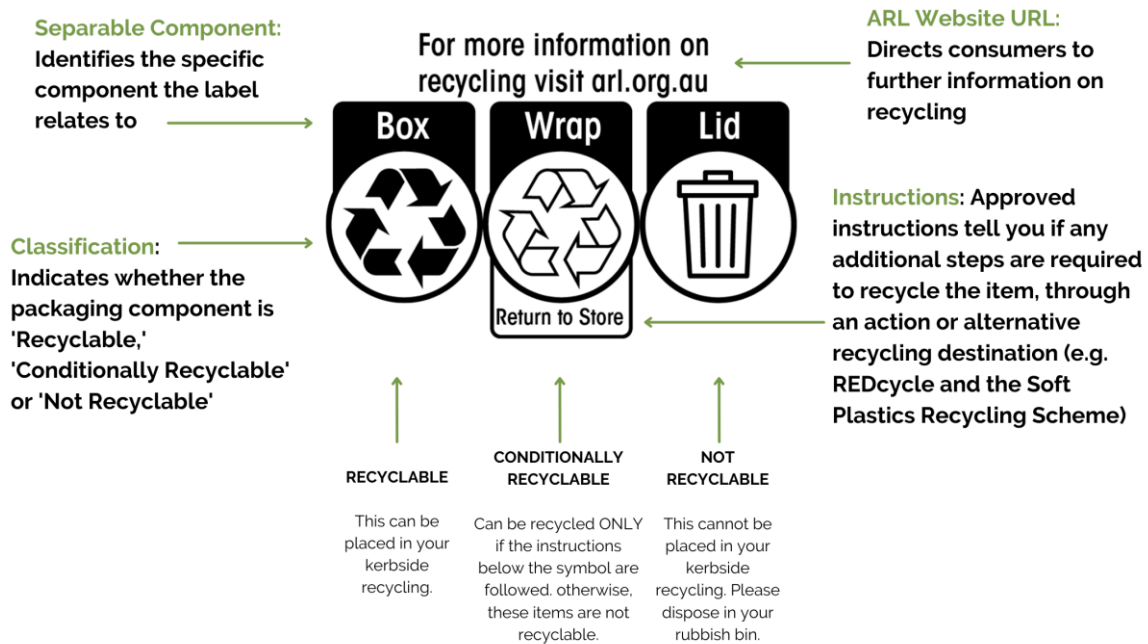


Figure 5 Australian Recycling Labelling (ARL) scheme

Similarly, the How2recycle programme in the USA also provides an insight into a customer centric approach to labelling (Figure 6).



Figure 6 Recycling Labels by How2Recycle (in USA)

Need to manage output quality of recyclate⁵⁶: The Spanish experience shows that despite clearly defined recycling specifications, concerns regarding quality of recycled material have been reported by producers especially with regard to PET and beverage cartons. Estimates have suggested that roughly only 25% of all PET delivered has been used to produce newer PET owing to quality concerns. The rest is downcycled and into flakes and is used for instance in preparation of MLP. This quality related concern is majorly attributed to the sorting process which is done manually. Further, due lack of transparency on recycling results it also becomes difficult to track. There is clearly a need for developing standards for quality of recyclates.

Research support⁵⁶: Spain presents a good example in the form of the Circular lab which serves as one of the major instruments for Ecoembes to promote innovation and sustainability in packaging, improve rates of collection, recycling and enhance consumer awareness. Within the lab, Ecoembes works in partnership with multiple companies on improving Ecodesign, identifying sustainable materials and newer methods to incorporate recycled materials into the production process. The body through its research capacities also offers recommendations for potential design improvements to the industry.

Centralized Coordination: Centralized bodies such as ZVSR and GS in Germany have shown good examples of ensuring smooth centralized coordination and to facilitate interaction between multiple PROs and act as an interface body to ensure neutral competition. This could be attributed as one of the major reasons for the success of EPR in Germany.

Fiscal Incentives: In an attempt to boost investment in recycling, the example from Republic of Korea⁵⁸ is relevant, which in addition to the EPR, has set aside 103.6 KRW (around 94.18 million USD) in 2016 to be given out as loans to agencies to setup recycling infrastructure, with a low interest rate of 1.51%.

Promoting Eco-modulation: Eco-modulation, a form of economic incentive is defined⁵⁹ as the modification of EPR fees to be paid by the producers based on measurable product characteristics. This has been a characteristic of a few EPR schemes in EU including France, Belgium, Italy to name a few. For instance, in Belgium EPR fee for transparent PET is EUR 200/t which is almost less than half of the price for coloured PET which is EUR 470/t. A similar differentiated charge system is also practiced by South Korea⁶⁰ with packaging producers of different types of packaging prescribed rates from 65 won to 883 won per kg.

Handling low value plastics: Experience from across countries demonstrate that high value plastic waste generally gets easily collected, sorted, and recycled. Medium value plastic waste requires some efforts for collection, segregation, treatment, and disposal. But low value plastic waste requires government or other support for collection, treatment, and disposal (e.g. multi-layered plastic (MLP)). The support can be for facilitating or establishment of incineration / waste to energy plant or recycling infrastructure etc. The key to success is increasing the notional value of “low value plastics”. For instance, low value plastic covered under the EPR

⁵⁸Dr. Agamuthu Pariatamby, Mehran Bhatti, Dr. Jayanthi Barasarathi (2021) EPR Policy Review Report – WWF Malaysia and Jeffrey Sachs Centre on Sustainable Development, https://jeffreysachs.center/sites/default/files/content/WWFMY-JSC_EPR_Policy_Review_Report_2021.pdf

⁵⁹European Environmental Bureau (2021) <https://eeb.org/library/extended-producer-responsibility-and-ecomodulation-of-fees/>

⁶⁰ Sea Circular (2020) https://www.sea-circular.org/wp-content/uploads/2020/05/SEA-circular-Country-Profile_SOUTH-KOREA.pdf

law in Philippines⁶¹. The collection of low-value plastics will be increased by proving it with higher value. The informal sector is the only one who collects and sort low value plastic as it is the source of their income. Under rule 15 section 2.2 (6) of EPR law there is a provision to establish a collaborative partnership with local authorities, cooperatives and informal waste sector for effective implementation of EPR. EPR scheme gives the informal sector choices in which they can retrieve waste materials suitably and comfortably, either through continuing their waste-picking activities or by being integrated by social enterprises or cooperatives. They shall be given the opportunity to earn additional income by earning revenue not just from high-value plastics but also from low-value plastics.

Deposit Refund Schemes: DRS have been a common feature as a part of legislations in European countries⁶² with an additional surcharge on individual products at the point of purchase commonly used for metal and plastic beverages. DRS seems to be working well in countries like Germany, where monetary value ranging⁶³ from €0.08 to 0.25 is collected upfront at the time of sale and is then reimbursed to the customer when the empty container is returned at the outlet.

Multiple case studies shows that DRS has positive impact not only on environment but also on amount of waste generation that can be avoided. It also seen to provide 11 to 38 times⁶⁴ more jobs than a curbside recycling system for beverage container. “What We Waste” case study shows the rapid positive effect of deposit return legislation and implementation. For example, in 2015, before Lithuania⁶⁵ introduced deposit return, 113 beverage containers were wasted per capita, amounting to almost ten a month. In 2017, the first full year of the DRS implementation, wastage had fallen sharply to just 14, barely one a month.

Along with several benefits of implementing DRS scheme there are some disadvantages also. Firstly, the initial implementation and functioning cost is high as it requires installation of reverse vending machines and collection points for smooth and effective collection back mechanism and the installation cost for reverse vending machine is the high along with maintenance and transportation cost.

Reverse Vending Machines: Norway is one of the first countries to be establishing the deposit refund scheme for reusable and refillable containers predominantly PET, HDPE, and metal (aluminium/tinplate). This was supported by the deployment of reverse vending machines that offers convenient recycling and an incentive to customers depositing eligible stream of containers under the DRS scheme. The incentive offered⁶⁶ range from 2 NOK (approximately €0.20) for containers 0.5 liters or less, and 3 NOK (approximately €0.30) for containers over 0.5 liters.

Market based competition can keep costs for waste management operations low: Although it is difficult to determine the effective impact of competition between PROs on

⁶¹ EPR Law toolkits for Philippines -

https://wedocs.unep.org/bitstream/handle/20.500.11822/41844/EPR_Waste.pdf?sequence=3&isAllowed=y

⁶²European Commission (2021) <https://environment.ec.europa.eu/system/files/2021-10/Deposit%20Refund%20Schemes.pdf>

⁶³ Tomra Web Portal (2023) <https://www.tomra.com/reverse-vending/media-center/feature-articles/germany-deposit-return-scheme>

⁶⁴ <https://www.reloopplatform.org/wp-content/uploads/2021/01/DRS-Factsheet-Jobs-27Jan2021.pdf>

⁶⁵ <http://changingmarkets.org/wp-content/uploads/2021/04/What-We-Waste-European-Press-Release.pdf>

⁶⁶ Tomra Web Portal(2022) <https://www.tomra.com/en/discover/reverse-vending/feature-articles/norway-deposit-return-scheme>

prices for the collection, sorting (if applicable) and recycling of waste, the analysed case studies⁶⁷ show that competitive tendering of waste management activities implemented by multiple PROs can lead to prices close to the actual cost for the services provided. This is also driven by the PROs' strong self-interest in minimising their operating costs in competitive environments in order to not lose customers. Accordingly, this self-interest is often less pronounced in monopolistic systems.

Monopolistic systems further pose a higher risk of price collusion between the parties entrusted with waste management (e.g., operators, municipalities) and the PRO, as contributions can be more easily passed on to the producers without them having the possibility to switch to another PRO (as occurred, for example, in Germany prior to the opening of the market for competition in 2003). However, both competitive and monopolistic EPR systems require appropriate monitoring and enforcement measures to effectively ensure reasonable costs for waste disposal.

4. Strengthening circular economy and EPR Models for plastics packaging in India

By embarking on a circular economy transformation, India could create direct economic benefits for businesses and citizens while reducing negative externalities.⁶⁸ Circular solutions for plastics, include:

- a. producing alternatives to plastics from non-fossil fuel feedstocks.
- b. redesigning plastic manufacturing processes and products to enhance longevity and recyclability.
- c. reusability and waste prevention.
- d. collaboration between businesses and consumers to encourage recycling
- e. using plastic waste as a resource
- f. encouraging sustainable business models which promote plastic products as services,
- g. developing robust information platforms to aid circular solutions.
- h. adopting fiscal and regulatory measures to support the circular economy.⁶⁹

According to the Ellen MacArthur Foundation, the circular economy development path in India could create an annual value of ₹14 lakh crore (US\$218 billion) in 2030 and ₹40 lakh crore (US\$624 billion) in 2050 in comparison to the current development scenario. It could reduce greenhouse gas emissions by 44% along with significant reduction in air pollution, thus contributing to health and economic benefits for society.⁷⁰

4.1 Different potential EPR implementation models for India

Although the EPR guidelines offer freedom to the PIBOs to follow any model, the following are a few potential models that may emerge for compliance to the regulations.

⁶⁷ Analysis of EPR Schemes - https://erp-recycling.org/wp-content/uploads/2021/07/adelphi_study_Analysis_of_EPR_Schemes_July_2021.pdf

⁶⁸ Ellen MacArthur Foundation: Circular economy in India: Rethinking growth for long-term prosperity (2016) <https://ellenmacarthurfoundation.org/circular-economy-in-india>

⁶⁹ Confederation of Indian Industry (2020) https://sustainabledevelopment.in/wp-content/uploads/2020/06/1589884216Manage-Plastics-Report_web.pdf

⁷⁰ Ellen MacArthur Foundation, Circular Economy in India: Rethinking growth for long-term prosperity (2016) <http://www.ellenmacarthurfoundation.org/publications/>

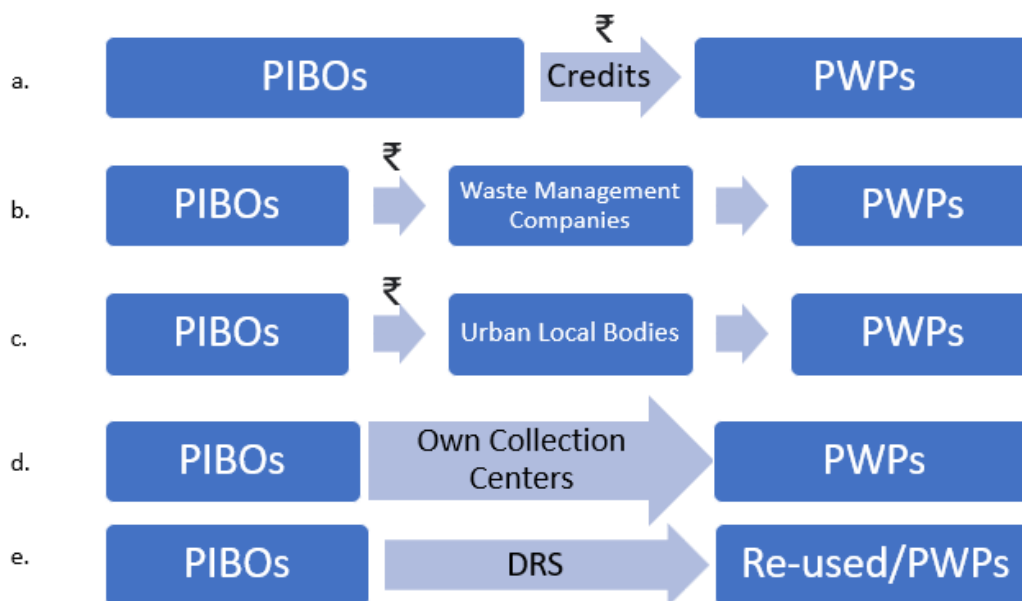


Figure 7 Emerging Plastic Waste Management models for implementing EPR in India

a) Purchasing plastics credits

PIBOs, which are typically formed by manufacturers or producers, can adhere to their EPR obligations by purchasing credits from PWPs. These PWPs are entities that specialize in handling packaging waste and ensuring its proper management and recycling. By purchasing credits from PWPs, PIBOs effectively contribute to the financing and implementation of packaging waste management and recycling initiatives.

This approach benefits both parties: PIBOs fulfil their EPR responsibilities without establishing their independent waste management infrastructure, while PWPs secure funding to support their waste management efforts.

b) Collective or Individual Model (Waste Management Agencies)

Under this potential model for implementation, the objective is to establish/entrust a body/entity to carry out EPR obligations of plastic packaging waste collection and hand it over to PWPs on behalf of PIBOs. The body/entity could be a third-party professional organisation authorised or financed collectively by producers, which can take responsibility for collection and channelization of plastic packaging waste generated from the end of life of their products to ensure environmentally sound management. In essence, this entity would serve as a “Service Provider” that optimises and facilitates EPR Implementation. The entity could be collectively/individually and formally appointed by the Producers and can be non-profit organisation or for-profit organisations. The entity could collectively represent the Producers before the government agencies and get individual Producer’s action plan approved & endorsed; ensure meeting up of EPR liability/take back targets of Producers on time by collection, sorting and recycling itself or by appointing of other waste management operators; maintain the trail of documents of EPR execution and provide it to the Producers for further submission; would also work to optimize costs for Producers by negotiating with other waste management operators; and may aid process of packaging eco-design with their expertise and on ground knowledge of PWM.

This is also aligned with the EPR guidelines which provides for an option to the Producers to establish modalities individually or collectively for waste collection system or involve local bodies concerned. When collectively done, such a model would generate economies of scale and reduce the cost to be borne by each Producer this is to say because collection, segregation and transportation costs are optimally divided if all Producers are working jointly rather than individually.

c) Collaborative model with ULBs

The Urban Local Bodies in India are key stakeholders in waste management. The Plastic Waste Management Rules, 2016, assigns responsibility for the collection, transportation, and disposal of plastic waste to the local bodies. Owing to the key role, the Central Pollution Control Board (CPCB) has envisaged mechanisms through which ULBs could participate as a part of the EPR mechanism. The centralized CPCB portal, therefore, provides the following avenues for Urban Local Bodies (ULBs) to engage in plastic waste management under two distinct mechanisms. This document aims to elucidate the two mechanisms, states the benefits, and outline the process by which Urban Local Bodies of Bihar can register on the CPCB EPR portal.

Mechanism 1: ULB as Provider of Waste

Under this mechanism, ULBs can participate in the EPR framework as either provider of waste. ULBs have the option to provide resources such as plastic waste from seizures, legacy waste sites, through setting up material recovery facilities, or by providing transportation facilities to Plastic Waste Producers (PWP). In return, PWPs can issue certificates to ULBs, certifying the services rendered. These certificates can be subsequently traded with PIBOs to offset the ULBs' EPR liabilities.

Mechanism 2: ULB as PWP Facility Operator

Alternatively, ULBs can establish their own Plastic Waste Producers (PWP) facility, through which it can generate EPR certificates based on the plastic waste they manage and recycle. These certificates can then be transferred to PIBOs to fulfil the ULBs' EPR liabilities.

d) Buy Back Model- Taking full financial and full organisational responsibility

Under this Model the Producer would individually or collectively establish infrastructure for collection of waste that is through establishment of Reverse Vending Machines (RVMs) or collection centres.

Such Models sometimes prove expensive to the producer. Hence, less dominantly followed across the world. There are possible failures of such system when a buy back price is mentioned on the product, but sufficient number of collection centres are not available and consumers do not make efforts to store, travel and specifically deposit wastes. However, there are examples of companies globally, who took up such models for EPR of their plastic wrappers and thus producers may opt this model if it is found feasible to them.

e) Deposit Refund Model- Taking full financial and full organisational responsibility

Under this model, the Producer would establish a system where at the level of retailers, infrastructure, and model of collection of used plastic packaging have to be established. In this the customers are asked to deposit a pre-decided amount which is refunded back when they return the packaging items back to the retailers. The model could be established by a Producer through its own distribution channels.

Such model is useful and beneficial under following conditions:

- Products can be reused
- Products that contain hazardous substances and should not be left with the consumers
- Products containing materials with enough value.

Although the concept is simple, the implementation is highly complex. It is useful for products with short life span in comparison to long life span to ensure high rotation. It was most commonly seen in India for glass bottles previously which reached the brand for refilling purposes. No such model has been widely visible till date for plastic packaging waste in India.

5. Recommendations

An effective EPR framework should a) address the issue of plastics and plastic waste management in tandem with the existing machinery, b) minimise duplication of efforts, c) lead to a positive environmental impact, and d) ensures transparency with effective monitoring mechanisms including penalties for non-compliance.⁷¹

The new EPR regulations in India have come into effect in 2022 as a means to contribute towards effective plastic waste management, and the implementation of the rules is imperative. The literature review carried out in this paper presented experiences, learnings and challenges faced in various countries for implementing EPR scheme for plastics packaging.

Based on the review and assessment of potential EPR models, the following possibilities for strengthening the EPR in India have been identified

- 1) **Standardization of plastic packaging:** Standardization of plastic packaging especially in FMCG category can lead to an easing of requirements for end-of-life management interventions such as recycling. This could lead to simplifying identification of a variety of plastics packaging leading to better levels of collection. The concept of standardization could have implications on aspects such as design, inks used on packaging, shape, size, or colour of packaging design, MLP composition and target packaging for Fast Moving Consumer Goods (FMCG).
- 2) **Incentives for handling Low Value Plastics:** High value plastic waste such as PET, HDPE generally gets easily collected, sorted, and recycled. However, low value plastic waste such as multi-layered plastic (MLP) are often found littered owing to little or no market value. Collection and channelization of these streams to processing would require support for collection, treatment, and disposal. The concept of eco-modulation may be tweaked to provide an incentive in terms differed credits to recyclers for handling streams of low value plastics. This could be done by increasing the value of plastic credits that the recyclers would receive upon handling these streams of waste.
- 3) **Geographically level playing field:** The current EPR targets are applicable pan India and are not sub-national specific. It would be critical to consider the costs for waste management in challenging terrains in the country for instance the Indian Himalayan Region (IHR) or even differentiate rural from urban areas to understand if differential

⁷¹ Adda247 Website <https://www.adda247.com/upsc-exam/the-editorial-analysis-the-gaps-in-the-plan-to-tackle-plastic-waste/>

treatment in terms of recycling certificates awarded may be introduced to ensure a level playing field for waste to be handled under the EPR framework.

- 4) **Need for improvement in waste management infrastructure:** Local recycling infrastructure could lead to lowered transportation and handling costs making it more viable. There is a definite scope of improvement in available infrastructure especially in N-E states. Owing to policy backing, increasing demand and incentive for recycling/recycled content, stakeholders such as PIBOs must look to handhold the ULBs in setting up and development of infrastructure for plastic waste collection & segregation, recycling, its treatment & disposal.
- 5) **Labelling especially for compostable and other bioplastics:** Clear labelling would be critical to ensure scientific disposal of waste streams such as compostable and bio plastics. This would also be important considering these streams would have to be identified during collection/segregation stage at the city levels and diverted for appropriate and specifically prescribed processing methods. A recent amendment in PWM rules has been made in this regard.
- 6) **Need for increased capacity of industrial composting facilities -** With the increasing promotion and use of compostable plastics, it becomes imperative to enhance industrial composting infrastructure across all urban areas. As these eco-friendly plastics become a prevalent waste stream, cities and towns must invest in building capacity, adopting advanced technologies, and implementing effective regulations to ensure the efficient processing of compostable plastic waste, reducing environmental impact.
- 7) **Emphasis on circular models:** While industry is actively looking for potential solutions, circularity with a cradle to grave approach needs to be considered. For example, downcycling of resins such as PET into apparel or garments lead to generation of microfibrils and nano plastics, each time they are washed. Finally, these waste apparels beyond their use-phase find their way to landfills or incinerators.
- 8) **Standards for recycled polymers:** There is a much-needed emphasis on the need to set standards for acceptance of recycled plastic. This would also be relevant considering that the use of plastic has been found in a variety of sectors ranging from packaging to chemicals raising concerns regarding the source especially while considered for food grade use.
- 9) **Strict monitoring and control:** The current EPR framework calls for strict monitoring and control systems to avoid fraud, strict and enforced monitoring both at the end of PWP and PIBOs. Controls and penalties are indispensable and shall be carried out by the concerned authorities to ensure compliance of all actors.
- 10) **Regulating chemicals in Plastics:** There is a need to intensify research efforts aimed at evaluating the necessity of regulating chemicals and additives in plastics, spanning applications in both food and non-food sectors. This research should be coupled with the development of robust policy frameworks that prioritize consumer safety, environmental protection, and the overall well-being of society.
- 11) **Informal sector inclusion**

All round support and “hand holding” of informal sector is required to integrate them at every level with the emerging “ecosystem” under the EPR based new rules. These could lead to informal sector playing a major role in strengthening of the EPR compliance. A good start would be to mandate PWPs/recyclers or MRF operators to engage a minimum number of informal sector staff and also upload a written undertaking on the EPR portal to be eligible to be able to transact with EPR credits.
- 12) **Awareness generation & capacity building**

Awareness generation and capacity building for all the stakeholders especially consumers (for reusability, segregation, collection etc) and industry (for design for environment / design for recyclability / alternate materials) should be promoted. For

wider implementation of EPR, regular capacity building programmes need to be carried out to support the industry and ULBs to register on the EPR portal and report implementation activities.