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BUILDING A CLEANER WORLD

THE EVOLUTION OF WASTE MANAGEMENT PRACTICES IN INDIA

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Preface

India is viewed as a front-runner in the list of developing nations at the global stage. India's lead on the global stage can be attributed to rapid increase in the population coupled with the Government of India's (**GoI**) focus on development across all sectors. However, Indian economy's stride towards development has also significantly increased the quantum of waste that is being generated.

This white paper explores the evolution of India's waste management framework amidst rapid industrial and economic growth and increasing waste generation. It examines key legislations, with a special focus on the 'Extended Producer Responsibility' mechanism. We analyze the roles of stakeholders, challenges in implementation, and provide recommendations for enhancing the current system to foster a circular economy and sustainable development.

LEGISLATIVE AND REGULATORY DEVELOPMENTS 2025

- The Ministry of Environment, Forests and Climate Change (**MoEF**) notified the *Draft Guidelines for Storage and Handling of Waste Solar Photo-Voltaic Modules or Panels or Cells under EWM Rules* on June 4, 2025, to provide technical guidance for safe transport, handling and storage of waste generated from solar photo-voltaic panels, modules or cells and their related components.
- The MoEF notified the *Battery Waste Management Amendment Rules, 2025* on February 24, 2025. The amendment introduces digital product labelling requirements and clarifies extended producer responsibility (**EPR**) obligations for battery producers to facilitate efficient collection and recycling of end-of-life batteries.
- The MoEF notified the *Plastic Waste Management (Amendment) Rules, 2025* on January 23, 2025, which *inter-alia* provides marking or labelling requirements on plastic bags for producers, importers or brand owners.
- Proposed amendment to the Plastic Waste Management Rules, 2016 by notifying the *Draft Plastic Waste Management (Second Amendment) Rules, 2025* on June 3, 2025, to strengthen EPR compliance for plastic packaging.
- Introduction of *Environment (Construction and Demolition) Waste Management Rules, 2025*; making producers responsible for environmentally sound disposal and management of construction and demolition waste in the country and *inter-alia* introduces EPR and environmental compensation mandates.
- Introduction of *Environment Protection (End-of-Life Vehicles) Rules, 2025* which encourage recycling and reuse of vehicle components and materials to reduce demand for new raw material, effective from April 1, 2025.
- The MoEF notified the *Hazardous and Other Wastes (Management and Transboundary Movement) Amendments Rules, 2025* on July 1, 2025. These rules *inter-alia* introduce a comprehensive EPR framework for scrap and products made from non-ferrous metals (aluminum, copper, zinc and their alloys). These rules will become effective on April 1, 2026.
- The MoEF notified the *Environment Protection (Management of Contaminated Sites) Rules, 2025*, establishing a structured process for identifying, assessing and remediating contaminated sites.
- CPCB issued draft *Guidelines on Municipal Solid Waste (MSW) Incineration- Based Waste to Energy Plants* with an aim to facilitate compliance by waste to energy facilities with the Solid Waste Management Rules, 2016 while advancing environmentally sound, efficient and sustainable waste processing practices.

Introduction

The functions and processes necessary to manage the entire life cycle of waste, from its inception until its disposal is referred to as waste management. It includes a wide range of activities, including the collection, transportation, processing, disposal, control and oversight of waste. The objective is to ensure that waste is managed in an environmentally responsible manner, minimizing harm to both human health and ecosystems.

Annually, India generates 62 million tons of waste which is expected to rise to 165 million tons by 2030.¹ As a result of rapid economic growth, the volume of waste generated has surged, prompting the establishment of regulations to govern waste management practices in India.

The MoEF is the parent ministry which controls all issues pertaining to environment including waste management in India. Under the Air (Prevention and Control of Pollution) Act, 1981 (**Air Act**) and the Water (Prevention and Control of Pollution) Act, 1974 (**Water Act**), the GoI has formed the Central Pollution Control Board (**CPCB**)² and State Pollution Control Boards of relevant states (**SPCB**)³. The CPCB and the SPCBs provide technical services to the MoEF for implementing the waste management framework in India.

The legal framework governing waste management in India is based on fundamental principles such as *sustainable development*, *precautionary principle*, and the *polluter pays principle*. These foundational ideas compel municipal administrations, businesses and the general public to act responsibly towards the environment, including rectifying any damage they may cause.

The primary legislation that governs waste management in India is the Environment Protection Act, 1986 (**EPA**), which gives power to the GoI to regulate all forms of waste in different regions of India. The waste management framework in India has been categorized based on the type of waste generated, which includes solid waste, e-waste, battery waste, hazardous waste etc.

One of the most significant concepts enshrined in India's waste management framework is the concept of EPR – where the responsibility of producers extends beyond the sale of a product and includes proper disposal at the end of the product's life cycle. The mechanism of EPR under the waste management framework imposes annual waste management targets on obligated entities, requiring them to collect, recycle, and properly dispose the waste.

This white paper analyzes the major provisions of the key legislations concerning waste in India, with a particular emphasis on EPR. It serves as a critical examination of the legal obligations relevant to companies and enterprises involved in industries that generate waste. Given the extensive array of legislation governing waste management, this paper covers only a selection of the significant laws for selected waste streams such as e-waste, plastic waste, battery waste, and construction waste.

¹ <https://www.trade.gov/market-intelligence/india-solid-waste-management>

² Section 4 of the Air Act and Water Act.

³ Section 4 of the Air Act and Water Act.

Regulatory Framework for Waste Management in India

(a) E-Waste Management Rules, 2022 (EWM Rules)⁴ (as amended from time to time)

Scope:

The EWM Rules expanded the scope of e-waste from the previous rules, to include electrical and electronic equipment, including solar photo-voltaic modules or panels or cells discarded as waste, as well as rejects from manufacturing, refurbishment and repair processes.

Applicability:

The EWM Rules apply on every manufacturer, producer, refurbisher, dismantler and recycler involved in manufacture, sale, transfer, purchase, refurbishing, dismantling, recycling and processing of e-waste or electrical and electronic equipment listed under the EWM Rules.

Registration:

Under the EWM Rules, manufacturers, producers, refurbishers and recyclers are required to obtain a registration for conducting business and are prohibited from dealing with an unregistered entity in the entire value chain of e-waste management. CPCB established an *EPR e-waste portal* where these entities are required to be registered.

Penalties:

The penalty mechanism under the EWM Rules stems from the provisions of the EPA. In addition, the CPCB has issued guidelines on levy of environmental

compensation for non-compliance under the EWM Rules.

Updates:

Draft Guidelines for Storage and Handling of Waste Solar Photo-Voltaic Modules or Panels or Cells under EWM Rules. (Draft EWM Guidelines)

On June 4, 2025, the MoEF notified the Draft EWM Guidelines to provide technical guidance for safe transport, handling and storage of waste generated from solar photo-voltaic panels, modules or cells and their related components, consumables, parts and spares. These draft guidelines have not yet been notified. The objective is to ensure environmentally responsible practices that safeguard and protect the health and environment. The Draft EWM Guidelines will be applicable to the producers, manufacturers and recyclers of solar photo-voltaic panels, modules or cells.

(b) Battery Waste Management Rules, 2022 (BWM Rules)⁵ (as amended from time to time)

Scope:

The BWM Rules cover all types of batteries regardless of its chemistry, shape, volume, weight, material composition and use. The rules specifically include electric vehicle batteries, portable batteries, automotive batteries, and industrial batteries.

However, the BWM Rules do not apply to batteries used in: (i) equipment connected with the protection of the essential security interests including arms, ammunitions, war material and those intended specifically for

⁴ The EWM Rules were notified in suppression of the E-Waste Management Rules, 2016.

⁵ The BWM Rules were notified in suppression of the Batteries (Management and Handling) Rules, 2001.

military purposes; and (ii) equipment designed to be sent into space.

Applicability:

The BWM Rules apply on every producer, dealer, consumer, entities involved in collection, segregation, transportation, refurbishment and recycling of waste battery.

Registration:

Under the BWM Rules, producers, recyclers and refurbishers are required to obtain a registration for conducting its business and are prohibited from dealing with an unregistered entity in the entire value chain of battery waste management.

Penalties:

The penalty mechanism under the BWM Rules stems from the provisions of the EPA. The CPCB has also issued guidelines on levy of environmental compensation for non-compliance under the BWM Rules.

Updates:

Battery Waste Management Amendment Rules, 2025

On February 24, 2025, the MoEF notified amendments to the BWM Rules. This amendment introduces digital product labelling requirements and clarifies EPR obligations for battery producers to facilitate efficient collection and recycling of end-of-life batteries. The amendment applies to battery producers and importers, requiring them to display their EPR registration number on either the batteries or packaging through a barcode, quick

response code or product information brochure. Producers are required to inform the CPCB of their chosen method, who then will maintain and publish a quarterly-updated list of compliant producers on the centralized online portal. Additionally, the amendment provides relief by exempting the packages covered under rule 26⁶ of the Legal Metrology (Packaged Commodities) Rules, 2011 from labeling requirements under the Legal Metrology (Packaged Commodities) Rules, 2011.

(c) **Plastic Waste Management Rules, 2016 (PWM Rules)**⁷ (as amended from time to time)

Scope:

The PWM Rules apply to plastic waste which means any plastic⁸ discharged after use or after its intended use is over.

Applicability:

The PWM Rules apply to every waste generator, local body, gram panchayat, manufacturer, importers, brand-owner, plastic waste processor, recycler, co-processor and producers.

Registration:

Under the PWM Rules, producers, importers, brand owners, plastic waste processors, manufacturers and importers of plastic raw material and manufacturers of items made from compostable plastics or biodegradable plastics are required to obtain a registration for conducting business. The PWM Rules prohibit a registered entity from dealing with an

⁶ Rule 26 of the Legal Metrology (Packaged Commodities) Rules, 2011 includes packages where the net weight or measure of the commodity is less than ten grams or ten millilitre and packages containing loose commodities ordered through e-commerce channels etc.

⁷ The PWM Rules were notified in suppression of the Plastic Waste (Management and Handling) Rules, 2011.

⁸ The PWM Rules defines “plastic” to mean material which contains as an essential ingredient a high polymer such as polyethylene terephthalate, high density polyethylene, vinyl, low density polyethylene, polypropylene, polystyrene resins, multi-materials like acrylonitrile butadiene styrene, polyphenylene oxide, polycarbonate, polybutylene terephthalate.

unregistered entity in the entire value chain of plastic waste management.

Penalties:

The penalty mechanism under the PWM Rules stems from the provisions of the EPA. The CPCB has also issued guidelines on levy of environmental compensation for non-compliance under the PWM Rules.

Updates:

(i) **Plastic Waste Management (Amendment) Rules, 2025**

On January 23, 2025, the MoEF amended the PWM Rules to allow producers, importers and brandowners to provide *marking or labelling* on plastic bags as required under the rules in the following manner: (a) in a barcode or quick response code printed on the plastic packaging; (b) in the product brochure; or (c) by printing the unique number issued under any law for the time being in force, on the plastic packaging. This provision is effective from July 1, 2025. The producer, importer or brandowner (as the case may be) is required to inform CPCB of the details of such packaging who then will publish a list with these marking or labelling on its website and update the same every quarter.

(ii) **Draft Plastic Waste Management (Second Amendment) Rules, 2025**

The draft amendment (to the Plastic Waste Management Rules, 2016) were notified by the MoEF on June 3, 2025, with the aim to strengthen EPR compliance for plastic packaging through mandatory recycled plastic content targets and reuse obligations that escalate progressively from FY 2025-26 to 2028-29 and onwards.

The draft amendment provides recycled content mandates for producers, importers,

and brand owners, category wise, such as:

(a) Category I Rigid packaging - must contain 30-60% recycled content; (b) Category II Flexible packaging - must contain 10-20% recycled content; and (c) Category III Multilayer packaging - must contain 5-10% recycled content by 2028-29, with flexibility allowing shortfalls in FY 2025-26 to be carried forward over 3 years.

(d) **Environment (Construction and Demolition) Waste Management Rules, 2025 (CDWM Rules) (as amended from time to time)**

Scope:

On April 2, 2025, the MoEF notified the Environment (Construction and Demolition) Waste Management Rules, 2025,⁹ which become effective on April 1, 2026. The CDWM Rules make producers responsible for environmentally sound disposal and management of construction and demolition waste in the country, incorporates specific measures for waste utilization, to align with circular economy and resource efficiency approaches by introducing EPR, environmental compensation and centralised interface based on online monitoring and compliance assessment.

Applicability:

CDWM Rules are applicable to all activities of construction, demolition, remodelling, renovation and repair of any structure, and do not apply to waste categories or streams covered under the (a) Atomic Energy Act, 1962 and the rules made thereunder; (b) defence projects and other projects with strategic nature; (c) waste generated due to natural disasters or act of war; and (d) waste covered in any

⁹ [C&D_rules_2025.pdf](#)

other sector specific waste management rules.

Registration:

It is mandatory for entities such as (a) producers¹⁰; (b) operators of intermediate waste storage facilities;¹¹ (c) recyclers; and (d) collection points established by local or development authorities to register on the online portal. Any entity which falls under more than one category is required to obtain registration for each category.

Penalties:

Non-compliance with the provisions relating to disposal and recycling of construction and demolition waste, including EPR and utilisation of waste targets under the CDWM Rules, thereby causing loss, damage or injury to environment or public health will be liable to pay environmental compensation which may be equal to such loss, damage or injury. Such compensation may be imposed by CPCB.

The CDWM Rules provide that payment of environmental compensation does not absolve the producer of its EPR obligations and the unfulfilled EPR of one year shall be carried forward to the next year and so on for a maximum period of 3 years. The CDWM Rules also provide for reimbursement of partial environmental compensation on the basis of the timeline within which such obligations have been met. Where the EPR obligations have been complied by the producer, partial reimbursement will be provided in the following manner:

- (a) 1 year, 85% of the environmental compensation;
- (b) 2 years, 60% of the environmental compensation; and
- (c) 3 years, 30% of the environmental compensation.

(e) **Environment Protection (End-of-Life Vehicles) Rules, 2025 (ELV Rules) (as amended from time to time)**

Scope:

To address environmental pollution and safety hazards from unregulated disposal of old vehicles while promoting circular economy, the MoEF on January 6, 2025, notified the ELV Rules which encourage recycling and reuse of vehicle components and materials to reduce demand for new raw material, effective from April 1, 2025. The ELV Rules establish a structured EPR framework mandating vehicle manufacturers and importers to meet progressive annual scrapping targets based on steel weight used in vehicles that were sold in the market 15 years ago (for transport vehicles) and 20 years (for non-transport vehicles).

Registered vehicle scrapping facilities are required to perform environmentally sound dismantling including depollution (removal of fluids, gases, mercury, catalysts, batteries, hazardous waste), segregation, safe storage, and recycling/refurbishing of materials and generate tradeable EPR certificates based on the processed steel scrap weight. The vehicle manufacturers and importers are required to purchase these EPR certificates through a centralized online portal

¹⁰ The CDWM Rules defines “producers” to mean a waste generator, who is occupier or in charge of a building or building complex project having a built-up area of 20000 square meters and above.

¹¹ The CDWM Rules defines “intermediate waste storage facility” to mean a place in the jurisdiction of the local authority, operated by

the authority or an authorized operator, where construction and demolition waste can be stored to facilitate its management in an environmentally sound manner.

maintained by CPCB to fulfill their obligations.

Applicability:

The ELV Rules apply to (a) the producers, registered owner of vehicles, bulk consumers, registered vehicle scrapping facility, collection centres, automated testing stations and entities involved in testing of vehicles, handling processing and scrapping of end-of-life vehicles; and (b) all types of vehicles,¹² and includes electric vehicle, battery operated vehicle, and e-rikshaw or e-cart.

The ELV Rules do not apply to the following: (a) waste batteries as covered under the BWM Rules; (b) plastic packaging as covered under the PWM Rules; (c) waste tyres and used oil as covered under Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016; (d) e-waste as covered under EWM Rules; (e) agricultural tractor; (f) agricultural trailer; (g) combine harvester; and (h) power tiller.

Registration:

A producer is required to make an application for registration to the CPCB while a registered vehicle scrapping facility and bulk consumer is required to make an application to the SPCB concerned. The registration obtained remains valid until it is suspended or cancelled by the CPCB or SPCB (as the case may be).

Penalties:

Non-compliance with the provisions relating to handling and scrapping of end-of-life vehicles in an environmentally

sound manner under the ELV Rules, which causes loss, damage, or injury to the environment or public health, shall be liable to pay environment compensation which may be equal to such loss, damage or injury. The CPCB shall impose environmental compensation for any non-compliance by the producers while the SPCB shall impose environmental compensation for any non-compliance by registered vehicle scrapping facilities and bulk consumers.

The ELV Rules provide for reimbursement of partial environmental compensation on the basis of timelines within which such obligations have been met. When environmental compensation has been paid within (a) 1 year, 75% of the environmental compensation may be returned; (b) 2 years, 60% of the environmental compensation may be returned; (c) and 3 years, 40% of the environmental compensation may be returned.

(f) **Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (HOWM Rules)**
(as amended from time to time)

Scope:

The MoEF had notified the HOWM Rules, under the Environment (Protection) Act, 1986 on April 4, 2016 to ensure safe storage, treatment and disposal of hazardous waste in an environmentally sound manner without causing any adverse effect to environment and human health. The HOWM Rules, 2016 allow import of the hazardous waste listed in part A of schedule III of the HOWM Rules for

¹²The Motor Vehicles, Act 1988 defines “motor vehicle” or “vehicle” to mean any mechanically propelled vehicle adapted for use upon roads whether the power of propulsion is transmitted thereto from an external or internal source and includes a chassis to which a body has not been attached and a trailer; but does not include

a vehicle running upon fixed rails or a vehicle of a special type adapted for use only in a factory or in any other enclosed premises or a vehicle having less than four wheels fitted with engine capacity of not exceeding [twenty-five cubic centimetres];

recycling, recovery, reuse and utilization including co-processing, and prohibits import of hazardous waste for disposal in India. The import of hazardous waste listed in part A of the schedule III is allowed only to actual users with permission from the MoEF and the Directorate General of Foreign Trade license, if applicable. Any import of hazardous waste without permission of the MoEF, in accordance with HOWM Rules is treated as illegal and under schedule VII of the HOWM Rules, Ports and Customs Authority are entrusted with the responsibility of taking action against importer for violations under the Indian Ports Act, 1908 or Customs Act, 1962.

Applicability:

The HOWM Rules apply to the management of hazardous and other waste (as specified in the schedules of the rules), however these rules do not extend to (i) waste water and exhaust gases covered under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981; (ii) waste arising out of ship operations beyond 5 kilometers of the relevant baselines as covered under the Merchant Shipping Act, 1958; (iii) radioactive waste, covered under Atomic Energy Act, 1962; (iv) bio-medical waste covered under the Bio-Medical Wastes (Management and Handling) Rules, 1998; and (v) waste covered under the Municipal Solid Wastes (Management and Handling) Rules, 2000.

Registration:

The HOWM Rules mandate producers, collection agents, recyclers, and used oil importers to register on the online portal established by CPCB. Entities which fall under more than one category are required

to make independent registrations for each such category. The rules further prohibit any registered entity to deal with a non-registered entity.

Penalties:

Non-compliance with the provisions of the HOWM Rules where no specific penalty is provided for attracts the same penalty as provided under section 15 of the Environment Protection Act, 1986. The person liable shall pay penalty of INR 10,000 (Indian Rupees Ten Thousand) which may extend to INR 15,00,000 (Indian Rupees Fifteen Lakh) for each such contravention. The contravening person shall be liable to an additional penalty of INR 10,000 (Indian Rupees Ten Thousand) for each day that the contravention continues.

Updates:

Hazardous and Other Wastes (Management and Transboundary Movement) Amendments Rules, 2025 (HOWM 2025 Rules)

On July 1, 2025, the MoEF notified the HOWM 2025 Rules. This amendment introduced a comprehensive EPR framework for scrap and products made from non-ferrous metals (aluminum, copper, zinc and their alloys) becoming effective on April 1, 2026. The amendment applies to more than 18 product categories including beverage cans, packaging foils, doors, windows, furniture etc. The HOWM 2025 Rules make it mandatory for producers to register on the CPCB portal and meet progressive recycling targets, calculated based on the average product lifespan. The framework allows producers to meet targets by establishing collection points, selling through registered collection agents, or purchasing EPR certificates from

registered recyclers through an online portal that the CPCB must operationalize within six months from the rules' commencement.

The amendment further establishes comprehensive obligations for manufacturers, producers, collection agents, refurbishers, and recyclers, each requiring independent registration and periodic reporting. The HOWM 2025 Rules introduce environmental compensation liability for non-compliance and allow refurbishment of specified products to defer EPR targets (with only 75% of deferred quantities credited back upon product end-of-life) and promotes circular economy principles while penalizing violations through revocation of registration and monetary fines under section 15 of the EPA.

(g) Environment Protection (Management of Contaminated Sites) Rules, 2025 (EMC Rules) (as amended from time to time)

Scope:

The MoEF notified the EMC Rules on July 24, 2025, establishing a structured process for *inter-alia* identifying, assessing, and remediating contaminated sites. Under these rules, the SPCBs are required to conduct preliminary assessments of suspected contaminated sites, identified by the local authorities, and submit a list of sites which exceed the prescribed hazardous screening levels to the CPCB.

Applicability:

The EMC Rules only provide a list of waste and activities to which these rules do not extend, namely: (i) radioactive waste covered under Atomic Energy (Safe

Disposal of Radioactive Wastes) Rules, 1987; (ii) mining operations covered under Mines and Minerals (Developments and Regulation) Act, 1957; (iii) pollution of sea by oil or oily substance covered under the Merchant Shipping Act, 1958; and (iv) solid waste from dump site as covered under Solid Waste Management Rules, 2016. It is pertinent to mention that in the event the contamination of a site is due to a contaminant mixed with any of the four categories mentioned above, and if the contamination of the site exceeds the response level limit specified in the EMC Rules, remediation of the site will be governed by the EMC Rules.

Penalties:

Though the EMC Rules do not provide for any specific penalty for the party responsible for contamination, the EMC Rules provide for such responsible parties to submit and execute approved remediation plans at their own cost. If no party is found responsible, the concerned SPCB is required to undertake remediation action, upon the approval of the CPCB.

(h) Draft Guidelines on Municipal Solid Waste (MSW) Incineration - Based Waste to Energy plants (MSW Guidelines)

Scope:

The CPCB issued draft guidelines for public consultation¹³ on Municipal Solid Waste Incineration Based Waste to Energy plants which provides details regarding the sources of waste streams from Waste to energy (WtE) plants, characterization of these waste streams as well as prevention and control measures for such waste stream. These guidelines are intended to facilitate compliance by WtE facilities with the Solid

¹³ [Press Release:Press Information Bureau](#)

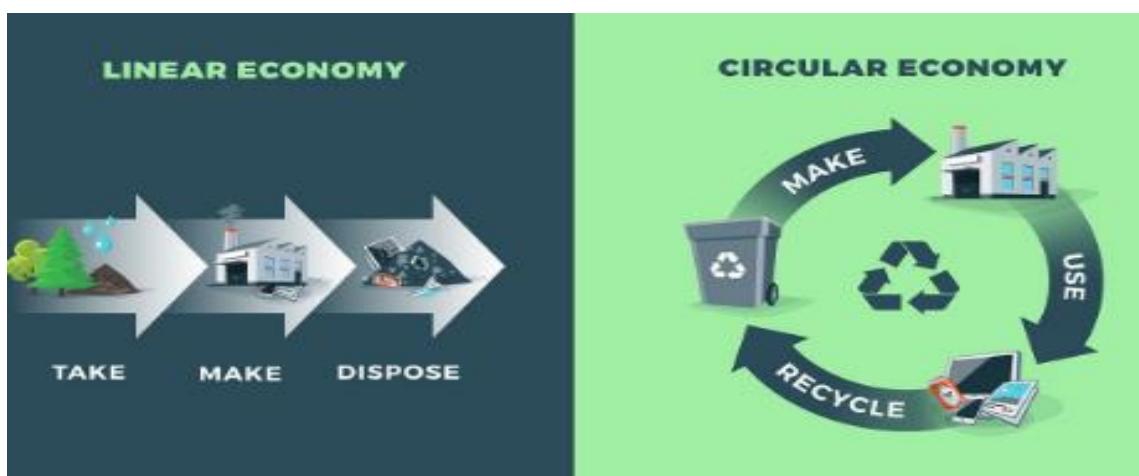
Waste Management Rules, 2016, while advancing environmentally sound, efficient, and sustainable waste processing practices.

Applicability:

These guidelines are applicable to: (i) all existing, under construction and proposed MSW incineration-based WtE plants in India, irrespective of technology or capacity; (ii) urban local bodies responsible for municipal waste management and planning; and (iii) regulatory authorities including SPCBs and state urban development departments for enforcement, monitoring and compliance checks.

Circular Economy

The circular economy represents a sustainable model of production and consumption that emphasizes practices such as sharing, leasing, reusing, repairing, refurbishing, and recycling materials and products.¹⁴ The circular economy model is a progression from the traditional, linear economic model which follows a “take-make-consume-dispose” pattern. The linear economy model prioritizes profit over sustainability where value is created by selling as many products as possible, irrespective of the products’ life cycle. On the contrary, the circular economy model focuses on creating different revenue streams while taking into account the principles of sustainable development.



The transition from linear economy model to the circular economy model requires a holistic approach that goes beyond the product’s end-of-life management and envisages upstream activities. The upstream side focuses on all activities prior to the disposal of a product and includes the design and manufacturing of the product, the supply chain, and the wider infrastructure to

recycle or refurbish the product.¹⁵ However, current market dynamics often fail to provide adequate incentives for these upstream actions, with linear models remaining more economically viable. For instance, at the end-of-life stage, costs associated with collection and sorting can be substantial, particularly when the necessary infrastructure is underdeveloped. For a

¹⁴<https://www.europarl.europa.eu/topics/en/article/20151201STO05603/circular-economy-definition-importance-and-benefits#:~:text=What%20is%20the%20circular%20economy,cle%20of%20products%20is%20extended>

¹⁵<https://www.unido.org/sites/default/files/files/2024-01/Circular%20Economy%20and%20Extended%20Producer%20Responsibility.pdf>

feasible transition to a circular economy model, these costs must be supported by sufficient funding and incentives. Adoption of circular economy model will also assist in reduction of planned obsolescence, where businesses intentionally design products with a limited lifespan to encourage consumers to make repeat purchases.¹⁶

Waste Management and Circular Economy

The concepts of waste management and the circular economy are closely intertwined and together help in fostering sustainable solutions to the environmental challenges. While waste management focuses on minimizing environmental risks and reducing waste production and subsequent disposal through recycling, reuse, and proper waste handling, circular economy aims to design sustainable products, minimize waste, and enhance resource efficiency, addressing a range of environmental, economic, and social issues.

Principles of designing sustainable products, recycling products and materials after their end use, and regenerating natural ecosystems are central to the circular economy.

By the implementation of these principles, a closed-loop system can be created for recycling and transforming waste into new products, which reduces our environmental footprint, creates jobs, and supports eco-friendly industries.¹⁷ EPR is a relevant solution and can play a critical role in a transition to a circular economy.

Understanding Extended Producer Responsibility

(a) Definition and Principles of EPR

Extended Producer Responsibility is a mechanism that encourages companies to design more sustainable and recyclable products and manufacturing processes. In order to comply with EPR, businesses must demonstrate their commitment to a circular economy through initiatives such as product reuse, buyback schemes, and recycling programs. This mechanism emphasizes that optimal environmental outcome can be achieved when manufacturers are accountable for sustainability costs from the sourcing of raw materials to end-of-life phase and recycling.¹⁸ EPR first gained prominence in the European Union (EU) during the early 2000s due to increase in waste and environmental degradation. Traditionally, waste management was funded and managed by the state across the globe.¹⁹

Today, EPR is recognized worldwide as a vital strategy for promoting sustainability and advancing a circular economy. Its fundamental principle holds that private companies must take responsibility for the waste generated by their business activities. The regulatory strategies for EPR are typically implemented through formal registration requirements, reporting obligations, recycling obligations, product design criteria and disclosures for consumers.

¹⁶ *supra note at 8.*

¹⁷ Hoang, A. T. (2024) 'Waste management and circular economy', *Springer*.

¹⁸ <https://www.sap.com/products/scm/responsible-design-and-production/what-is-extended-producer-responsibility.html>.

¹⁹ <https://www.oecd-ilibrary.org/docserver/67587b0b-.>

(b) **Overview of the EPR Framework in India**

India's EPR framework closely mirrors the mechanisms followed in the EU. The EPR framework in India was introduced in 2011 and applied to e-waste and plastic waste on a voluntary basis. It was only in 2016 that India mandated target-based EPR obligations, requiring producers, importers and brand owners to meet specific waste management and recycling goals.²⁰ By 2022, significant updates were made, including the introduction of mandatory registration requirements and the expansion of EPR to cover additional waste categories such as batteries, waste tyres, and used oil.

Under the current EPR framework, any business introducing or placing products within regulated waste categories into the Indian market must adhere to specific EPR obligations. However, determining when a product is considered to be 'placed on the market' can be challenging, particularly for companies with complex supply chains or those in service industries that use physical products to provide their services.²¹

The scope of EPR obligations is not confined to producers or manufacturers alone. It also extends to importers and brand-owners, depending on the waste category, thereby encompassing a broader range of stakeholders involved in the market.

Businesses, subject to the relevant waste management legislations, are required to meet annual targets set by the CPCB and

report their compliance through annual filings and self-declarations.²² There are separate targets for re-use, recycling, use of recycled products, refurbishment and end-of-life disposal.²³ The targets are volume-based and calculated as a percentage of either the company's annual sales or the quantity of products introduced into the market. However, the applicability of these targets varies depending on the type of waste. For instance, plastic packaging producers must meet targets for reuse, recycling, and the use of recycled products, but are exempt from end-of-life disposal obligations.²⁴ Companies fulfill their EPR obligations either by purchasing EPR certificates or by collecting and depositing waste with registered recyclers to obtain certificates. To streamline the EPR compliance process, the CPCB has developed specific EPR portals for different waste categories. These portals serve as a centralized system for exchanging and purchasing EPR certificates, submitting compliance data, verification, and auditing processes.

The following waste management legislations in India envisage EPR framework:

- (i) EWM Rules;
- (ii) PWM Rules;
- (iii) BWM Rules;
- (iv) Hazardous and other Wastes (Management & Transboundary Movement) Rules, 2016 (for waste tyre and used oil); and
- (v) CDWM Rules.

²⁰<https://www.financialexpress.com/business/industry-extended-producer-responsibility-in-india-and-adaptations-required-for-businesses-3355014/>

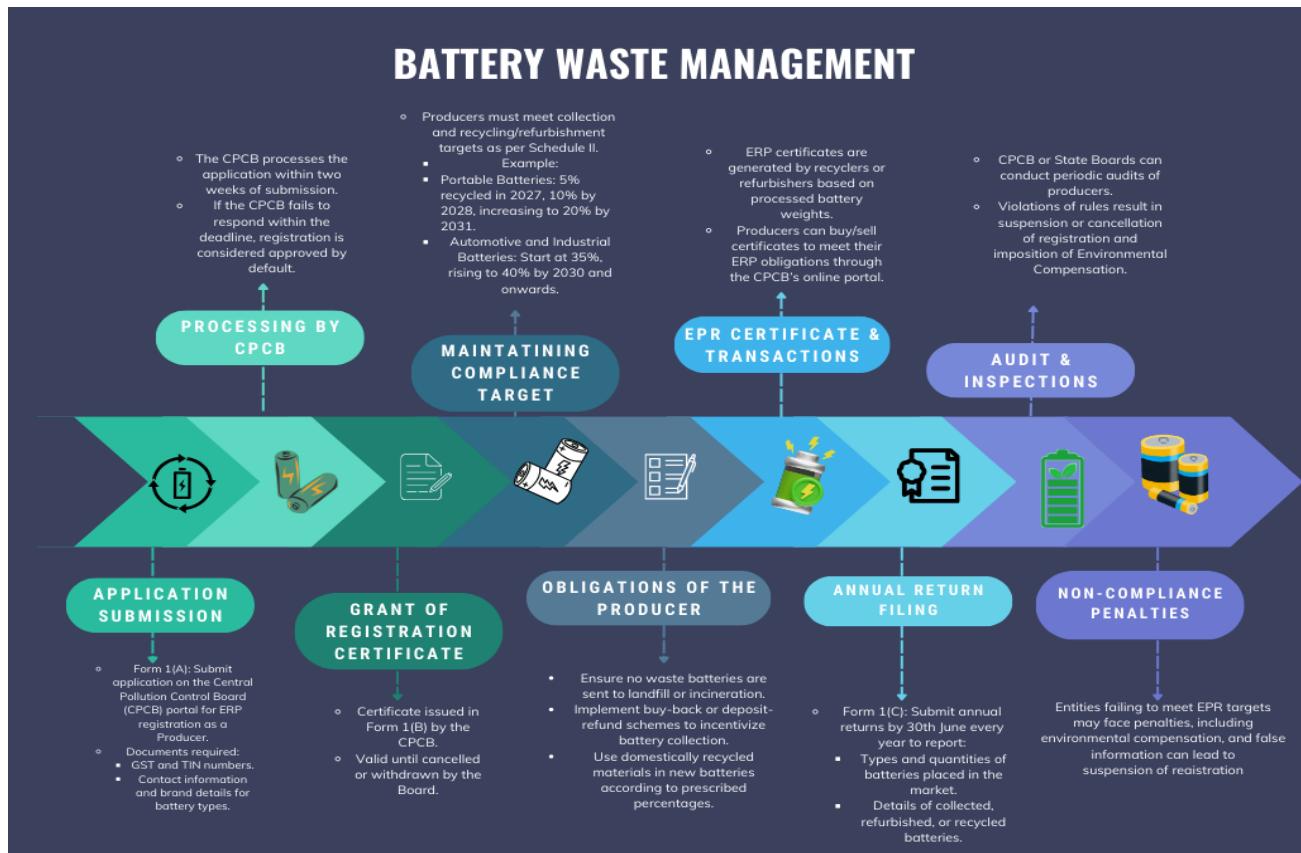
²¹https://www.teriiin.org/sites/default/files/files/White_paper_E-wasteEPR.pdf

²² As per the EWM Rules, e-waste recycling targets will not be applicable for waste generated from solar photovoltaic modules or panels or cells.

²³ *supra note at 11.*

²⁴<https://www.mondaq.com/india/wastemanagement/1055270/decoding-extended-producer-responsibility-epr>

➤ EPR Framework under BWM Rules



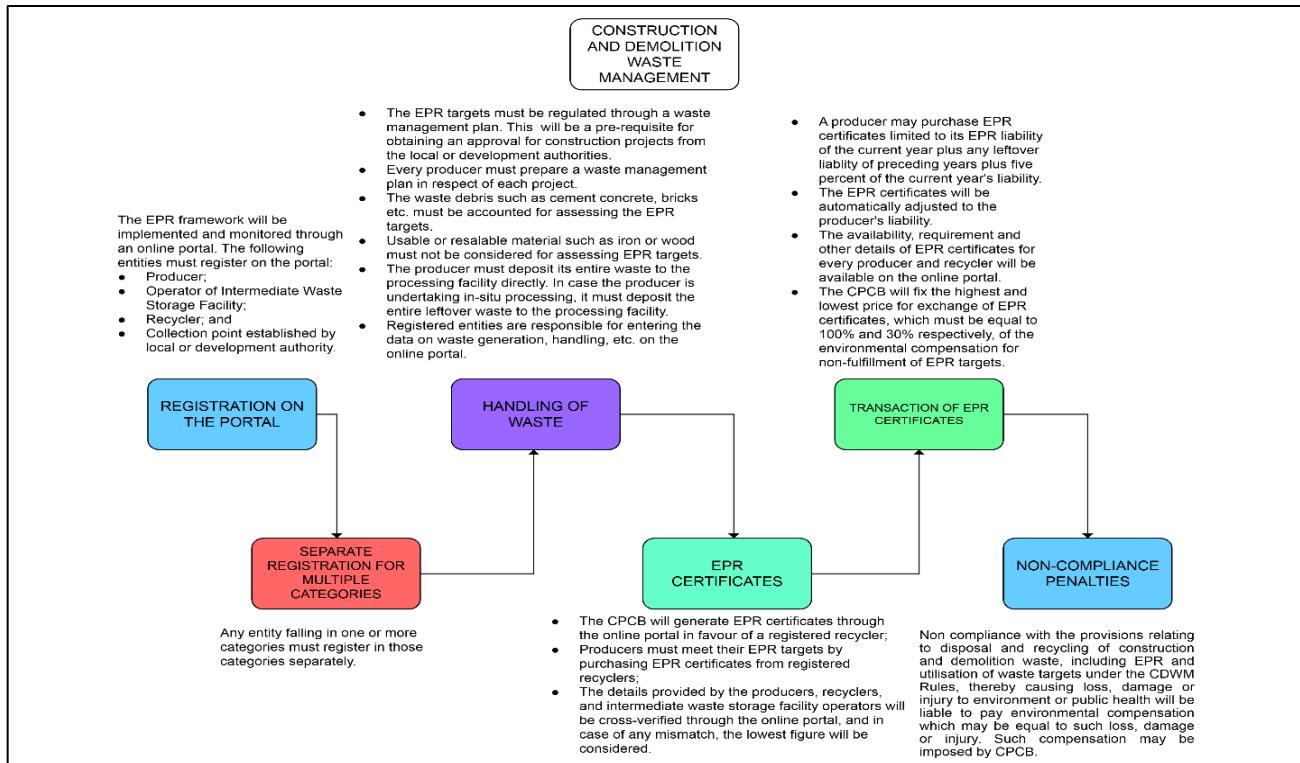
➤ EPR Framework under EWM Rules



➤ EPR Framework under PWM Rules



➤ EPR Framework under CDWM Rules



(c) **Role of the Stakeholders**

(i) ***Producers:***

The primary responsibility for managing the waste generated by the products lies with producers, placing them at the forefront of ensuring compliance with EPR obligations. As a key stakeholder in the product lifecycle, producers are tasked with establishing systems for the collection, recycling, and proper disposal of waste. Producers are required to register with the CPCB and submit periodic compliance reports. They are required to take responsibility for the entire life cycle of the product from sourcing of raw materials to recycling. The role of producer also includes collaborating with government bodies, ensuring proper compliance, monitoring recycling activity and most importantly funding the waste management channels.²⁵

(ii) ***Importers and Brand Owners:***

The importers and brand owners are obligated to fulfil the EPR compliances as specified under the respective waste management legislation. The importers are required to collaborate with producers to streamline waste management processes and comply with EPR requirements, including registering with relevant authorities and submitting compliance reports.²⁶ They must adhere to specific EPR guidelines related to the imported products. Similarly, brand owners, who may not manufacture products but are associated with such products through their brand names, have to comply with the EPR compliances. They work with producers and importers to manage waste, support producers in creating recyclable products, and promote sustainable practices.

By actively engaging in eco-friendly initiatives and adhering to EPR regulations, brand owners can enhance their brand reputation.

(iii) ***Producer Responsibility Organizations (PROs):***

The PROs serve as intermediaries between producers, collectors, recyclers, and the national authority. Their role includes facilitating compliance, data management, conducting public awareness campaigns, co-operating with government and national authorities and assisting in developing the most efficient and effective method of waste handling.²⁷

(iv) ***Government bodies:***

Government bodies and departments play a crucial role in developing, implementing and enforcing guidelines, rules and regulations pertaining to the EPR framework.

(v) ***Consumers:***

The consumers play a crucial role in the success of EPR frameworks. Their actions and choices significantly influence the lifecycle of products. Various ways in which consumers can contribute to EPR compliance are by choosing a sustainable product, promoting recycling practices and implementing waste segregation mechanism.²⁸

²⁵ <https://khoamoitruongdotti.neu.edu.vn/vi/cong-trinh-nckh/roles-and-responsibility-of-stakeholders-in-extended-producer-responsibility-epr-system-lessons-from-international-experience-and-proposal-to-vietnam>.

²⁶ <https://recykal.com/blog/a-guide-to-epr-compliance-in-india/>.

²⁷ <https://recykal.com/blog/pros-role-of-stakeholders-in-epr/>

²⁸ <https://rekart.co.in/blog/role-of-consumers-in-epr>

Environmental Compensation Guidelines Under Waste Management Rules

The CPCB undertakes imposition and collection of Environmental Compensation (EC) in case of violation of the provisions of the relevant waste management rules. In this regard, the CPCB publishes EC guidelines approved by the MoEF. We have analyzed relevant EC guidelines for waste management rules below:

(a) **EC Guidelines under the E-Waste Management Rules (2022)**²⁹

The CPCB issued the guidelines for environmental compensation under EWM Rules, 2022 on September 9, 2024 (**E-Waste EC Guidelines**).³⁰ The EWM Rules mandates CPCB to impose EC on obligated entities in cases of non-compliance with the provisions of the rules.³¹ Further, the guidelines provide a price band (30%–100% of environmental compensation for non-fulfilment of extended producer responsibility obligation) for exchange of EPR certificates, which remain valid for 2 years. The E-Waste EC Guidelines are applicable to manufacturers, producers, refurbishers, recyclers and any non-registered entities involved in the entire value chain of e-waste management.

The E-Waste EC Guidelines is divided into two regimes, i.e., (i) EC regime 1; and (ii) EC regime 2. EC regime 1 is applicable to all obligated entities in cases of non-fulfilment of EPR targets by the producers. The calculation of penalty under the EC regime 1 considers average cost of

collection, cost of transportation and cost of processing e-waste as the parameter.

The EC regime 2 is applicable to all obligated entities in cases of non-compliances with the EWM Rules, except for the obligation of meeting the EPR targets. The calculation of penalty under the EC regime 2 considers average registration fees, payable by the obligated entities, as the parameter.

(b) **EC guidelines under the Battery Waste Management Rules (2022)**³²

The CPCB issued the guidelines for environmental compensation under the BWM Rules on September 9, 2024 (**BWM EC Guidelines**). The BWM Rules mandates CPCB to impose EC in cases of non-compliance with the BWM Rules by the obligated entities.³³ Further, the guidelines specify the price band (similar to the EPR certificate price band discussed before) for exchange of EPR certificate. The BWM EC guidelines are applicable to producers, recyclers, refurbishers and any entity involved in collection, segregation and treatment of waste battery.

The BWM EC Guidelines are also divided into two regimes, i.e., (i) EC regime 1; and (ii) EC regime 2. EC regime 1 is applied in case of non-fulfilment of EPR targets by the producers. The calculation of penalty under the EC regime 1 considers cost of handling, cost of collection, cost of transportation and cost of processing waste batteries as the parameter. The EC 1 regime has been further bifurcated based on the type of batteries due to difference in cost of handling, cost of

²⁹<https://cpcb.nic.in/openpdffile.php?id=UmVwb3J0RmlsZXMyMTY2NF8xNzI1ODgzNjY3X21lZGlhcGhvdG81MTEExLnBkZg==>

³⁰ Rule 22(1) of the E-Waste (Management) Rules, 2022.

³¹ Under the E-Waste EC Guidelines 'obligated entities' means producer, manufacturer, recyclers, refurbishers.

³²https://www.eprbattery.cpcb.in/upload/adminDoc/Notice_EC%20Guidelines.pdf

³³ Rule 13 (3) the BWM Rules, 2022.

collection, cost of transportation and cost of processing waste batteries.

The EC regime 2 is applied in case of non-compliances under the BWM Rules, except for the obligation of meeting the EPR targets, and applies to all obligated entities. The calculation of penalty under the EC regime 2 considers registration fees, payable by the obligated entities, as the parameter.

(c) **Revised EC guidelines under the Plastic Waste Management Rules (2016)**³⁴

The CPCB issued the revised EC guidelines under the PWM Rules, 2016 (**PWM EC Guidelines**). The PWM Rules mandates CPCB to impose EC in case of non-compliance of the PWM Rules by the obligated entities.³⁵ The PWM EC

guidelines are applicable to producers, importers, brand-owners, recyclers and end of life processors.

The PWM EC Guidelines takes into account the following costs for calculation of EC:

- (i) average cost for collection and transportation;
- (ii) average cost of setting up of material recovery facility;
- (iii) average cost of setting up of refused derived fuel facility; and
- (iv) average cost of operations and maintenance of the refused derived fuel facility.

Subsequently, a deterrent factor of 2.5 is applied on the sum of the average costs to determine the quantum of EC per ton of plastic waste.

Global examples of EPR implementation

Country	EPR Obligations Overview
Singapore	<i>The Resource Sustainability Act (RSA)</i> ³⁶ , implemented in October 2019, establishes a framework for managing waste through EPR obligations. Singapore's EPR approach is centralized under the RSA ³⁷ , in place of having different EPR regulations for various waste types. The RSA covers three main waste streams: electronic waste, packaging waste, and food waste. These EPR measures are part of Singapore's broader commitment to reducing waste and promoting a circular economy, aligning with its <i>Zero Waste Masterplan</i> , which aims to reduce landfill waste and improve recycling rates by 2030. The framework requires producers to register with the National Environment Agency (NEA) and take responsibility for recycling and disposal. The RSA also introduces a <i>Producer Responsibility Scheme</i> for collective recycling, while small producers receive exemptions to ease compliance.
South Africa	In South Africa, EPR regulations were introduced under the National Environmental Management: Waste Act. ³⁸ The EPR regulations were officially promulgated in November 2020, focusing on sectors such as electrical and

³⁴<https://cpcb.nic.in/openpdffile.php?id=UmVwb3J0RmlsZXMyMTY2MV8xNzI0MzAzOTEzX21lZGlhcGhvG8yMzM3LnBkZg==>

³⁵ Provision 9.2 of Schedule-II of the PWM rules 2016.

³⁶<https://www.mse.gov.sg/resource-room/category/2020-07-30-resource-sustainability-act/>

³⁷<https://www.pinsentmasons.com/out-law/analysis/resource-sustainability-act-singapore-road-to-zero-waste>

³⁸ Act 59 of 2008, <https://www.dffe.gov.za/registration-terms-regulations-regarding-extended-producer-responsibility-2020>

Country	EPR Obligations Overview
	<p>electronic equipment, lighting, paper, and packaging.³⁹ The regulations promote a circular economy by encouraging recycling and diverting waste from landfills. The producers in such sectors are required to register with the Department of Forestry, Fisheries, and Environment (DFFE) and create an EPR scheme. They are also required to pay EPR fees and submit annual reports detailing their waste management activities.</p>
Germany	<p>Germany's EPR framework is classified under three type of waste streams namely packaging, electrical equipment, and batteries. The aim of these EPR regulations in Germany is to ensure that producers are held responsible for the entire lifecycle of their products. For packaging, producers must register with a portal called the LUCID Packaging Register, participate in a dual collection and recycling system, and report packaging quantities.⁴⁰ For electrical and electronic equipment, registration with an organization called Stiftung EAR is required, along with setting up take-back systems and providing an insolvency-proof guarantee to cover recycling costs. Similarly, battery producers must also register with Stiftung EAR and implement take-back systems, ensuring responsible recycling and waste management.⁴¹</p> <p>Under the German EPR compliance regime, EPR is regulated under the following three Acts:</p> <ul style="list-style-type: none"> (i) German Packaging Act (Verpackungsgesetz). (ii) Batteries Act (Batteriengesetz). (iii) Electric and Electronic Equipment Act (Elektrogesetz).
Europe	<p>The EU introduced the first EPR policy in the early 2000s, which has since expanded across member states, increasing the responsibilities of organizations to meet the evolving environmental requirements in line with the EU's climate neutrality goals. EPR has been implemented across the EU through various directives that cover specific waste streams such as packaging, electrical and electronic equipment, single-use plastics, and batteries.⁴² A forthcoming EPR framework for textiles is also in development but has not yet been enacted.⁴³ These directives are mandatory for all EU member states, requiring national laws to reflect them by 2025 at the latest. However, beyond these EU-wide directives, there are additional EPR regulations and approaches that can vary at the national level within individual member states. While the EU sets minimum requirements through directives, national governments can develop specific regulations to enhance or</p>

³⁹https://www.dffe.gov.za/sites/default/files/legislations/nemwa_extendedproducerresponsibilityregulations_g43879gon1184.pdf

⁴⁰<https://www.epr-compliance.com/en/epr-blog/the-ultimate-guide-to-epr-in-germany>

⁴¹<https://partner.zalando.com/university/article/epr-obligations-in-germany>

⁴²[https://blog.sourceintelligence.com/what-are-the-epr-directives-in-the-eu#:~:text=Extended%20Producer%20Responsibility%20\(EPR\)%20is,%2C%20recycling%2C%20and%20final%20disposal](https://blog.sourceintelligence.com/what-are-the-epr-directives-in-the-eu#:~:text=Extended%20Producer%20Responsibility%20(EPR)%20is,%2C%20recycling%2C%20and%20final%20disposal)

⁴³https://ec.europa.eu/commission/presscorner/detail/en/ip_23_3635

Country	EPR Obligations Overview
	<p>tailor EPR schemes to their needs.⁴⁴ The simple understanding is that if you distribute your goods in the EU countries, the EPR regulations of that country apply. The EPR regime of EU is broadly classified under the following EU directives:⁴⁵</p> <ul style="list-style-type: none"> (i) Waste Framework Directive (2008/98/EC). (ii) Packaging and Packaging Waste Directive (94/62/EC). (iii) The Waste Electrical and Electronic Equipment Directive (2012/19/EU). (iv) Battery Directive (2006/66/EC). (v) Single-Use Plastics Directive (2019/904/EU). <p>The Packaging and Packaging Waste Regulation (PPWR), which standardised the EPR framework across the EU, was published on January 22, 2025, and will take full effect by August 12, 2026.</p> <p>Unlike the previous “EU Packaging Directive”, this new regulation is legally binding for all 27 EU member states, ensuring uniform implementation across the region.</p>

Other Policies for Waste Management in India (b)

(a) Waste to Wealth Mission

The Waste to Wealth Mission, set up under the Prime Minister’s Science, Technology & Innovation Advisory Council, is an initiative by the Office of the Principal Scientific Advisor to the Government of India. The Waste to Wealth programme aims to promote the efficient management and recycling of waste materials. It focuses on converting waste into valuable resources through various processes, such as composting, recycling, and energy generation. By implementing waste management practices and promoting circular economy principles, the programme aims to reduce waste generation, conserve resources, and create sustainable livelihoods

National Repowering and Life Extension Policy for Wind Power Projects, 2023

The National Wind Repowering Policy was notified by the Ministry of New and Renewable Energy (MNRE) on December 7, 2023⁴⁶ to facilitate repowering of wind power projects by replacing old generation Wind Turbine Generators (WTGs) with technically advanced WTGs.

Under the National Wind Repowering Policy, the wind repowering project aggregator (WRPA) will be nominated by the state nodal agency or central nodal agency. The WRPA will be responsible for decommissioning of the existing assets, removal and lawful disposal of all the scrap from the site including disposal of the wind turbine blades. The turbine blades are required to be disposed of as per the applicable norms of the MoEF, and CPCB/SPCB.

⁴⁴ <https://deutsche-recycling.com/blog/comparing-epr-regulations-europe/>

⁴⁵ *supra* note at 27.

⁴⁶ The National Wind Repowering Policy has been issued by the MNRE in suppression of the earlier Policy for Repowering of the Wind Power Projects dated August 5, 2016.

Challenges in Implementing EPR

(a) Challenges in India

(i) ***Clarity on implementation of the legislations:***

Given the recent changes in various waste management legislations, the entire value chain associated with the respective waste legislation is in a state of confusion.

For instance, the CPCB recently issued the E-Waste EC Guidelines for setting up the price band for exchange of EPR certificates and computation of EC. However, the provisions of the EWM Rules and the E-Waste EC Guidelines, when read together, are creating a confusion with respect to the exchange of EPR certificates on the EPR portal. The stakeholders involved have made representations before the CPCB for issuing clarifications with respect to the entire mechanism of exchange of EPR certificates and its pricing.

The deficit in alignment between the legislative intent and business practices undertaken in the market often results in lack of compliance and proper implementation of EPR obligations by the obligated entities.

(ii) ***Collection points and channels:***

Due to cost implications, producers are not inclined towards setting up easily accessible disposal points for consumers or initiating any take back schemes. The efforts of producers towards creating a smooth and robust collection channel lacks proper

implementation which subsequently hinders the circular economy.

(iii) ***Infrastructure:***

Insufficient recycling and waste processing infrastructure hinders the effective implementation of EPR obligations.⁴⁷ Many regions lack the facilities needed to collect, segregate, and recycle waste. Additionally, the possibility of 'waste leakage' through the value chain significantly increases due to inadequate infrastructure. In addition, there is a lack in implementation of robust checks and verification measures for industry participants involved in the business of recycling and refurbishing in India.

(iv) ***Historical sales data and average life cycle of the products:***

Setting up of EPR target for different kinds of waste is not straightforward and is dependent on the sales data of the past and the average life cycle of the product manufactured. The self-declaratory nature of historical sales data leads to inaccuracy in assessing EPR targets. It is also very difficult to determine the average life cycle of the product, and it often leads to subjective interpretation due to the different quality of goods and technologies available in the market. Although various stakeholders are consulted before deciding the average life cycle of the products, a clear guideline is still the need of the hour for better implementation of EPR targets.

(v) ***Compliance cost:***

The cost of complying with EPR requirements can be significant,

⁴⁷ <https://recykal.com/blog/epr-challenges-in-india/>

particularly for small companies. Many businesses face financial difficulties in collecting and recycling waste, leading them to either ignore their obligations or participate in minimal ways.⁴⁸ Without adequate financial or policy support, the burden of compliance remains a challenge.

(vi) ***Awareness and sensitization:***

Most consumers are not aware of disposal points and recycling policies. No information about disposal is provided to consumers at the point-of-sale where the entire focus is on the sale of the product. Some corporate organizations have initiated a take-back campaign encouraging youth and schools for awareness on e-waste, however, more efforts would be required for awareness and sensitization of individuals.⁴⁹

(b) **EPR Challenges – Comparative Analysis**

When comparing the challenges in India's EPR system to those in the UK, USA, and China, it's clear that each country faces its own set of difficulties. India's situation is particularly complex due to the dominance of informal recycling sector. In India, most categories of waste are processed by unregulated, small-scale recyclers who operate outside the formal system.⁵⁰ This makes it very difficult for the registered recyclers to compete, as the informal sector offers quicker and more attractive deals to retailers and households. This widespread informal sector poses a severe threat to the effectiveness of India's EPR policies.⁵¹

China faces a similar problem, where over 60% of e-waste is also recycled informally, but they've implemented a subsidy-based framework to tackle this issue and to encourage recyclers from unorganized sector to co-ordinate with recyclers from organized sector.⁵² Though this approach is still evolving, it shows China's effort to integrate the informal sector with the formal sector in ways India has not yet fully explored.

In contrast, the UK has managed to avoid many of these issues by establishing a well-organized mechanism in the case of plastic waste known as Packaging Waste Recovery Notes (**PRNs**), which allows for market-based incentives and strong regulatory oversight.⁵³ While companies in the UK occasionally find the compliance process to be complex and costly, the real challenge is with respect to management of bureaucracy rather than dealing with a large unorganized recycling sector.

The situation in the USA is different as they don't encounter similar issues like India but lack a unified national EPR framework which means there's inconsistency in implementation of EPR framework across different states. The state of California has been successful with its EPR programs for motor oil and e-waste, but other states haven't caught up, leading to an erratic approach to recycling across the country.⁵⁴ In short, while countries like the UK and the USA face challenges related to regulation and compliance, India's key hurdle is the vast, unregulated and an informal recycling sector, which makes enforcing EPR policies much more difficult.

⁴⁸<https://thecsruniverse.com/articles/india-s-waste-management-scenario-challenges-and-recycling-capacities>

⁴⁹ *supra note at 12.*

⁵⁰ *supra note at 38.*

⁵¹ *supra note at 38.*

⁵² Gupta, Y. (2015) 'Review of extended producer responsibility: A case study approach', *Waste Management and Research*.

⁵³ *Ibid.*

⁵⁴ *supra note at 46.*

(c) **Recommendations for Enhancing Waste Management and EPR Framework in India**

(i) ***Formalizing the informal sector:***

The informal sector plays a key role in waste management and generally works in parallel with the formal sector.⁵⁵ It lacks the proper recycling techniques and often disrupt the circular economy. It is the need of the hour to bring in regulations to include them in the waste management hierarchy. The workers in the informal sector play a vital role in the waste value chain but often lack formal recognition, leading to marginalization and health risks.⁵⁶ The formalization of the informal sector in India's waste management framework is crucial for enhancing the efficiency and safety of waste workers. Initiatives led by organizations like UNDP aim to integrate these workers into a structured system, providing them with social protection and safer working conditions.⁵⁷ This approach will not only improve their livelihoods but also contribute to the broader goal of establishing a circular economy in waste management. By efficiently integrating the informal sector with organized waste collection and recycling industry, India can significantly advance its waste management objectives while promoting social equity.

(ii) ***Reducing the compliance cost and providing incentives:***

A significant challenge for smaller businesses is the ability to manage the costs associated with complying with EPR obligations and waste management framework. The financial burden is particularly heavy on smaller suppliers who serve larger retailers or brand owners. To address these concerns, a *de minimis* or threshold-based approach can be considered. For instance, in Belgium, businesses placing less than 300 kg of packaging material on the market are exempt from EPR obligations, while the United Kingdom imposes EPR only on companies with a minimum annual turnover of GBP 1 million.⁵⁸ Such thresholds can ensure that smaller entities are not disproportionately burdened by compliance costs. Providing financial incentives or recognition for companies that excel in their EPR obligations can also be considered to motivate more producers to actively engage in sustainable practices.

(iii) ***Collaboration with stakeholders:***

Engage local governments, private sector, NGOs, and the informal sector to create a unified and effective waste management system. Encouraging collaboration between public and private sectors is crucial for effective waste management. Businesses and companies should also be encouraged to implement takeback schemes and use proper waste collection techniques to promote a circular economy. For

⁵⁵ <https://recykal.com/blog/role-of-stakeholders-informal-sector/>

⁵⁶ <https://www.undp.org/india/stories/beyond-bin-transforming-waste-management>

⁵⁷ *Ibid.*

⁵⁸ <https://www.financialexpress.com/business/industry-extended-producer-responsibility-in-india-and-adaptations-required-for-businesses-3355014/>

instance, Samsung has started a *Care for Clean India* program to spread awareness for responsible disposal of e-waste and plastic waste. Consumers can participate in the takeback scheme when the product reaches its end-of-life. Samsung collects e-waste/plastic waste and ensures that it is disposed of in the most responsible manner.

(iv) ***Innovative solutions:***

The world's trash problem isn't going away any time soon, and traditional waste management systems aren't equipped to deal with the extra waste produced by growing populations. To help bridge the gap, authorities need to adopt smart waste management technologies that increase efficiency, lower collection costs and divert more waste away from landfills.⁵⁹ It has become necessary to promote innovation in waste management, such as repurposing plastic waste into building materials, to provide sustainable alternatives and reduce environmental impact.

(v) ***Data transparency:***

Establishing a transparent data-sharing system among stakeholders can improve accountability and enhance collaboration between producers, recyclers, and regulatory bodies. The CPCB has already developed platforms for different waste streams to manage EPR compliances. The portals serve as a means to check for discrepancies, non-compliances and audit purposes.

(vi) ***EPR targets and average life cycle of the product:***

Setting EPR targets under various waste management rules is not straightforward and is dependent on the assessment of average life cycle of the products manufactured.⁶⁰ It is necessary to consult the relevant stakeholders before assessing the life cycle of the products to set realistic EPR targets and to ensure proper implementation. Matching regulatory EPR targets with the actual life cycle of products is also important as additional product categories are brought under EPR.

(vii) ***Waste segregation at source:***

Promote separation of waste into biodegradable, recyclable, and non-recyclable categories at the household and business levels to enhance recycling and reduce landfill use. The segregation will help recyclers in the waste management process and will ensure appropriate recycling of complex goods.

(viii) ***Investment in waste treatment technologies:***

Expand facilities for composting, recycling, and energy-from-waste technologies to manage waste more effectively. Bringing in technology for better collection, monitoring and analysis of data is essential to support government departments. For instance, Bhopal Municipal Corporation in Madhya Pradesh has developed a strong GPS-enabled vehicle tracking system for door-to-door collection of waste.⁶¹ The collection vehicles have

⁵⁹<https://www.bigrentz.com/blog/smart-waste-management?srsltid=AfmBOoqXkIRCkeCxxhpP-282gjXUmz0Cj4PNLBzCOoyGjYj021ZTzth1>

⁶⁰ *Ibid.*

⁶¹<https://www.weforum.org/agenda/2023/08/how-india-is-coming-up-with-innovative-solutions-to-tackle-waste/>

unique ID numbers and designated zones from which they are required to collect waste. CPCB has also taken

steps in this regard and has developed separate portals for different waste streams to manage EPR compliances.



M&A in Waste Management in India

The M&A activity in India's waste management industry is on a steady incline. Despite the market fragmentation, GoI's focus on consolidation of the market has resulted in strategic acquisitions made by both domestic and foreign companies. The increasing interest in the field is demonstrated by various noteworthy transactions in the waste management sector. While issues including regulatory hurdles, financial limitations, and infrastructure inadequacies continue to exist in the industry, the industry offers potential for expansion and innovation in spite of these obstacles.

(a) Key Transactions in Waste Management Sector

(i) Black Gold Recycling – a circular economy startup acquired majority stake in Reteck Envirotech Private Limited, the Indian subsidiary of Hong

(ii) Kong and US based Li Tong Group a global firm in reverse supply chain management and electronics lifecycle solutions.

(iii) Kundan Green Energy acquired a WtE project of Jabalpur MSW Private Limited with an installed capacity of 11.5 MW.

(iv) The investment firm KKR & Co. bought a controlling share of the Indian company Ramky Enviro Engineers Ltd (*now known as Re Sustainability*). They also acquired 60% stake in the waste management and environmental services provider in India.

(v) EverEnviro Resource Management Pvt. Ltd, a wholly owned subsidiary of Green Growth Equity Fund, has acquired IL&FS Environmental Infrastructure & Services Ltd.

(b) **Factors Driving M&A Activity in Waste Management Sector**

- (i) **Growing Government Focus:**
The waste management sector has become more lucrative for investment as a result of government programs and policies like the Swachh Bharat Mission and government's focus on environmental issues.
- (ii) **Increasing Urbanization and Waste creation:**
As a result of rising consumption and urbanization, waste creation has significantly increased resulting in opening of new markets for waste management firms. According to a global consumer life study survey, two in every three urban Indian consumers take into account environmentally responsible actions undertaken by businesses while making their purchase decisions.⁶²
- (iii) **Technological Developments:**
Innovation and industry consolidation are being propelled by developments in waste management technology, such as waste-to-energy and recycling technologies.
- (iv) **Regulatory Changes:**
With amendments to the existing waste management framework in India, various novel opportunities have been created for the businesses operating in the waste management sector.

(c) **Challenges and Opportunities**

- (i) **Fragmentation of the Market:**
The Indian waste management market is highly fragmented, with a large number of small and medium-sized players. The huge fragmentation can hinder the efforts towards consolidation and improving the efficiency of operations.
- (ii) **Infrastructure and Technological Gaps:**
India faces significant infrastructure and technological challenges in the waste management sector. Increase in investment in modern waste management infrastructure and technologies is crucial for sustainable growth.
- (iii) **Financial Constraints:**
Many waste management companies in India face financial constraints, limiting their ability to invest in growth and expansion.
- (iv) **Regulatory Hurdles:**
Complex regulatory frameworks and bureaucratic hurdles can hinder the growth of the sector.

⁶² Sustainable synergies: The evolution of Environmental, Social and Governance landscape in Mergers & Acquisitions, Deloitte, June 2024.

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