

A SEAT AT THE TABLE

INCLUDING THE INFORMAL RECYCLING
SECTOR IN EXTENDED PRODUCER
RESPONSIBILITY FOR PLASTICS



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About Chintan Environmental Research and Action Group

Chintan is a gendered Circular Society Do-Tank that improves lives, livelihoods, and leadership to equitably manage and reduce consumption and its effects on the environment. Three key themes Chintan focuses on are Circular Economy and Waste, Air Pollution and Climate Change. Our mission is to pioneer a transition to a Circular Society—a humanized system that is just, gender-inclusive and climate resilient. It's a comprehensive approach to circularity where not only are materials and energy circulated in sustainable loops, but also, wealth, knowledge, technology, power and agency are circulated and redistributed to everyone in society. We think and act to enhance resilience for marginalized communities, develop green skills and income opportunities in recycling and repair, and build gender-inclusive capacities to empower Circular Society actions.

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PLASTICS

Research Team

Bharati Chaturvedi

Abhishek Singh

Apoorva Agrawal

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238 Sidhartha Enclave, New Delhi-110014

Email: info@chintan-india.org

Website: www.chintan-india.org

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List of Abbreviations

AFR	Alternative Fuels or Raw Material
CPCB	Central Pollution Control Board
DO	Designated Officer
DWCC	Dry Waste Collection Centre
EPR	Extended Producer Responsibility
MJ	Megajoule
MoEFCC	Ministry of Environment, Forest and Climate Change
MT	Metric Tonnes
PCC	Pollution Control Committee
PIBO	Producers, Importers, and Brand-Owners
PIMBO	Producers, Importers, Brand Owners, and Manufacturers
PPE	Personal Protective Equipment
PWP	Plastic Waste Processor
PWM	Plastic Waste Management
RO	Regional Office
SPCB	State Pollution Control Board
SWM	Solid Waste Management
TPA	Tonnes Per Annum
TPD	Tonnes Per Day
UT	Union Territory

Glossary

Aggregators: Aggregators refers to the informal scrap dealers that collect recyclables from various channels and then hyper-segregate these recyclables to ultimately sell to a supplier or a recycler.

Conversion Factor: The Conversion Factor defines how much of the output is generated based on the quantity and type of the input in the process. Thus, Conversion Factor forms the basis for calculating and generating EPR certificates.

Co-Processing:	Co-Processing refers to the use of waste materials in industrial processes as alternative fuels or raw material (AFR) to recover energy and material from them.
Dhalao:	Dhalaos are pre-processing centers for the municipal waste collection system of the city. Typically, these are large three-walled concrete structures.
Ethical Sourcing:	Ethical sourcing refers to the process of sourcing products in a sustainable and responsible way while ensuring that the workers involved in making the goods are safe and working in a sustainable environment free of fraud, corruption, and bribery. Ethical sourcing also includes respect for human rights, fair treatment, and payment of living wages to the workers.
Extended Producer Responsibility (EPR):	EPR is 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.
Itinerant Buyer:	Itinerant buyers are workers that collect recyclables from households and businesses in exchange for payment or barter.
PIBOs	PIBOs refers to Producers, Importers, and Brand Owners. These are the entities that have defined obligations under EPR to appropriately manage the plastic waste introduced by them in the environment.
Polluter-Pays Principle:	The polluter-pays principle is an environmental policy principle that suggests that the responsibility to bear the costs of managing and mitigating pollution should be on the entity responsible for that pollution.
Post-Consumer Plastic Waste:	Post-consumer plastic waste is the plastic waste that is generated at the end of the consumer lifecycle.
Pre-Consumer Plastic Waste:	Pre-consumer plastic waste is the plastic waste produced by factories, facilities, or other organizations but not consumed by consumers.

- Pyrolysis:** Pyrolysis is the process in which plastic is heated to extremely high temperatures, with a lack of oxygen, to break it down into smaller molecules and transform it into pyrolysis oil or gas.
- Traceability:** Traceability refers to the ability to trace something forward or backward in a process, value chain, or ecosystem.

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Prologue



A SEAT AT THE TABLE Advancing Fairness and Inclusion in India's Plastic Waste Management

As India approaches its eighth decade as a modern nation, poised to become the world's third largest economy, its commitment to inclusion remains an act of faith. Among the many communities striving for recognition and equity, wastepickers stand uniquely as a group seeking both climate and economic justice. Long marginalized and vulnerable, they have only recently gained access to social protection schemes. Yet, their indispensable role in India's waste management and recycling ecosystem cannot be overstated.

How can we reduce the vulnerabilities of wastepickers, strengthen their resilience, and integrate their contributions into the formal economy? This report argues for one pathway that has already presented itself is their meaningful inclusion in waste management, recycling, and Extended Producer Responsibility (EPR). Enshrined in India's regulatory framework, EPR mandates that producers take responsibility for the end-of-life management of materials. However, its successful implementation hinges on recognizing and fairly compensating those who form the backbone of the system.

A *Seat at the Table*, focussed on plastic waste, asserts that integrating wastepickers into the EPR regime is not merely an ethical imperative—it is part of India’s broader inclusion agenda. True progress demands not only policy commitments but also tangible efforts to ensure fairness across the waste value chain. Beyond fulfilling national mandates, ethical plastic waste management is essential to eliminating human exploitation in this sector. For those who hesitate to embrace fairness, it is worth noting that ethically sourced raw materials are increasingly in demand across global markets.

Without wastepickers, EPR solutions for plastic waste in their current form would not exist. While start-ups and formal enterprises have entered the plastic waste management space, they still rely heavily on the wastepicker’s extensive networks, skills, and efforts. Yet, these workers remain invisible in reporting structures—there is no requirement to disclose how they are paid, if at all. The responsibility for ensuring fair compensation lies with Producer Importer Organizations (PIOs) and Producer, Importer, and Brand Owner (PIBOs) entities.

While some wastepickers benefit from social security programs, they are rarely compensated for the full extent of their labour. Payment is often tied to the sale of waste materials, failing to account for the painstaking processes of segregation, aggregation, and quality enhancement—tasks that require both expertise and endurance. This gap between contribution and compensation represents a critical failure in the inclusion framework.

Historically, the labour of Dalits, other marginalized castes and groups, and women from these communities has remained invisible to dominant social and economic systems, even as their contributions benefit society at large. This exclusion persists in waste management, where such workers are denied rightful earnings for their efforts.

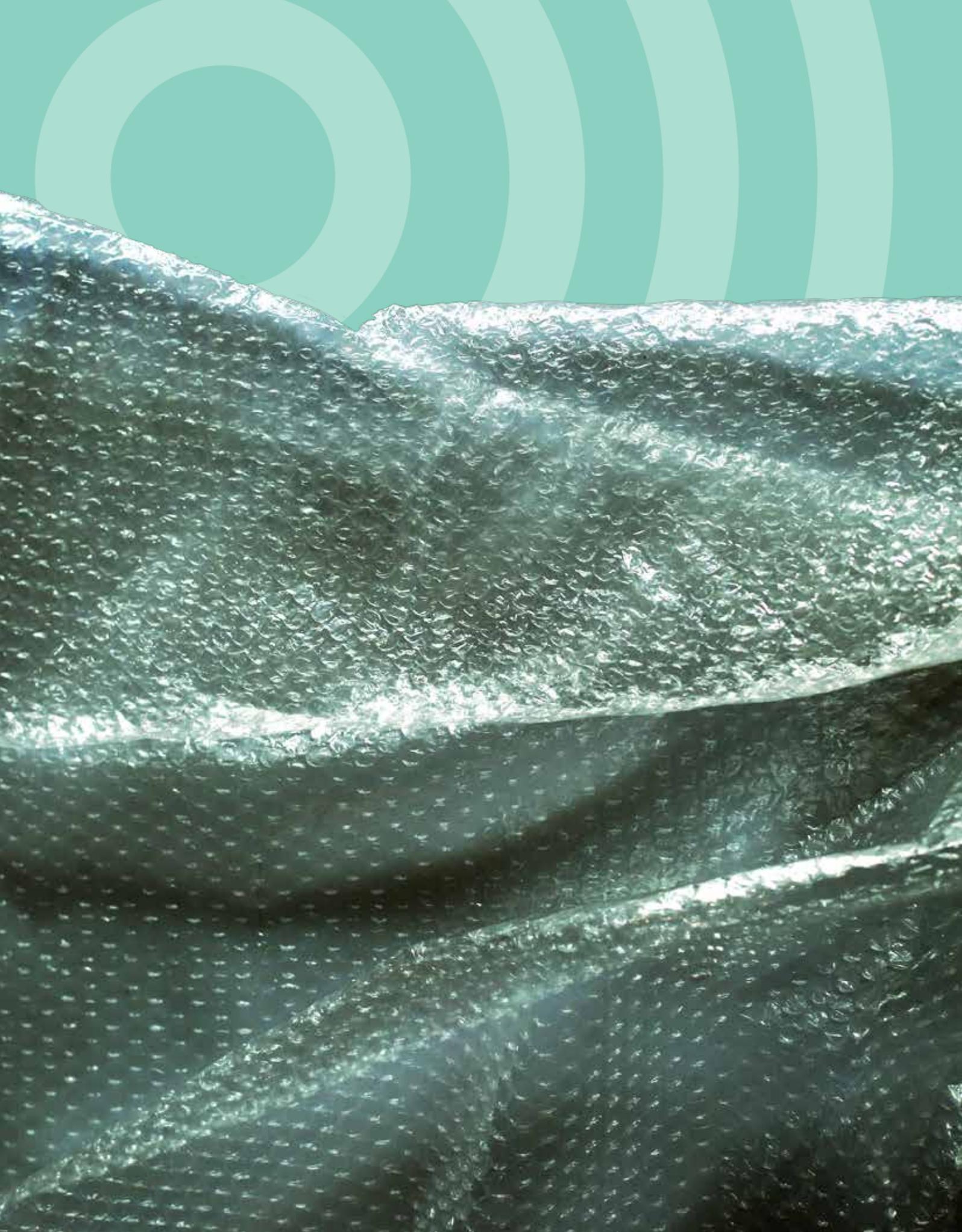
What course corrections can we anticipate? A few progressive plastic waste generators have begun to engage directly with wastepickers, seeking to understand and address these inequities. However, much more remains to be done. This report draws on global case studies and national policies—both within and beyond the waste sector—to outline a roadmap for a fair, inclusive, and accountable EPR system. Through in-depth consultations with wastepickers, we propose practical measures such as traceability, transparency via advanced technologies like AI, national wastepicker registration, and fair payment structures.

We hope this report serves as a catalyst for new ideas and concrete action. The time for change is now. In a nation that aspires to *Sabka Saath, Sabka Vikas*, with *Sabka Vishwas*- participation, development and trust of all- equitable trade within the EPR framework is not just necessary—it is non-negotiable.

Bharati Chaturvedi

Founder and Director

Chintan Environmental Research and Action Group



Executive Summary

India generates close to 26,000 tonnes of plastic waste per day. Around 60% of this is recycled, primarily by the 15-lakh strong informal sector.¹

The concept of Extended Producer Responsibility (EPR) was introduced in India through the Plastic Waste (Management and Handling) Rules, 2011, notified by the Ministry of Environment, Forest and Climate Change (MoEFCC). The rules underwent revisions and the Plastic Waste Management Rules, 2016, further strengthened the EPR framework. The EPR model is based on the polluter-pays principle. The polluter-pays principle is an environmental policy principle that suggests that the responsibility to bear the costs of managing and mitigating pollution should be on the entity responsible for that pollution.

The MoEFCC, Government of India, in its fourth Amendment to the Plastic Waste Management (PWM) Rules, dated February 16, 2022, notified 'Guidelines on Extended Producer Responsibility for Plastic Packaging' in Schedule II of the Rules. A centralized online extended producer responsibility (EPR) portal, 'Centralized Extended Producers Responsibility (EPR) Portal for Plastic Packaging', was developed by the Central Pollution Control Board (CPCB) and introduced on April 5, 2022, to improve accountability, traceability, and transparency to fulfill EPR obligations by Producers, Importers, and Brand-Owners (PIBOs) and to subsequently allow real-time monitoring of transactions between PIBOs and Plastic Waste Processors (PWPs).

The role of the informal sector was explicitly recognized by the MoEFCC in the Plastic Waste (Management and Handling) Rules, 2011. However, the Plastic Waste Management Rules, 2016, along with all amendments until March 2024, failed to recognize and include wastepickers as a legitimate entity in the plastic value chain. This oversight ignores the crucial role that the informal sector plays in plastic waste management, from aggregating waste to making collection possible. Furthermore, the focus on a material-centric approach often overlooks the human dimension—particularly the wastepickers—who are instrumental in achieving EPR targets. This gap may hinder a more sustainable and inclusive system.

The key aspects of EPR implementation in India can be broadly summarized as follows:

- **Producer, Importer, and Brand Owner (PIBO) Targets:** PIBOs have defined obligations to ensure recycling, end-of-life disposal, and reuse of plastic. They are also required to incorporate recycled plastic in their packaging.

- **Plastic Waste Categories:** Plastic waste is divided into five categories (Categories I to V) based on the type and characteristics of the plastic material.
- **Category-wise Targets:** Each PIBO has specific targets for plastic waste management, categorized by the type of plastic they produce or use.
- **Plastic Waste Processors (PWPs):** PWPs handle the processing of collected plastic waste and generate EPR Certificates indicating the amount and category of plastic processed.
- **EPR Certificates:** These certificates are issued in various denominations based on the type and quantity of plastic processed. PIBOs purchase these certificates to meet their EPR compliance requirements.
- **Market-Driven EPR Certificate Pricing:** The pricing for EPR Certificates is market-driven and subject to fluctuations. The March 2024 amendment links the price of these certificates to the Environmental Compensation (EC) rates, ensuring that the cost reflects the environmental impact and incentivizes compliance.
- **Environmental Compensation for Non-Compliance:** Both PIBOs and PWPs are liable for Environmental Compensation if they fail to meet their obligations. For PIBOs, this includes failing to meet their EPR targets, while PWPs are penalized for non-filing or late filing of their annual reports. The EC modality applies to both entities as a deterrent to non-compliance and encourages timely reporting and action.

While introduction of EPR promotes a more responsible approach to plastic production and disposal, incorporating the informal sector into EPR framework is critical to the creation of a sustainable and inclusive system that does not exploit the poorest workers in the value chain, on whose work the value is primarily extracted and reported. The informal sector is a glaring omission in EPR implementation as it is the informal sector that aggregates the waste and makes it possible for plastic waste to be collected in the first place. Moreover, the existing EPR rules lean heavily towards a material-centric approach, often overlooking the human aspect that enables the material-centric approach.

To enhance their role in the value chain, wastepickers, particularly women, should be prioritized for opportunities to handle the task of washing rigid plastic packaging for reuse. This would alleviate the burden of transporting heavy loads, ensure a more equitable

The informal sector is a glaring omission in EPR implementation as it is the informal sector that aggregates the waste and makes it possible for plastic waste to be collected in the first place

distribution of tasks, and foster gender-sensitive practices. Developing appropriate infrastructure to facilitate this process would further reduce the physical strain on workers and improve overall efficiency.

The overarching focus seems to centre on establishing and tracking plastic collection targets for PIBOs, with minimal attention directed towards scrutinizing the process implemented to attain these targets. The oversight on the human dimension of the process, primarily the informal sector, may impede a more comprehensive and sustainable approach to waste management.

ROLE AND STATE OF THE INFORMAL SECTOR:

Informal sector relates to individuals, entities, and activities that are unregulated and not protected by the state. It is easy for the use of the word 'informal' to conjure up images of a grey market. But this generalization can't be further from the truth, as we see in the case of the informal waste sector. The informal waste sector in fact provides a highly subsidized waste management, public health, and environmental service, the absence of which would be calamitous and bring our cities to their knees. To integrate this informal sector in the plastic value chain, and thereby included and recognized, should not be disallowed by law.

Despite their pivotal roles, the waste picker community in India is historically marginalized and continues to be stigmatized. They typically belong to the most oppressed categories of society that are denied access to resources and thereby pushed into cycles of poverty. The situation is worse for women and children. Excluding them from receiving just compensation for their role in enabling EPR forces them to be exposed to rent seeking behavior, while delivering invaluable services without receiving any credit or fair compensation for it.

ETHICAL SOURCING:

The principle of ethical sourcing demands that products be sourced in a sustainable and responsible way, while ensuring that workers involved in the value chain are safe, respected, paid a living wage and treated fairly. As businesses across the world make the shift from the shareholder value approach to the stakeholder value approach, principles of ethical sourcing are taking centre stage in business operations. And there is no reason why plastic PIBOs should also not be held accountable. Gen Z, which by 2030 would comprise 30% of the global workforce, demands purpose and accountability more than any other generation. As this demographic shift happens, Gen Z would become the largest consumer of the products and services as well. Thus, this is also an opportunity for businesses to differentiate their brand, and possibly earn a premium for this differentiation, amongst consumers that are increasingly passionate about social and environmental impact. In an environment where the quality and size of talent-pool are shrinking, the informal sector in waste provides a highly skilled talent-pool that is extremely motivated to work. Their inclusion, instead of being perceived erroneously as an additional cost or burden, should be seen by PIBOs as an opportunity to differentiate, possibly reap the benefits by being the first mover, bolster the supply chain, and leverage the impact stories to strengthen their brand, especially in the eyes of Gen Z, their largest employee and customer base in times to come.

RECOMMENDATIONS:

The first step to incorporating ethical sourcing principles into the plastic waste value chain is to understand the value chain better. Traceability and transparency are foundational to ethical sourcing. PIBOs cannot afford to drive blindfolded without a view into where their supply comes from, and they also cannot afford to keep their supply chain a black box. The informal waste sector serves as the primary supplier of unprocessed plastic waste, which is then processed by Plastic Waste Processors (PWPs) before reaching Producers, Importers, Brand Owners, and Manufacturers (PIMBOs). This processed plastic waste helps PIMBOs meet their EPR targets.

The March 2024 amendment² emphasizes the expanded role of manufacturers, making the term PIMBOs more inclusive in the EPR framework. The integration of the informal sector into this process ensures that a substantial amount of plastic waste is collected and processed, supporting compliance with EPR obligations. Thus, there is a need for a comprehensive study that maps the current plastic waste management ecosystem, identifies gaps, and recommends a way forward for the inclusion of the informal sector in the context of the ethical sourcing principles.

The key recommendations of this report in the context of EPR implementation are as below:

- As Urban Local Bodies (ULBs) are now enabled to engage directly with Plastic Waste Processors (PWPs) through the portal, it is essential to consider the Solid Waste Management (SWM) Rules 2016 and incorporate the involvement of the informal sector. Expand EPR regulations to assign and mandate responsibility for ethical sourcing to PIBOs. This includes not just materials but also the humans enabling the supply chain.
- Devise stronger disincentives and environmental compensations for PIBOs. Introduce heavier penalties for PIBOs that do not comply with ethical and environmental standards. Additionally, fines that are currently imposed on Plastic Waste Processors (PWPs) should also extend to PIBOs that engage with non-compliant PWPs, ensuring that PIBOs are accountable for their entire supply chain.
- Establish technology-led controls and automation to prevent possible errors.
- Drive better traceability and transparency in the supply chain by leveraging technology and seamless data integration. This should include wastepickers'

There is a need for a comprehensive study that maps the current plastic waste management ecosystem, identifies gaps, and recommends a way forward for the inclusion of the informal sector in the context of the ethical sourcing principles

registration, so every wastepicker can be registered on a cross-state/Union Territory portal, ensuring registration enjoys portability if the individual travels or migrates. Registration should be repeated to include those left out, and can be carried out with the help of organizations of wastepickers, via camps in informal settlements and near landfills, as well as at municipal offices, after widespread publicity and encouragement. Registration should enable wastepickers to be able to be identified, paid for their work and accounted for in the EPR chain, as relevant.

- Mandate standardized reporting requirements by law to push for transparency and accountability. Declarations by the ULBs under the PWM and SWM Rules, EPR regulations, and annual public disclosure by businesses should all be required to report on the same basic set of standard parameters, which should also include parameters on ethical sourcing from the informal sector.
- Strengthen audit process for PIBOs and PWPs under EPR by leveraging technology, such as predictive analytics, to flag high-risk entities and to minimize human intervention.
- Breakup EPR targets between post-production and post-consumer plastic waste, and establishes acceptable minimum guaranteed price for low-value plastic, to incentivize prioritizing of low-value post-consumer plastic waste by the informal sector.
- The Business Responsibility and Sustainability Reporting (BRSR) framework must be expanded to include disclosures on the inclusion of the informal waste sector in the supply chain and also to take into its purview unlisted companies.
- Payment to the informal sector should take into consideration their services, not only the value (by weight) of the materials. Payment to wastepickers therefore should include two components: by weight of the material and the services of collection, segregation and storage.
- For the reuse obligation³ under EPR, ensure that the mandate responsibility for washing rigid plastic packaging for reuse is first offered to wastepickers, particularly women, to alleviate the burden of transporting heavy loads. This will ensure a more equitable distribution of tasks in the recycling process, enhance their role in the value chain, and support gender-sensitive practices within the informal sector. Additionally, appropriate infrastructure should be developed to facilitate the process of reuse, reducing physical strain and improving efficiency.

It is high time the informal sector found its seat at the table in the discourse around plastic EPR. The producers' responsibilities must be extended to not just the plastic introduced by them in the environment but also to the humans collecting them. This is a win-win scenario, not a zero-sum game.



1

Background

India has been at the forefront of reducing plastics through rules and regulations. As the global host for World Environment Day 2018, India led the call to eliminate single-use plastics. 'Beat Plastic Pollution', the theme for World Environment Day 2018, urges governments, industries, communities, and people's collaboration to discover sustainable alternatives and reduce the manufacturing and excessive use of single-use plastic that pollutes the oceans, endangers marine life, and threatens human health.

The Ministry of Environment, Forest, and Climate Change (MoEFCC), Government of India, in its fourth Amendment to the Plastic Waste Management (PWM) Rules, dated February 16, 2022, notified 'Guidelines on Extended Producer Responsibility for Plastic Packaging'⁴ in Schedule II of the Rules. A centralized online extended producer responsibility (EPR) portal, 'Centralized Extended Producers Responsibility (EPR) Portal for Plastic Packaging', was developed by the Central Pollution Control Board (CPCB) and introduced on April 5, 2022, to improve accountability, traceability, and transparency to fulfill EPR obligations by Producers, Importers, and Brand-Owners (PIBOs) and to subsequently allow real-time monitoring of transactions between PIBOs and Plastic Waste Processors (PWPs).

The introduction of EPR in India reflects a strategic shift by the government to involve stakeholders, primarily plastic producers, importers, and brand owners, in the plastic supply chain in the sustainable management of plastic waste. The over 15 lakh (1.5 million) waste pickers operating in India, who sort plastic from unsorted waste, are an integral part of this value chain that results in around 60% of the plastic waste being recycled.⁵ As per Solid Waste Management (SWM) Rules, 2016, informal waste collectors include individuals, associations, or waste-traders who are involved in sorting, sale, and purchase of recyclable materials. SWM Rules, 2016, define a waste picker as a person informally engaged in the

There are over 1.5 million wastepickers operating in India, who sort plastic from unsorted waste, are an integral part of the plastic supply value chain that results in around 60% of the plastic waste being recycled

collection and recovery of reusable and recyclable solid waste from the source of waste generation to sale of waste to recyclers directly or through intermediaries.⁶

However, despite being recognized in the SWM Rules, the PWM Rules 2016, and its subsequent amendments till March 2024, failed to include waste pickers as a recognized entity in the plastic value chain, and the guidelines appear to neglect the crucial involvement of the informal sector in plastic waste management. Interestingly, the role of the informal sector had been explicitly recognized by MoEFCC in the Plastic Waste (Management and Handling) Rules, 2011, which were the precursor to the Plastic Waste Management Rules, 2016.

This report investigates the role of the informal sector in enabling EPR to be met, as also the extent of their inclusion. It analyzes economic and policy gaps and proposes potential practical solutions.

EXTENDED PRODUCER RESPONSIBILITY (EPR)

The concept of Extended Producer Responsibility (EPR) was introduced in India through the Plastic Waste (Management and Handling) Rules, 2011, notified by the MoEFCC. The rules underwent revisions and the Plastic Waste Management Rules, 2016, further strengthened the EPR framework. These rules were enacted to address the growing concerns associated with the increasing generation of plastic waste and its adverse impact on the environment.

The EPR model is based on the polluter-pays principle. The polluter-pays principle is an environmental policy principle that suggests that the responsibility to bear the costs of managing and mitigating pollution should be on the entity responsible for that pollution.

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Figure 1: The evolution of EPR



According to the Guidelines on Extended Producer Responsibility (EPR) for Plastic Packaging, 2022, Producers, Importers, and Brand-Owners (PIBOs) are mandated to ensure the processing of plastic waste resulting from the packaging of products they introduce into the market. Plastic packaging is classified into four distinct categories as per PWM (Amendment) Rules, 2022. However, as per Plastic Waste Management (Amendment) Rules, 2024, plastic packaging has been categorized into five categories:

Table 1: Plastic packaging categories covered under EPR

Category I	Rigid plastic packaging like PET bottles, oil cans etc.
Category II	Flexible plastic packaging of single layer or multilayer (more than one layer with different types of plastic)
Category III	Multilayered plastic packaging (at least one layer of plastic and at least one layer of material other than plastic)
Category IV	Plastic sheet or like used for packaging as well as carry bags made of compostable plastics
Category V	Biodegradable plastics: This category, introduced in the 2022 notification, covers plastics designed to decompose under specific environmental conditions.

Plastic waste can be processed by entities called Plastic Waste Processors (PWP) through recycling, utilization in end-of-life such as waste to oil or waste to energy, or roadmaking.

Table 2: Different ways in which PWP can process the plastic waste

Recycling	Recycling refers to the process of transforming segregated plastic waste into a new product or raw material for producing new products.
Co-processing	Co-processing refers to the use of waste materials in industrial processes as alternative fuels or raw material (AFR) to recover energy and material from them.
Waste to energy	Waste to Energy means using plastic waste for generation of energy . Waste to energy plants burn energy rich municipal solid waste (MSW), such as plastic, to produce steam in a boiler, and the steam is used to power an electric generator turbine that produces electricity.
Waste to oil	Plastic, originally produced using crude oil, can be used to produce synthetic oil and gas through a process called pyrolysis. In this process, the plastic is heated to extremely high temperatures, with a lack of oxygen, to break it down into smaller molecules and transform it into pyrolysis oil or gas. This product can then be used as a fuel or to create new plastic products.
Road construction	Plastic materials are crushed into small bits, dust particles are removed, crushed particles are mixed with hot gravel and warmed so that all plastic melts. It is then poured onto the hot asphalt roads. This needs to be processed as per Indian Road Congress guidelines.

Only those plastics which cannot be recycled are to be sent for end-of-life disposal such as co-processing (for example in cement kilns), waste to energy, waste to oil, road construction etc. as per relevant guidelines by Central Pollution Control Board (CPCB).

Additionally, under Extended Producer Responsibility (EPR), new targets have been introduced for the incorporation of recycled plastic into plastic packaging. These targets also emphasize the reuse of recycled plastics, promoting a more sustainable approach to plastic waste management and supporting the transition towards a circular economy.

While introduction of EPR promotes a more responsible approach to plastic production and disposal, incorporating the informal sector into EPR is critical to the creation of a sustainable and inclusive system. The informal sector is a glaring omission in EPR implementation as it is the informal sector that aggregates the waste and makes it possible for plastic waste to be collected in the first place to meet the EPR targets.

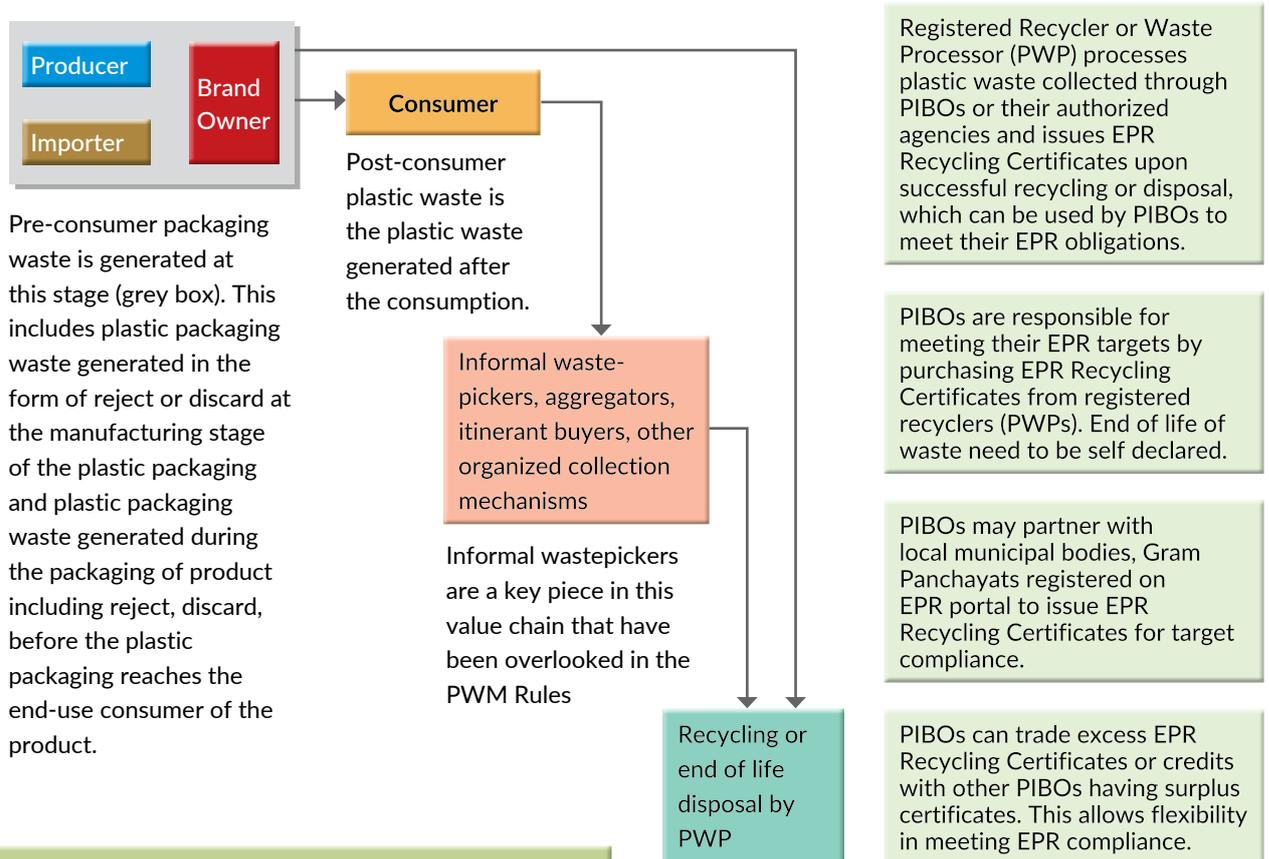
Trickle down effects of EPR to the cities (ULBs), effective implementation of EPR in urban local bodies (ULBs) presents an opportunity to incorporate the informal sector into the formal waste management framework. By recognizing and integrating informal waste collectors and recyclers, EPR initiatives can facilitate more effective waste aggregation, collection, and recycling. This inclusion would not only support the achievement of EPR objectives but also ensure equitable representation and improved working conditions for marginalized workers in the waste management sector.



2 Deeper Dive into EPR Laws

The Plastic Waste Management Rules, 2016, emphasize the principle of EPR by making it mandatory for PIBOs to take responsibility for the entire lifecycle of their plastic products. The below flowchart provides a schematic view of EPR in action.

Figure 2: A schematic of the plastic waste value chain

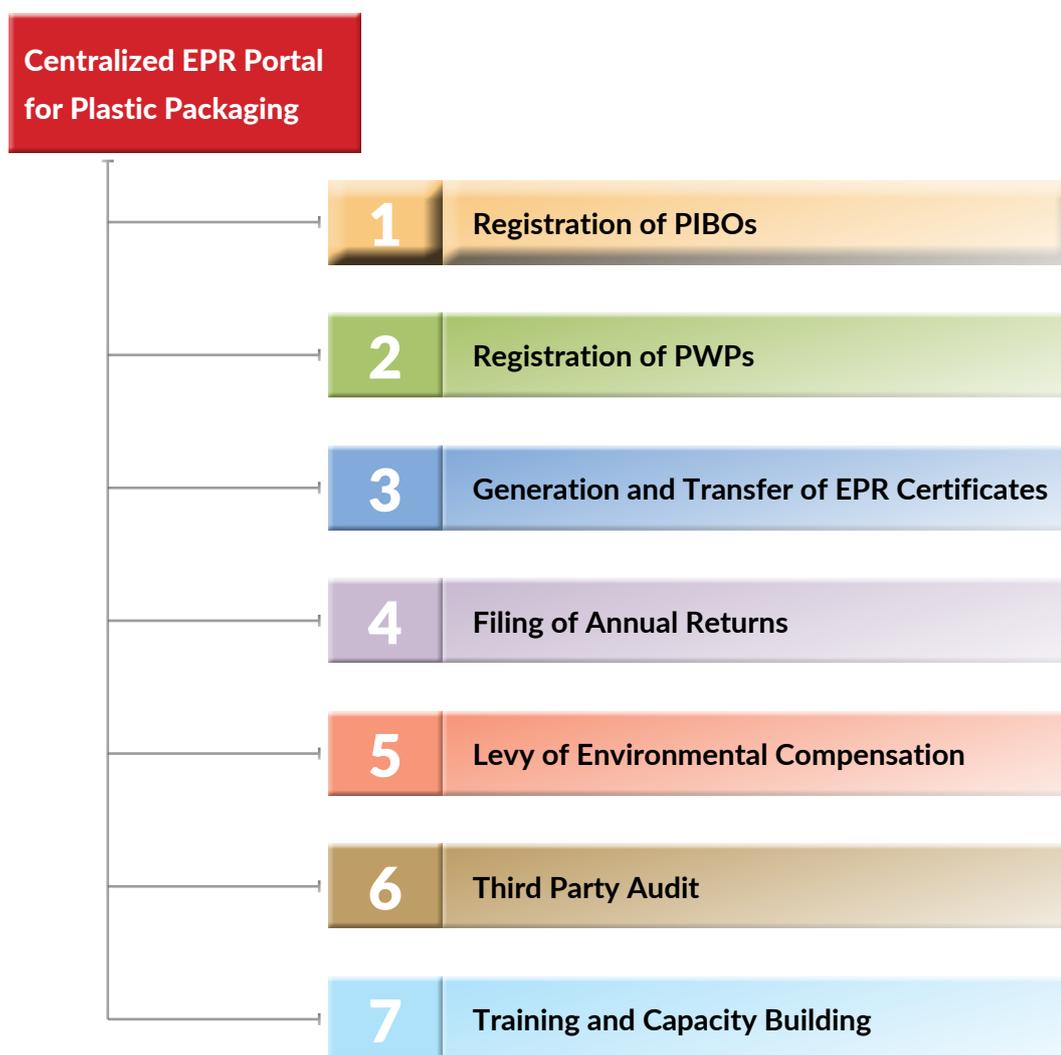


Note: The information on the operation and implementation mechanism of Extended Producer Responsibility (EPR) is based on the Plastic Waste Management (Amendment) Rules, 2022. While the Plastic Waste Management (Amendment) Rules, 2024 have revised certain EPR targets and introduced measures to strengthen compliance and monitoring, the overall implementation framework for EPR, including the roles of stakeholders and the functioning of the centralized EPR portal, remains largely unchanged.

Above are 4 ways in which PIBOs get recycling certificates. Targets are set plastic category-wise as per EPR guidelines. All exchange, transfer, purchase, and sale of certificates occurs through CPCB's Centralized EPR Portal for Plastic Packaging

The EPR guidelines permit the registration of Plastic Waste Processors (PWPs) and Producers, Importers, and Brand-Owners (PIBOs), as well as the issuance of certificates by PWPs and the exchange of credits between PIBOs and PWPs. Additionally, the guidelines stipulate environmental compensation for unmet obligations. The Centralized EPR Portal for Plastic Packaging ensures documentation and enforcement of accountability, enhancing the transparency, traceability, and management of EPR obligations. This process is supported by the portal's seven modules on the CPCB EPR portal.

Figure 3: The seven planned modules of the Centralized EPR Portal for Plastic Packaging.



As of August 2024, the online portal has total registered PIBOs are 42,421 and registered PWPs are 2,480.⁷

Table 3: Number of entities, by type, registered on the Centralized EPR Portal for Plastic Packaging

Type of entity	Number of Entities Registered
Producers	4,474
Importers	35,183
Brand Owners	2,764
PWPs	2,480

However, it is estimated that the actual number of those requiring registration is significantly greater as CPCB is issuing directives to unregistered PIBOs to register on the portal.⁸

The new provisions (listed below) in the Plastic Waste Management (Second Amendment) Rules, 2023, may help in addressing the low number of registrations:

- The Producers shall not sell or provide or arrange plastic to be used as raw material to a manufacturer of plastic packaging or to a seller not registered on the centralized online portal specified in Schedule II.
- The sale or purchase of plastic raw material or plastic packaging can only be made by those who are registered on the centralized online portal.
- Each plastic packaging shall contain the following information, printed in English, namely:
 - Name and registration certificate number for producer or importer or brand owner generated through the centralized online portal specified in Schedule II for plastic packaging.

Since all the activities and transactions listed above cannot be performed without registering on the Centralized EPR Portal for Plastic Packaging, the number of PIBOs registered is likely to increase.

THE KEY ASPECTS OF THE EPR PROCESS

A. Registration of Entities

- The following entities should register on the Centralized EPR Portal for Plastic Packaging:
 - Producer (P) including micro and small enterprises as defined under the Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006)
 - Importer (I)
 - Brand owner (BO)
 - Plastic Waste Processor (PWP) engaged in
 1. recycling,
 2. waste to energy,
 3. waste to oil, and
 4. industrial composting;
 - Manufacturers and importers of plastic raw material;
 - Manufacturers of items made from compostable plastics or biodegradable plastics.

- Only PIBOs and PWPs registered on the portal can engage in transactions.
- If an entity engages in more than one category (for example both as a brand owner and importer), it must be registered separately under each of the categories.
- PIBOs are required to obtain registration from CPCB, if operating in more than two States/Union Territories (UTs) and from concerned State Pollution Control Board (SPCB)/Pollution Control Committee (PCC), if operating in one or two States/UTs

B. Obligated Entities

The following entities shall be covered under the Extended Producer Responsibility obligations:

- Producer of plastic packaging, other than micro and small enterprises as defined under the Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006);
- Importer of plastic packaging including intermediate material used for manufacturing plastic packaging such as films and preforms and plastic packaging of imported products;
- Brand Owners including online platforms/marketplaces and supermarkets/retail chains other than micro and small enterprises as defined under the Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006);
- Plastic Waste Processors;
- Manufacturers and importers of plastic raw material;
- Manufacturers of items made from compostable plastics or biodegradable plastics.

C. Targets

The EPR targets for PIBOs are determined category-wise and fall under four types of obligations:

- Obligation for recycling
- Obligation for use of recycled plastic content
- Obligations for reuse
- Obligation for end-of-life disposal

The plastics waste to be managed under EPR was gradually increased from years 2021 - 22 to 2023 - 24, as shown in Table 4 below. The EPR target currently stands at 100% of the eligible quantity. Table 5 shows the methodology for calculation of the eligible quantity.

Table 4: EPR target calculation (category-wise)

	Year	EPR target (as a percentage of eligible quantity - category-wise)
I.	2021 - 22	25%
II.	2022 - 23	70%
III.	2023 - 24	100%

The methodology for calculation of 'eligible quantity' varies for Producers, Importers, and Brand-Owners.

Table 5: Methodology for calculation of eligible quantity

Variables	Producers (other than micro and small enterprises as defined under the Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006)	Importer of plastic packaging including intermediate material used for manufacturing plastic packaging such as films and preforms and plastic packaging of imported products;	Brand Owners including online platforms/marketplaces and supermarkets/ retail chains other than micro and small enterprises as defined under the Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006);	Manufacturers and importers of plastic raw material
A	Average weight of plastic packaging material sold in the last two financial years (category-wise).	Average weight of plastic packaging material and/or plastic packaging of imported products sold in the last two financial years.	Average weight of virgin plastic packaging material (category-wise) purchased and introduced in market in the last two financial years	The quantity of plastic raw material sold to micro and small producers where the sale invoice is authenticated by the manufacturer or importer of plastic raw material, on the centralized online portal
B	Average quantity of pre-consumer plastic packaging waste in the last two financial years.	Average quantity of pre-consumer plastic packaging waste in the last two financial years	Average quantity of pre-consumer plastic packaging waste in the last two financial years	The sale made by such micro and small producers to Brand Owners and Producers, which are not categorized as micro and small enterprises as defined under the Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006)
C	Annual quantity supplied to the Brand-Owners Annual quantity supplied to specific entities (as per sub-clause 4 (iii)) in the previous financial year.	Annual quantity supplied to specific entities(as per sub-clause 4 (iii)) in the previous financial years.		
Formula to calculate the eligible quantity (D)	$D = A + B - C$	$D = A + B - C$	$D = A + B$	$D = A - B$

The formulae presented in the table indicate that the volume of plastic supplied to Brand-Owners (excluding micro and small enterprises) is deducted from the total amount of plastic sold by Producers, Importers, and Manufacturers. This adjustment is made to determine the recycling target for the remaining plastic. Consequently, the obligation to recycle the plastic sold to Brand-Owners is transferred to these Brand-Owners.

The minimum level of recycling (excluding end-of-life disposal) of plastic waste collected under EPR, category-wise, will also progressively increase over the years.

Table 6: Minimum level of recycling (excluding end- of-life disposal) of plastic waste collected under EPR

Plastic packaging category	2024-25	2025-26	2026-27	2027-28 and onwards
Category I	50%	60%	70%	80%
Category II	30%	40%	50%	60%
Category III	30%	40%	50%	60%
Category IV	50%	60%	70%	80%

Similarly, the targets for use of recycled plastic in plastic packaging, category-wise, will steadily increase over the years. The obligation for reuse though applies only to the Brand-Owners and only for Category I. The targets for these two – use of recycled plastic in plastic packaging and reuse – come into effect later than the minimum recycling targets. These targets are shown in Tables 7 and 8 below

CALCULATING THE EPR TARGET (HYPOTHETICAL SCENARIO)

Let's assume the year is 2025 – 26

Producer X introduces 100 MT of Category II plastic in the market. 100% of this will be covered in EPR.

The minimum recycling target for Category II plastic in year 2025 – 26 is 40% (as shown in Table 6)

This means -

Minimum 40 MT of plastic packaging waste collected under EPR needs to be recycled. Remaining plastic waste collected (maximum 60 MT) may be used for end-of-life disposal such as co-processing, waste to energy, waste to oil etc.

Table 7: Mandatory use of recycled plastic in plastic packaging

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%

Table 8: Minimum obligation for brand owners to reuse Category I (rigid plastic packaging)

Year	Category I rigid plastic (Volume or weight ≥ 0.9 litre or kg but < 4.9 litres or kg)	Category I rigid plastic (Volume or weight ≥ 4.9 litres or kg)
2025-26	10%	70%
2026-27	15%	75%
2027-28	20%	80%
2028-29 and onwards	25%	85%

D. EPR Certification

Plastic Waste Processors (PWPs) registered under the Plastic Waste Management Rules, 2016, as amended, are only authorized to issue certificates for plastic waste processing, with the exception of plastic waste used in road construction. In cases where plastic waste is utilized for road construction, Producers, Importers, and Brand-Owners must submit a self-declaration certificate in the format prescribed by the Central Pollution Control Board. For the fulfillment of Extended Producer Responsibility obligations, only certificates issued by registered plastic waste processors will be recognized.

For End-of-Life, the Producers, Importers, Brand-Owners and Manufacturers, and manufacturers of commodities made from compostable plastics or biodegradable plastics shall provide the details of certificates for plastic waste recycled and sent for end-of-life disposal, by 30th June of next financial year while filing annual returns on the online portal, and the same will be verified by CPCB/SPCB/PCC.

The Manufacturer of biodegradable plastics shall fulfill their Extended Producer Responsibility obligations by obtaining Extended Producer Responsibility certificates generated by local authorities, as per agreed modalities. The generation and transfer of EPR certificates are managed through the CPCB's centralized portal. Figure 4 provides a schematic overview of the steps involved, from registration to the issuance of EPR certificates via the portal. Key aspects of this process, specifically related to the generation and transfer of EPR certificates by Plastic Waste Processors (PWPs), are outlined below:

- Post registration on the portal, a physical verification of the PWP is initiated. This physical verification is performed by the SPCB's/PCC's Regional Officer (RO) and based on their recommendation, the SPCB's/PCC's Designated Officer (DO) either approves or rejects the PWPs registration. The feature to generate certificates remains disabled until the approval.

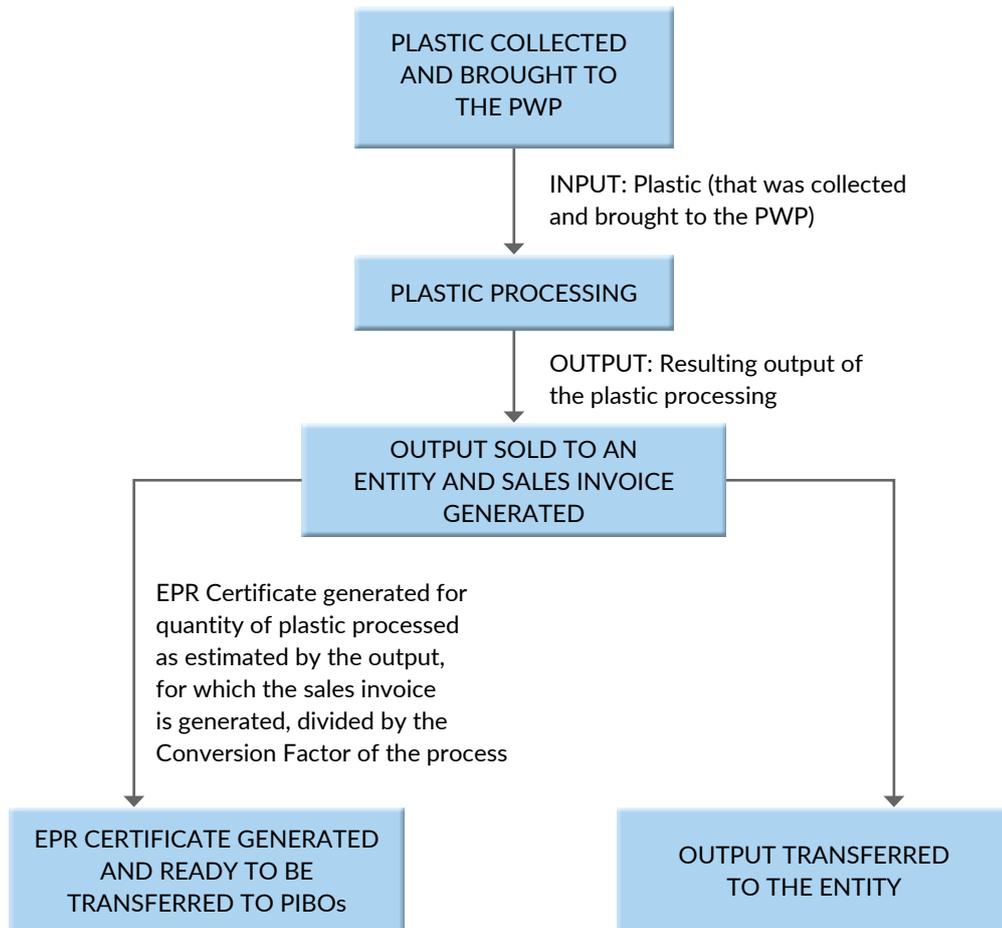
PWPs registered under the amended Plastic Waste Management Rules, 2016, are authorized to issue certificates for all plastic waste processing, except those used in road construction.

- During the physical verification, the actuals at the PWP's site are compared against a pre-populated checklist fetched from the centralized portal based on the self-declared information by the PWP. During this stage, the Conversion Factors⁹ are also verified by the RO. Conversion Factor forms the basis for calculating and generating EPR certificates.

Using the quantity of collected plastic waste directly as a metric for EPR Certificate generation presents risks of data misrepresentation and does not guarantee that the collected waste has been processed and sold. Figure 4 below provides a schematic representation of this process.

Therefore, the Conversion Factor acts as a control mechanism within the EPR process. An EPR Certificate is generated only when a verified sales invoice for the processed plastic or output has been issued. This ensures that plastic waste is not only collected but also processed and sold for further use, aligning with the objective of maximizing plastic recycling and reuse. The quantity of processed plastic waste is calculated by dividing the output by the Conversion Factor.

Figure 4: Schematic representation of EPR Certificate generation



As mentioned earlier, the Conversion Factors of the processes are verified by SBCBs/PCCs during the physical verification of the PWP. Tying EPR Certificates to the Conversion Factor and sales invoice introduce some control in the process of estimating the quantity of plastic processed, but there is still room for errors and misrepresentation depending upon the frequency and robustness of the physical audits.

The Conversion Factor calculation formulae for various types of PWPs, as defined in CPCBs guidance document, are listed below¹⁰:

- Recycling: Quantity of product output divided by input of plastic waste
- Waste to Energy: Energy output of the boiler divided by energy input
- Waste to Oil: Energy consumption per ton of oil in Joules
- Co-Processing: Energy consumption per ton of clinker in Megajoules (MJ)

CALCULATING THE QUANTITY OF PLASTIC WASTE PROCESSED BASED ON CONVERSION FACTOR AND PROCESSED OUTPUT (A HYPOTHETICAL SCENARIO TO ILLUSTRATE THE CONCEPT)

Let's assume that the plastic waste processor processes Category I plastic and converts it into pellets or chips.

Conversion factor: 0.7

Production (Output): 70 tonnes

The 70 tonnes of output was sold to a manufacturing unit and a sales invoice was generated for the amount.

Thus, corresponding quantity of plastic waste processed (Category I): $70/0.7 = 100$ tonnes

The EPR Certificate for 100 tonnes of Category I plastic can now be generated and transferred to a PIBO.

E. Surplus EPR Certificates

Producers, Importers, and Brand Owners can also fulfill their EPR obligations in a specific category by purchasing surplus EPR certificates from other Producers, Importers, or Brand Owners within the same category.

A Brand Owner who exceeds their Extended Producer Responsibility (EPR) targets, for each specific category, may utilize the surplus in the following ways:

- Offset any shortfall from the previous year, subject to clause 9.5;
- Carry it forward for use in the subsequent year;
- Sell the surplus to other Producers, Importers, and Brand Owners.

Although surplus in one category can only be used for offsetting, carrying forward, or selling within that same category. However, surplus under different processes such as reuse surplus may be used for reuse, recycling, or end-of-life disposal. Surplus from recycling can

CPCB, SPCBs/PCCs are authorized to levy environmental compensation on Producers, Importers, and Brand-Owners who fail to meet their EPR targets and obligations under their jurisdiction.

be applied to recycling and end-of-life disposal, but surplus from end-of-life disposal cannot be used for reuse or recycling.

All such transactions must be recorded and reported by Producers, Importers, and Brand Owners on the online portal when submitting annual returns under the EPR framework as per the system established by CPCB on the centralized portal.

F. Environmental Compensation

Based upon the polluter-pays principle, the guidelines on EPR for plastic packaging provide a framework for the levy of environmental compensation in case of non-fulfilment of EPR targets by PIBOs.

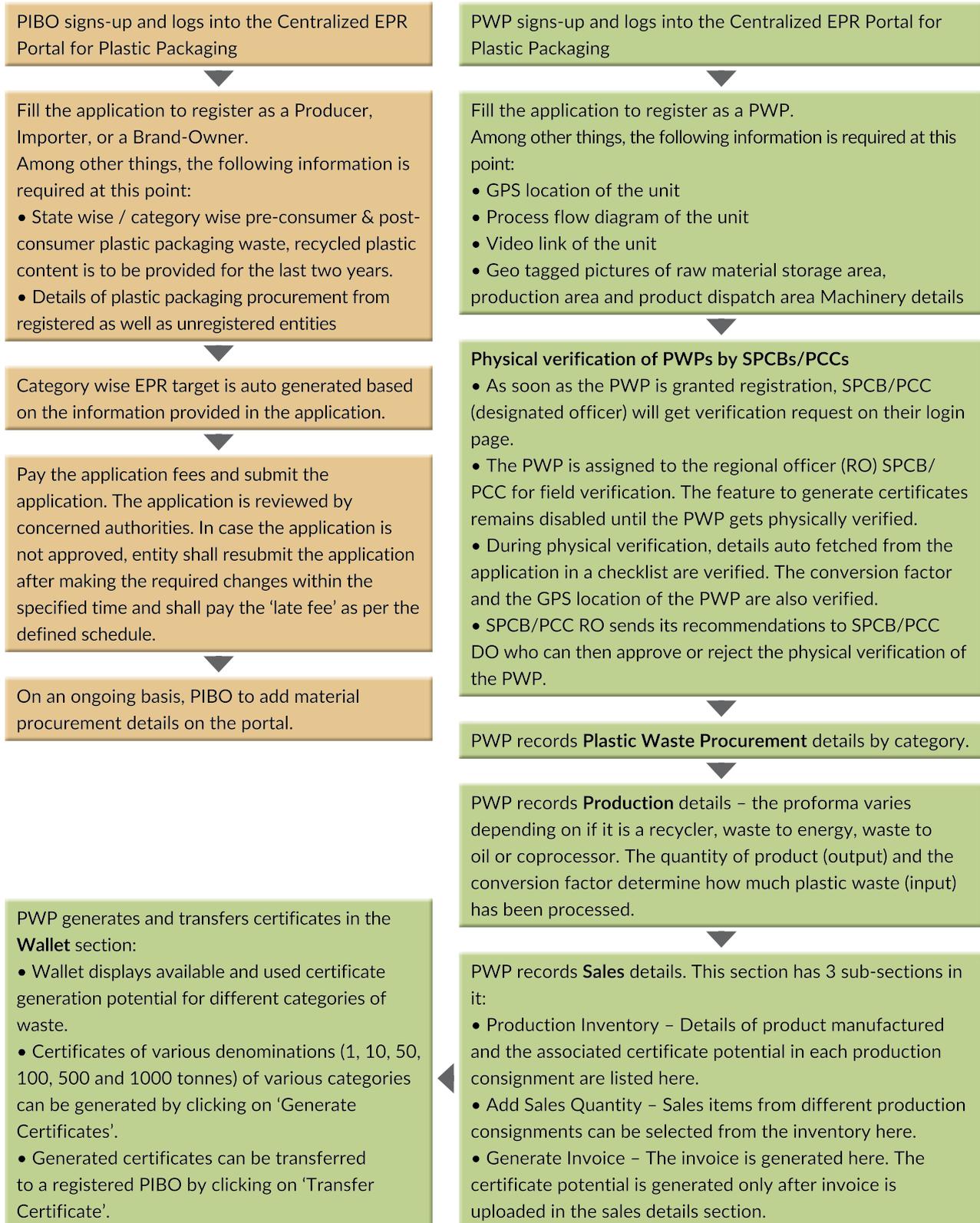
CPCB is authorized to levy environmental compensation on Producers, Importers, and Brand-Owners operating across more than two states who fail to meet their EPR targets and obligations. Similarly, respective SPCBs/PCCs are responsible for levying Environmental Compensation on entities operating within their jurisdiction, including Producers, Importers, and Brand-Owners not operating in more than two states or union territories, as well as Plastic Waste Processors (including recyclers and other waste processors) for non-fulfilment of their EPR targets or responsibilities and obligations set out in the guidelines.

However, payment of environmental compensation does not exempt PIBOs from the responsibilities outlined in the guidelines. Any unfulfilled EPR obligations for a given year will be carried forward to the following year, with a maximum carry-forward period of three years. In case the shortfall against the EPR obligation is fulfilled by PIBOs within three years, the imposed environmental compensation shall be reimbursed to PIBOs in a specific proportion after which the amount will be forfeited.

Table 9: Conditions for return of levied environmental compensation

Shortfall addressed within:	Percentage of levied environmental compensation reimbursed to PIBO
One year of levying Environmental Compensation	75%
Two years of levying Environmental Compensation	60%
Three years of levying Environmental Compensation	40%

Figure 5: A schematic of the three currently active modules of the Centralized EPR Portal for Plastic Packaging





3

Role of the Informal Sector

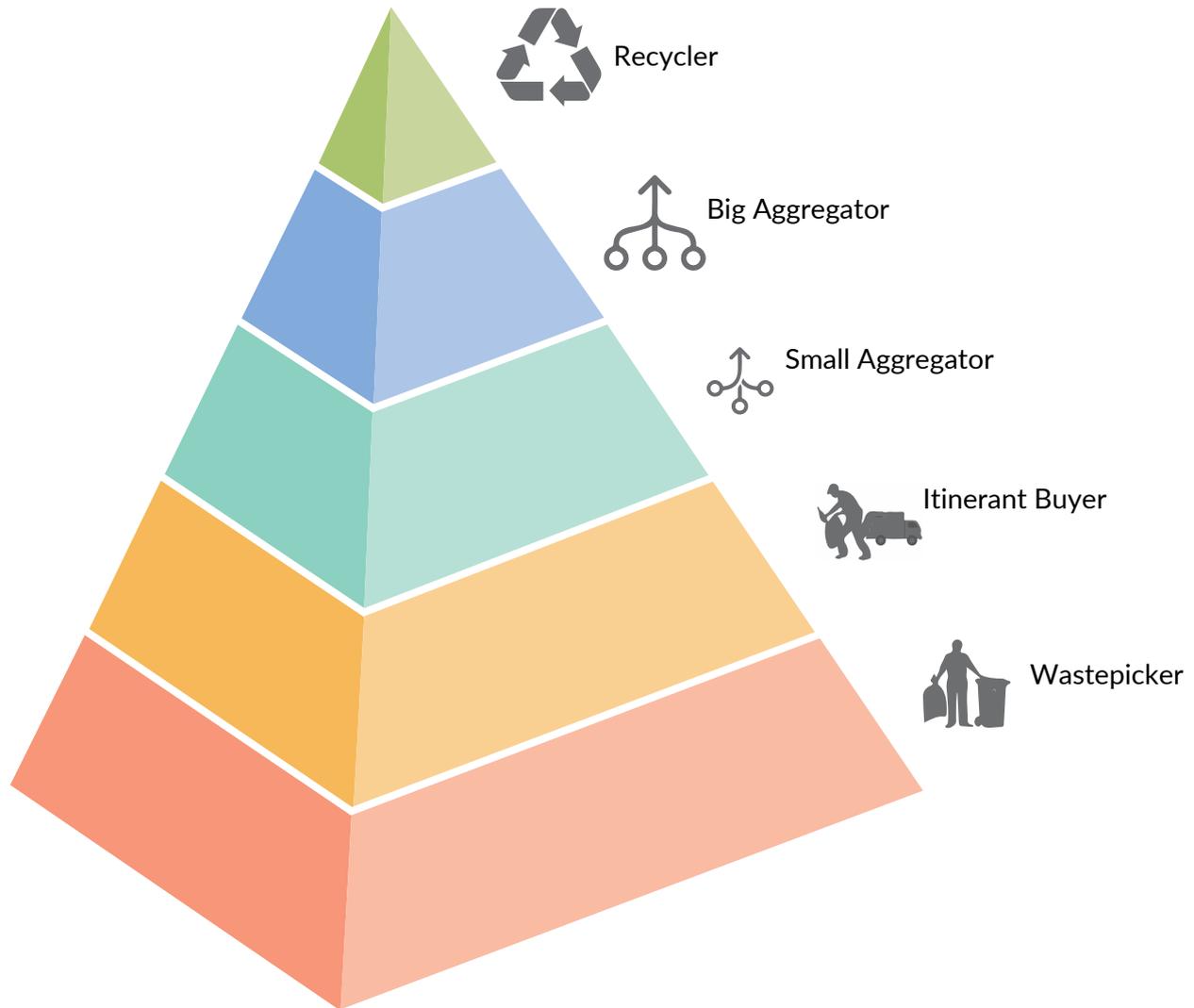
Informal sector relates to individuals, entities, and activities that are unregulated and not protected by the state. It is easy for the use of the word 'informal' to conjure up images of a grey market. But this generalization can't be further from the truth, as we see in the case of the informal waste sector. The informal waste sector in fact provides a highly subsidized waste management, public health, and environmental service, the absence of which would be calamitous and bring our cities to their knees.

The discourse about inclusion of the informal sector is therefore not one of 'whether or not' but of how. The reasons are apparent. Firstly, Informal economy is here to stay. The International Labour Organization (ILO) estimates that about 2 billion workers, more than 61% of the world's employed population, make their living in the informal economy.¹¹ Secondly, economy is not binary - a one for formal and a zero for informal with nothing in the middle. As Chen notes in her paper, "Economic relations - of production, distribution, and employment - tend to fall at some point on a continuum between pure 'formal' relations (i.e., regulated and protected) at one pole and pure 'informal' relations (i.e., unregulated and unprotected) at the other, with many categories in between".¹² Think of the latest unicorns that grab the headlines on a daily basis. E-commerce, quick commerce, cab aggregators, all delivering services to the consumer via a value chain that comprises a legal and regulated entity, which is the parent company, at one end, and the gig economy freelance workers with minimal benefits and safety-nets at the other. This intricate relationship across the formality spectrum is a feature of the economy.

HOW DOES THE INFORMAL WASTE SECTOR WORK?

The informal waste management economy in India consists of various informal actors and entities that operate across the waste value chain - from waste collection, segregation, transportation to recycling. These informal actors in the value chain can be best visualized in the form of a pyramid.

Figure 6: *The pyramid of informal waste management economy*



Wastepickers occupy the lowest tier of the waste management hierarchy. They primarily collect low-value recyclables, as high-value materials are often set aside by waste generators for sale to itinerant buyers. Wastepickers earn their livelihood by selling the recyclables they collect, typically to small aggregators. One of their main sources of waste is household waste, which they collect from doorsteps. Using cycle rickshaws, they segregate the waste, disposing of non-recyclables in municipal bins and selling the recyclables. Additionally, wastepickers gather recyclables from waste discarded on roadsides, municipal bins, and even landfills.

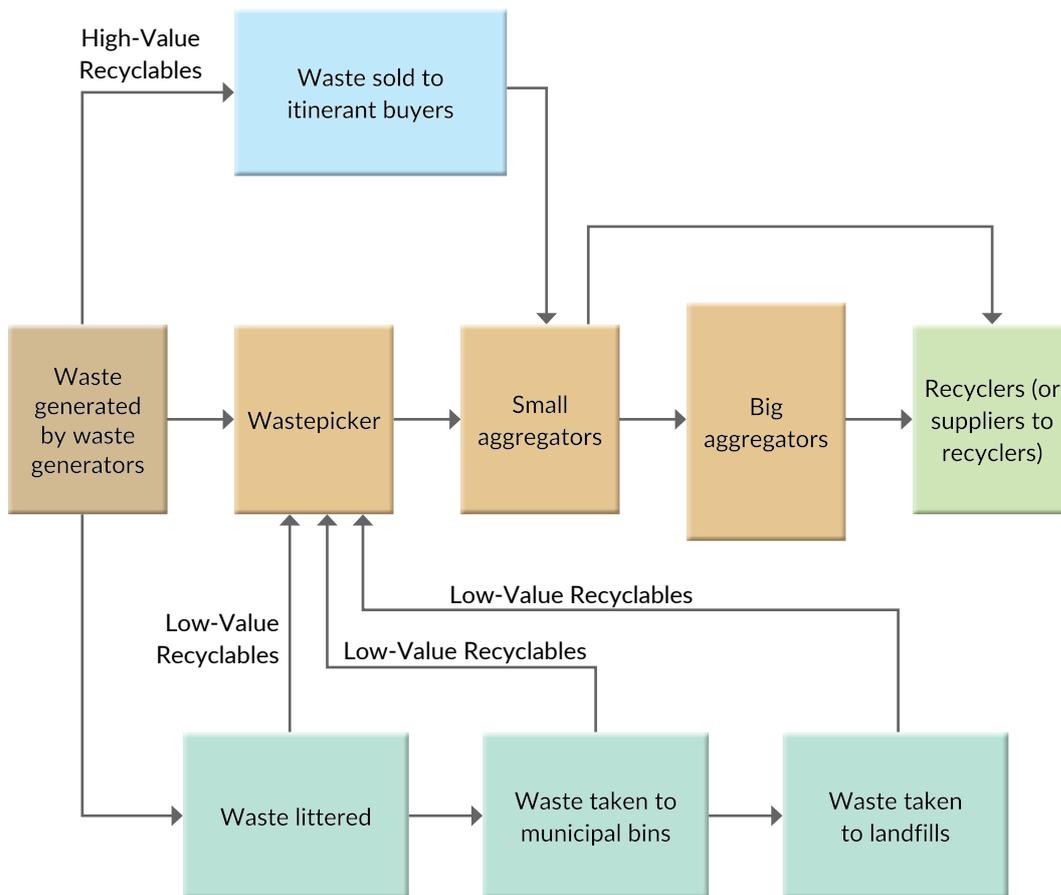
Above wastepickers in the hierarchy are the itinerant buyers, who typically offer doorstep services by traveling on cycles or cycle rickshaws to purchase high-value recyclables directly from households. These buyers collect materials such as metals, plastics, and paper, which are often set aside by waste generators for resale.

Next, small and large aggregators play a key role in the waste management system. They employ informal waste segregators to hyper-segregate the collected materials into specific categories for higher value recovery. Once this hyper-segregation process is complete, the aggregators sell the sorted recyclables to recyclers, who may operate in either formal or informal sectors. These recyclers process the waste into raw materials for reuse in manufacturing and other industries.

This multi-tiered system—spanning from wastepickers and itinerant buyers to aggregators and recyclers—ensures that valuable materials are reclaimed and reintegrated into the production cycle, contributing to a more sustainable waste management process.

The figure below shows a schematic representation of the flow of materials in this value chain.

Figure 7: Flow of waste in the informal waste management value chain



THE SCALE OF SERVICES PROVIDED BY INFORMAL WASTE SECTOR

As per the data reported by the Central Pollution Control Board, an estimated 160,000 TPD (tonnes per day) of solid waste is generated in the country.¹³ While there is no official national-level data available, it is estimated that about 15 lakh people in India make their living as wastepickers by recovering, sorting and selling recyclable materials.¹⁴ Approximately 150,000 people are involved in waste picking, trading, and recycling in Delhi alone that recycle at least 2000 tonnes of paper, plastic, metals and glass daily. They save the municipality up to ₹ 1 crore (₹ 10 million) per day.¹⁵

India generates close to 26,000 tonnes of plastic waste per day. Around 60% of this is recycled, primarily by the informal sector.¹⁶ (See Figure 7 above for a schematic of the flow of this waste.)

150,000 strong informal wastepickers in Delhi saves 3.6 times more greenhouse gases in Delhi alone, compared to any other waste project in India receiving carbon credits. In Pune, emission of more than 167,000 tonnes of CO₂e per year is prevented by the wastepickers by collecting and preventing the open burning of waste. Imagine a public health and environmental catastrophe in our cities without informal waste sector.

Services that go beyond waste management:

The quantification of the public health and environmental service provided by the informal sector is slightly more complex, but the direct correlation is hard to miss. A Chintan study shows that this 150,000 strong informal waste sector in Delhi saves 3.6 times more greenhouse gases in Delhi alone, compared to any other waste project in India receiving carbon credits.¹⁷ In the city of Pune, emission of more than 167,000 tonnes of carbon dioxide equivalent per year is prevented by the wastepickers by collecting and preventing the open burning of waste in underserved communities.¹⁸

A vivid picture of public health and environmental catastrophe could be painted by a simple exercise of imagining our cities minus the informal waste sector. This would mean more outbreaks of vector-borne diseases, choking of drains causing flooding, and plastics reaching our water bodies and eventually making their way back into our bodies as microplastics. This would also mean more cancer producing dioxins being released by burning of unsegregated waste containing polyvinyl chloride and more cancer producing furans and dioxins being released as leachates into ground water and making their way back to us. Without this informal sector, more 'hot load' (ignitable material) would reach landfills and act as fuel for the fires triggered by highly inflammable methane released from

the decomposing wet waste. Even particulate matter in the air would increase due to dusty streets and other harmful pollutants would make their way into the air due to open burning of accumulating waste.

In summary, the informal waste sector plays a crucial role in mitigating environmental and health impacts, underscoring its essential contribution to urban sustainability and public health.

In addition, the more indirect impacts of their waste management services include enablement of ecosystem services (think: that park that one can now extract cultural service from since the waste rotting next to it has been removed), additional tourism revenue the cities can enjoy as tourists no longer see it as a filthy city, and ecological and economic value added by keeping materials in circulation longer.

Increasing pressure from waste:

The challenge of waste management is poised to become increasingly complex due to expanding urban areas, rising populations, increasing incomes, and evolving lifestyles. According to the 2011 census, 31% of India's population resided in urban areas, a figure projected to rise to 45% by 2025. By 2050, India's urban population is expected to nearly double from its 2014 level of approximately ₹ 41 crore to around ₹ 81.4 crore.¹⁹ This rapid urbanization will heighten population density in cities, exacerbating waste generation per unit area.

Income disparities persist, but the number of individuals earning above ₹ 5 lakh per annum has surged significantly. According to a BNP Paribas analysis of I-T department data, this number increased fivefold from 3.8 million in FY12 to 18 million in FY21. Higher incomes typically lead to increased consumption, contributing to greater waste generation. Additionally, changing lifestyles, such as a rise in online shopping from remote sellers who often use excessive packaging, further compound the waste problem. India's e-commerce sector is anticipated to grow at an annual rate of 11.45%, with user penetration expected to reach 34% by 2029, up from an estimated 22.1% in 2024²⁰. This growth in e-commerce will likely result in more packaging waste and added pressure on waste management systems.

This increased complexity requires even more efficient and effective utilization of the wastepicker service providers.

By 2050, India's urban population is expected to reach around 81.4 crore. In spite of high income inequality, number of individuals earning above ₹ 5 lakh per annum has risen significantly as well as consumption level. With increasing online delivery and associated packaging, this rapid urbanization will exacerbate waste generation per unit area.

THE STATE OF WASTEPICKERS

Despite their pivotal roles, the wastepicker community in India is historically marginalized and continues to be stigmatized. They typically belong to the most oppressed categories of society that are denied access to resources and thereby pushed into cycles of poverty. Most of these wastepickers have migrated to the cities to escape this abject poverty but find themselves experiencing more of the same in the cities. The situation is worse for women and children.

A direct occupational hazard is the lower life expectancy of wastepickers when compared with the national average. One estimate puts the life expectancy of wastepickers in India at a staggering 39 years.

Lack of robust social security for many and access to medical insurance means that a wastepicker is one catastrophic life event away from falling into the debt trap, letting the child drop out of school, or having the women in the family forgo their meals to supplement the nutrition of the male members. Their life in urban slums, very often under the shadows of landfills, is exposed to all the hazards that our cities face, but many times over – whether it is a heat wave, water scarcity, or flood. They typically lack access to healthcare and sanitary facilities in their communities. A recent study by Chintan in Delhi showed that only 4% of the wastepickers had health insurance and only 9% had life insurance.²¹ On top of this is the risky and potentially dangerous nature of their occupation.

A large number of studies exist that highlight the negative health impact on wastepickers of working with dangerous materials and in hazardous conditions as they deal with improperly and unscientifically disposed waste. A direct occupational hazard is the lower life expectancy of wastepickers when compared with the national average. One estimate puts the life expectancy of wastepickers in India at a staggering 39 years.²² Interestingly, another study arrives at the same number for wastepickers in Mexico City compared to 67 years among city residents overall.²³

A 2022 study on health issues faced by wastepickers in Lucknow revealed that they commonly experience respiratory problems (19%), eye issues (40%), dermatological conditions (22%), and injuries (60.5%). The study also reported a high prevalence of general health problems, including fever (78%), cough and cold (83.5%), and gastrointestinal issues such as diarrhoea and dysentery (40%). Additionally, wastepickers faced elevated risks of road accidents and falls (23%), animal bites (16.5%), and frostbite (16.5%).²⁴

Chintan's comprehensive studies on the health conditions of wastepickers in Delhi provide further insights. A 2003 study found that 84% of child wastepickers were highly anaemic, 7% tested positive for roundworms, and 17% suffered from chronic gastrointestinal tract diseases. Among female wastepickers, 24% tested positive for roundworms and 3%

for hookworms, with over 12% experiencing chronic gastrointestinal issues. The study also indicated that male wastepickers frequently suffered from fever, upper respiratory tract infections (URI), and other gastrointestinal infections.²⁵

A 2013 study conducted near Pune showed that asthma and tuberculosis were prominent among the diseases that impacted the wastepickers.²⁶ Another study from 2009-10 in Pune found that more than 70% of women had chronic musculo-skeletal symptoms, 30% had problems related to monthly periods, 25% had symptoms of GIT infection, and 10% had symptoms of reproductive tract infection/sexually transmissible infection.²⁷

In the waste picking profession, the regular employer-employee relationship does not exist. While it can be said that some of these wastepickers do work for contractors, that equation ends up being largely exploitative of the wastepickers as they fall into debt traps and are also forced to give a substantial cut to the contractor.

Wastepickers also face a lack of formal ties with municipalities and recyclers. A Chintan survey from 2021-22 found that fewer than 2% of the 1,224 wastepickers surveyed had any formal contracts with entities. Instead, wastepickers frequently encounter harassment and rent-seeking behaviour from police and municipal officials. The same survey revealed that 9% of wastepickers reported paying between ₹ 100 and ₹ 2,000 monthly to police, local officials, or contractors to continue their work. Additionally, nearly 7% indicated paying ₹ 500 to ₹ 1,000 to use their rickshaws when stopped and questioned.

Public perception also contributes to this daily hardship. A Chintan survey from 2016, involving 3,000 residents of Delhi, found that around 80% of respondents across all income categories believed wastepickers could be thieves, reflecting persistent stigma and bias against this essential workforce.²⁸

On one hand, the state of waste in the country – waste that is going to continue growing rapidly unless consumption patterns and business paradigms change dramatically – is critical. On the other hand, we have a workforce that, while dealing with social and economic injustice, has been providing exemplary service to address this problem, has the experience and experiential know-how, and is interested in using that knowledge to continue making a living. And in the middle, we have the other government, private, and civil society stakeholders. The choice to integrate these for a win-win should not be ignored or discouraged by law.

Our survey from 2021-22 found that fewer than 2% of the 1,224 wastepickers surveyed had any formal contracts with municipalities and recyclers. Instead, wastepickers frequently encounter harassment and rent-seeking behaviour from police and municipal officials.

CASE STUDY ON INCLUSION OF WASTE PICKERS

The featured three case studies below: SWaCH, Chintan Environmental Research and Action Group, and Hasiru Dala Innovations illustrate various approaches to integrating informal wastepickers into formal systems and enhancing waste management practices. However, it is important to clarify that these examples primarily reflect the outcomes of support provided by organizations to micro-enterprises, rather than the direct impacts of Extended Producer Responsibility (EPR) mandates. It may be noted how EPR could further scale up or deepen these models, which are already promoting EPR by picking up plastics listed under the law, and enabling the system to meet its mandates without any remuneration for their work. The cases present opportunities for EPR to fulfill their obligations appropriately.

SWaCH, Chintan and Hasiru Dala benefit from organizational support that includes funding, training, and resources, which has enabled them to effectively implement waste management solutions. Nonetheless, these benefits do not fully represent the influence of EPR regulations themselves but rather the support structures surrounding them. To ensure broader and more equitable benefits, it is essential to universalize the impact of EPR, extending its advantages beyond the few enterprises currently supported to encompass all relevant stakeholders.

Case Study 1: SWaCH

SWaCH integrates over **3,500 informal wastepickers** into Pune's formal waste management system, offering fair wages, social security, and identity cards.

Operating under a public-private partnership with the Pune Municipal Corporation (PMC), SWaCH provides **door-to-door waste collection to over 800,000 households**, charging a user fee of ₹70 per household per month. Wastepickers also earn additional income by selling recyclable materials. Annually, SWaCH recycles **79,697 tonnes of waste**, significantly reducing landfill burden and supporting a circular economy.

Case Study 2: Chintan Environmental Research and Action Group

Chintan Environmental Research and Action Group, integrates informal wastepickers into formal waste management systems, focusing on social equity, environmental sustainability, eliminating child labour and women's empowerment and livelihood.

Chintan's **Material Recovery Facility (MRF)** handles 11 tons of waste daily, handled primarily by the informal sector with 80% women. The MRF reduces landfill waste and promotes recycling.

Chintan's efforts focus on skill development, entrepreneurship, and formal integration of wastepickers into structured systems, enhancing their livelihoods while promoting sustainability. 14 other micro-MRFs are run by women micro-enterprises. Material-specific facilities, such as StoHo (Stop Hoarding) enable wastepicker women to manage, reuse and repair textile discards, while Magic Mitti enables them to compost and sell the produce. SHGs are trained to run this.

Case Study 3: Hasiru Dala Innovations

Hasiru Dala Innovations, founded in 2015 in Bengaluru, is a social enterprise integrating informal wastepickers into the formal waste management system. Through its **Inclusive Circularity** model, it empowers wastepickers by transitioning them into "green-collar" professionals and entrepreneurs. The enterprise provides Total Waste Management Services to bulk waste generators, employing wastepickers to manage waste collection, segregation, and processing. By creating over **20 wastepicker entrepreneurs** and establishing Dry Waste Collection Centres (DWCCs), Hasiru Dala has helped divert over **90,000 tons of waste from landfills**, fostering economic inclusion and environmental sustainability.

Unacknowledged Ongoing Role of the Informal Sector Under EPR

With the fact that the informal sector is responsible for recycling approximately 60%²⁹ of the plastic waste generated, Producer-Importers-Brand Owners (PIBOs) would face significant challenges in meeting their EPR targets without the informal sector's involvement. The establishment of Extended Producer Responsibility (EPR) targets and the expectation for compliance underscore the critical role of the informal sector in recycling plastic waste. Although high-quality national-level data would provide a clearer picture, existing distinct datasets and credible research collectively highlight the essential contribution of the informal sector to this value chain.

To further illustrate the assertion above, that the EPR targets cannot be met without the contributions from the informal sector, the estimated EPR target for one particular type of plastic, PET, was compared with the quantity of PET estimated to be collected by the informal sector. The figures were triangulated based on existing research and publicly available information. The analysis revealed that for the EPR target to be met for this particular type of plastic, informal sectors contribution to the value chain is critical (see Analysis Summary below).

While the contributions of the informal sector would vary based on the type of plastic, or Category of plastic as defined under EPR, the result of the analysis can be extrapolated with reasonable confidence to other types, and hence Categories, of plastic. It is to be noted however that the economics of the supply chain impacts the level of contribution of the informal sector. As discussed later in this report, low-value plastic, such as multi-layered plastic, provides little financial incentive to the informal sector to collect it. But this is a case for better designed financial incentives to encourage collection of low-value post-consumer plastic waste so that it doesn't end up as mixed waste at our landfills.

PIBOs would face significant challenges in meeting their EPR targets without the informal sector's involvement, who recycle almost 60% of the plastic waste generated

Analysis Summary: The methodology for the analysis is described in the box below.

METHODOLOGY TO CALCULATE INFORMAL SECTOR'S CONTRIBUTION IN PLASTIC WASTE COLLECTION

Assumption: While each piece of the analysis lists and explores its associated assumptions (see Appendices A,B, and C), the overall assumption is that if we analyse the EPR target numbers for one particular type of plastic (in this instance, we have chosen PET) and then compare that with the quantity of that same type of plastic that is collected by the informal sector (wastepickers) in India, the results of the comparison can be extrapolated to apply to other types of plastics as well.

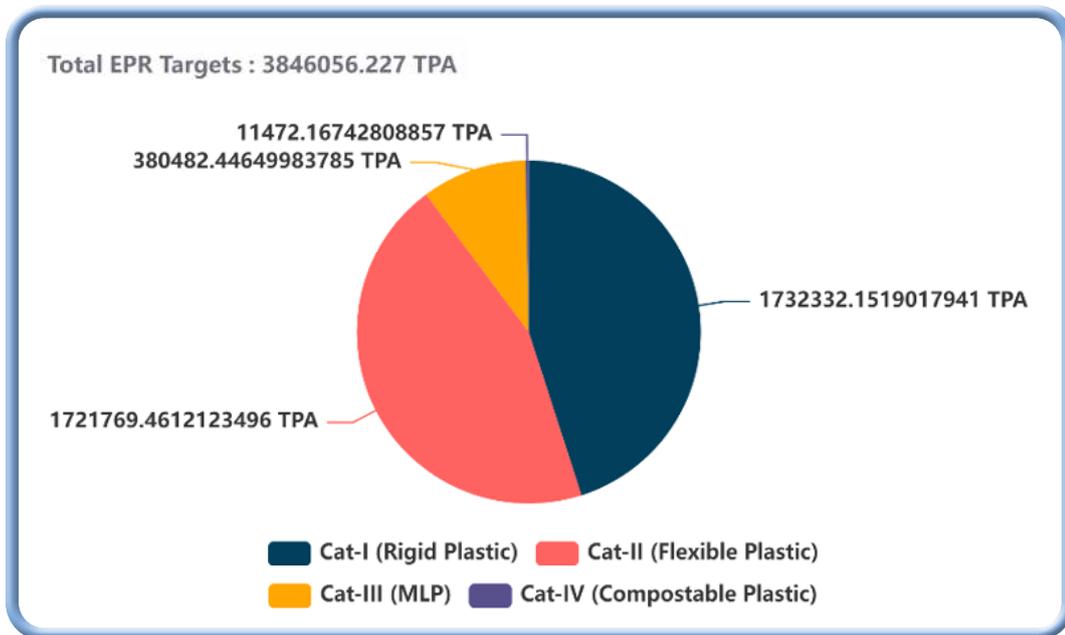
Hypothesis: If the quantity of PET collection/recycling by the informal sector is comparable to the estimated EPR target for PET, it is a safe assumption that in order to meet these targets, the informal sector is a key piece of the value chain.

Challenge: Calculations are based on underlying variables whose values vary based on their sources. Therefore, assumptions we make can sway the analysis significantly.

STEP I of the analysis:

- The EPR target for registered PIBOs for Category I plastic for FY 2022-23 as stated on the Centralized EPR Portal for Plastic Packaging is 17,32,332 tonnes. Category I plastic refers to rigid plastics (see Table 1 earlier in the document), such as PET bottles, oil cans etc.³⁰

Image 1: A screenshot showing EPR targets for FY 2022-23 from the CPCB's dashboard for plastic EPR



- The provisional EPR target for registered PIBOs for FY 2023-24 was calculated based on CPCBs notification dated June 14, 2023, as per which Provisional EPR Target for 2023-24 = (EPR Target for 2022-23)/0.7. Using this formula, the EPR target for Category I was calculated to be 24,74,760 tonnes. The overall provisional EPR target for FY 2023-24 across all Categories was calculated to be 54,94,364 tonnes.³¹
- The targets are, however, specified by Category. Therefore, an estimate had to be made for what percentage of the total EPR target would potentially be fulfilled by collection of PET. Existing data on total plastic waste generated and total PET waste generated in India puts PET waste, as a percentage of total plastic waste generated, at close to 15%. (See Appendix A)
- Using the same percentage as a proxy for the quantity of PET to be collected to meet the EPR target, **it was estimated that close to 8 lakh tonnes of PET should be collected under EPR to meet the EPR target in 2023-24.** (See Appendix A)

STEP II of the analysis:

A bottom-up analysis was performed to estimate the total quantity of PET collected by the informal sector in India. The starting point of this analysis was the estimate of the average daily quantity of waste collected by each informal sector worker, and what percentage of that waste is PET. **It was estimated that close to 10.5 lakh TPA of PET is collected by the informal sector in India.** (See Appendix B)

STEP III of the analysis:

A top-down analysis was performed to estimate the total quantity of PET collected by the informal sector in India. The starting point of this analysis was the estimate of total plastic waste generated in India, and what percentage of that waste is managed by the informal sector. **It was estimated that close to 10 lakh TPA of PET is collected by the informal sector in India.** (See Appendix C)

The triangulation does tell a story – one in which PIBOs rely heavily on the informal sector to meet their EPR targets. If the 8 lakh tonnes of PET must be collected under EPR to meet the Category I target, and the informal sector collects close to 10 lakh tonnes of PET per annum, their role in the value chain cannot be sidelined.

In addition, the informal sector subsidizes the costs of PIBOs. An informal wastepicker gets paid only the value of plastic waste, usually not a fair one, and not for the service they provide. If instead, the responsibility of paying for this service was rightfully transferred to the PIBOs, this would result in an additional cost burden of close to ₹ 5,800 crore on the PIBOs. Even if we slash this number to half to factor for unknown overestimations, the figure is still staggering. The recognition and inclusion of the informal sector is therefore essential on economic grounds alone. Not doing so forces the poor to subsidize the wealthy. (See Appendix D)



4

Integrating the Informal Sector

What is the purpose of a business? The world has changed tremendously from the 1960s when Milton Friedman, the Nobel-Prize winning economist from the University of Chicago, brought to the fore the primacy of shareholder value. Friedman argued that the purpose of business is to generate profits, and that the company has no social responsibility to the public or society; businesses only responsibility is to its shareholders.³² In 1984, Edward Freeman, an American philosopher and professor of business administration, published his book 'Strategic Management: A Stakeholder Approach'. In it, he argued that a firm should create value for all stakeholders, not just shareholders. However, the argument did not result in an overnight shift in businesses' priorities as is evident from the outcome of the Business Roundtable in 1997 which developed principles of corporate governance that said the CEOs should run their companies with only their shareholders' interest in mind.³³

Fast forward to 2019, when the Business Roundtable redefined its definition of the purpose of corporation, shifting from the shareholder primacy to commitment to all stakeholders. Among other stakeholders, the statement affirmed the commitment to suppliers as well. The statement included "Dealing fairly and ethically with our suppliers."³⁴

Looking at the key supplier role that the informal sector plays with respect to the PIBOs in India, the fair and ethical treatment of these stakeholders by the PIBOs must be made a priority by law.

THE PUSH FOR A STAKEHOLDER APPROACH

Taking a skeptical approach, hence not considering the innate desire to do good as a source of push for stakeholder approach, there are three levers that matter to drive the adoption of the stakeholder approach. As we discuss the three levers, we will also attempt to analyze the current state of these levers in the context of the informal sector in India.

- **Pressure from stakeholders** – Customers, employees, suppliers, and investors, all could be the catalysts for this change. Environmental and social impact of a business is increasingly under scrutiny by these stakeholders and mobilizing to influence a company's actions has proven to be effective in the past. In 2019, hundreds of

Amazon's employees walked out of the company's Seattle headquarters as part of a global 'climate strike' to demand greater action by Amazon to address its environmental footprint. As a result, Jeff Bezos, founder of Amazon, committed to stepping up Amazon's efforts to reduce their dependence on fossil fuels. This included using 100% renewable energy company wide by 2030.³⁵

Looking at the key supplier role that the informal sector plays with respect to the PIBOs in India, the fair and ethical treatment of these stakeholders by the PIBOs must be made a priority by law.

In India, a campaign was started by an influencer in 2023 to challenge the FMCG giant Cadbury on its high sugar content in a drink being marketed by it to children as a health drink. While at first this resulted in a legal notice being issued to the influencer, the public outcry and momentum generated resulted in the company cutting down its sugar content.³⁶ Furthermore, the government of India has issued the order to stop classifying any drinks as health drinks.³⁷

According to a study by Aberdeen University and the advocacy group Transform Trade in 2023, major international brands such as Zara – owner Inditex – were found operating unfairly toward Bangladesh clothing suppliers.³⁸ In June 2024, investors started applying pressure on Inditex to publish the details of their full supply chain.³⁹

A similar call for fair and ethical treatment of the informal sector, a key supplier of plastic waste to PIBOs, has the potential to set in motion incremental actions that could lead to the integration of the informal sector with the formal supply chain. Some aspects that make this lever susceptible to slow results or failure in our context are:

- ❑ Lack of a single target – Generating and sustaining voice against a single identifiable named adversary is much simpler than against a group loosely brought together by a technical term, PIBO, which does not mean anything for most of the lay population. This is analogous to how big numbers daily in newspapers on mass casualties might not move people, but one victim with a name and face ends up moving people and can be a sufficient motivator to act.
- ❑ Some issues are selective, others impact universally – The impact of climate change and air pollution, for example, cannot be restricted to a particular narrow group. Of course, a small island in the Pacific or a wastepicker living in an urban slum is impacted much more significantly and terribly. The high sugar content of a health drink impacts children across the social strata. But

the challenges that 15 lakh wastepickers in India face are theirs alone.

- The lack of voice of the impacted – The stakeholder group in our context, the informal waste sector, is one of the most disenfranchised groups in the country.
- **Regulatory requirements** – A regulatory framework that lays out the terms and requirements of informal sector’s inclusion, and enforces it, is possibly the quickest incentive for PIBOs to comply. A prerequisite for any such framework is a deep understanding of the current state of wastepickers’ operations and challenges analyzed in the context of ethical sourcing principles. The considerations under ethical sourcing principles are discussed later in this document.

Along with implementation, reporting of compliance with such a framework must be enforced. Business Responsibility and Sustainability Reporting (BRSR) framework for environmental, social, and governance (ESG) reporting came into effect in India in 2023. This framework is developed by the Securities and Exchange Board of India (SEBI) and the reporting via this framework is mandatory for the top 1,000 companies by market capitalization. This framework must be expanded to include disclosures on the inclusion of the informal waste sector in the supply chain and also to take into its purview unlisted companies.

- **Considerations for long-term profitability** – Research shows that organizations with strong focus on environmental, social, and governance (ESG) factors display superior financial performance over the longer term. NYU Stern Center for Sustainable Business and Rockefeller Asset Management examined the relationship between ESG and financial performance in more than 1,000 research papers from 2015 – 2020. Their meta-analysis found a positive relationship between ESG and financial performance for 58% of the studies with 13% showing neutral impact, 21% mixed results (the same study finding positive, negative, or neutral results) and only 8% showing a negative relationship.⁴⁰

The results seem intuitive. Imagine a scenario in which the supply chain is resilient and dedicated to long-term partnership to an organization because of the fair treatment and just economic benefits accorded to them. A customer base that is increasingly anxious about environmental and social impact and chooses the organization’s products each time over a competitor’s because of the organization’s commitment to those impacts. A pool of talent that looks for opportunities to get hired by the organization, and stays there longer, as they are inspired by the causes the organization is committed to. All such factors, and many more, would lead to

The Business Responsibility and Sustainability Reporting (BRSR) framework must be expanded to include disclosures on the inclusion of the informal waste sector in the supply chain and also to take into its purview unlisted companies.

better financial performance in the longer time horizon. As the demographic shift happens and Gen Z – those born between 1996 and 2010 – become a greater proportion of the workforce, one can expect much more increase in such demands for accountability. As an article by the management consulting firm McKinsey puts it, “Gen Z is also generally known for its idealism—they’re part of a new wave of ‘inclusive consumers’ and socially progressive dreamers. Generally speaking, Gen Zers believe in doing their part to help stop the intensification of climate change and to establish greater equity for all. More than any other generation, Gen Z collectively demands purpose and accountability, the creation of more opportunities for people of diverse and underrepresented backgrounds, and rigorous sustainable and green practices.”⁴¹

In the 15-lakh strong informal sector workforce, PIBOs have a supplier network that is highly skilled in what they do, has chosen a profession that is extremely demanding, and would most likely not display high attrition or turnover. While the rest of India struggles with finding, training, and retaining talent, there is a talent pool waiting to be tapped. Better living conditions, healthcare, safety nets, safe working conditions, and economic incentives would represent a slight uptick in the costs in the short term which would be more than sufficiently offset in the longer term with a resilient supply chain, potentially loyal customers and employees, and hence superior financial performance. Instead of the responsibility to include being seen as a cost or burden, it should be seen by PIBOs as an opportunity to differentiate, possibly reap the benefits by being the first mover, bolster the supply chain, and leverage the impact stories to strengthen their brand, especially in the eyes of Gen Z, their largest employee and customer base in times to come. By 2030, Gen Zs would comprise 30% of the global workforce.⁴²

ETHICAL SOURCING

The Chartered Institute of Procurement and Supply (CIPS), a global professional body working for the procurement and supply profession, defines ethical sourcing as “the process of sourcing products in a sustainable and responsible way. Ethical sourcing is also about ensuring that the workers involved in making the goods are safe and working in a sustainable environment free of fraud, corruption, and bribery. Human rights are respected, and workers are paid a living wage and treated fairly.”⁴³ As can be inferred, ethical sourcing is one of the pillars of how organizations operationalize their environmentally and socially responsible ethics and is a natural product of the stakeholder approach.

Businesses worldwide are increasingly adopting ethical sourcing practices not only because it aligns with their values but also due to the tangible benefits. Purpose-driven consumers, who make purchasing decisions based on how well brands reflect their values, now represent nearly 44% of the market.⁴⁴ These consumers are willing to pay a premium for ethically sourced products, presenting a significant opportunity for businesses. Additionally, ethical sourcing can lower long-term supply chain costs. A 2015 World Economic Forum report suggests that such practices can reduce costs by up to 16%. However, it is important

to note that these studies typically use actual supply chain costs as the baseline for savings calculations.

In the case of PIBOs, the informal sector's role in the plastic waste supply chain is often undervalued, with the cost of their services not fully accounted for. Initially, paying the informal sector for their contributions may lead to a rise in costs for PIBOs. However, by taking meaningful steps to include the informal sector—beyond just payment—the result will be a more resilient, motivated, and efficient supply chain, which could ultimately yield significant cost savings in the long term.

There is a need for a comprehensive study that maps the current plastic waste management ecosystem, identifies gaps, and recommends a way forward for the inclusion of the informal sector in the context of the ethical sourcing principles.

The informal waste sector is the primary supplier of plastic waste to the PIBOs via the PWPs, which helps the PIBOs meet their EPR targets. The ethical sourcing mechanism places a strong emphasis on creating safe working conditions within the waste management sector. This involves implementing measures that mitigate occupational hazards, ensuring that the efforts put in by these workers translate into a livelihood that is not only sustainable but also reflective of the value they bring to the waste management process. In essence, the ethical sourcing mechanism seeks to bridge the gap between the informal and formal sectors by fostering an environment where plastic waste management is not only economically viable but also aligns with principles of social responsibility and ethical labour practices. This transition, guided by ethical considerations, aims to uplift the entire sector, fostering a more inclusive and sustainable plastic waste management system.

There is a need for a comprehensive study that maps the current plastic waste management ecosystem, identifies gaps, and recommends a way forward for the inclusion of the informal sector in the context of the ethical sourcing principles. This study must be a coordinated effort with multiple stakeholders collaborating to bring their varied expertise and knowledge to the table. These stakeholders include government agencies, NGOs, businesses (including PIBOs and PWPs), informal sector representatives, scientists, economists, academics, and other experts (such as supply chain experts, data scientists etc.). The key components of such an exercise/study are discussed below.

- a. **Mapping the formal and informal stakeholders in the plastic waste ecosystem:** Each stakeholder must be mapped, their attributes recorded, and their connection with the next and the previous stakeholder in the value chain must be established. What is their current role and responsibility, how do they fulfill it, and what are

the economics and scale of their operations must be a part of this assessment. This must be a technology driven exercise to ensure integrity and accuracy of the data, and to develop a dashboard that is drillable and zoomable.

For the individual informal sector stakeholders, the wastepickers, the attributes collected should include their family income, family size, details of access to social security, health and life insurance, education and training, and details of the space of operation. This is by no means an exhaustive list of attributes. The exercise to arrive at what attributes must be collected for each stakeholder group is in itself a task that requires significant deliberation and multi-disciplinary inputs.

Establish a national registry of informal waste sector that allows, at any given point, to know exactly which wastepicker is where, what social securities do they have access to, how much is their income, who are they providing service to, among other things.

- b. **Indicative costs of operations:** Establish benchmark costs for waste collection and management (transportation, storage, processing) for various tiers of cities/towns/villages. This should be based on a model that factors both direct and indirect costs. The model should allow for cost adjustment based on inflation and other macroeconomic factors. These benchmarks would allow the stakeholders to optimize their cost structure for cost-effective operations. But more importantly, this analysis will provide transparency to have a data-backed dialogue when costs of operations, service by the informal sector, and funds to facilitate healthy living and working of the informal sector are analyzed together.
- c. **Model for minimum guaranteed price:** A model should be developed to arrive at real-time minimum price for the waste for different categories of waste depending upon geographical location, cost of living, available resources, and wages. The minimum guaranteed price would be triggered only when the supply-demand dynamic of the waste pushes the price offered to below the minimum guaranteed price. In addition to this scenario, minimum guaranteed price must also be applied to certain categories of plastics whose price currently offers no financial incentive to the informal sector to collect them. For example, Category I, and to a certain extent Category II, plastic possess inherent economic value. These are therefore segregated, collected, and transported by the informal sector stakeholders and subsequently recycled. Thus, the financial incentive in this scenario results in the fulfillment of the objectives of the Plastic Waste Management Rules and EPR.

In contrast, some Category III plastic, such as multi-layered plastic, do not offer enough financial incentives (the informal wastepicker gets paid paltry sums to collect these) for the informal sector to collect these. They therefore end-up at landfills as part of mixed waste, defeating the objective of EPR.

- d. **A universally accepted definition of inclusion:** The study should arrive at a standard definition, signed-off by all multidisciplinary stakeholders, of what inclusion means in the context of the informal sector. Some aspects that the definition must include - access to health insurance and life insurance, access to pension, access to sanitation, a living wage, minimum price guarantee, contracts that give legitimacy to their operations and protect them from harassment and exploitation. The study must also provide recommendations on how the roles to provide these accesses must be split across businesses, government agencies, and other stakeholders. Clear and universally accepted definitions would lay the foundation for developing metrics for measuring inclusion, and subsequently reporting them.
- e. **Recommendations on a national registry of informal waste sector:** The study should provide recommendations on how to establish a national registry of informal waste sector that allows, at any given point, to know exactly which wastepicker is where, what social securities do they have access to, how much is their income, who are they providing service to, among other things. A unique id could help with tracking of migration of wastepickers from one state to another. And the management and updating of this registry could be a multi-stakeholder collaborative exercise. If wastepicker Seema migrates to her home state of Uttar Pradesh from Delhi, she could report at one of the stakeholder NGOs in Uttar Pradesh to update her information in the centralized national registry and immediately find the support to get integrated with the waste supply chain in that state.
- f. **Capacity building and professional identification cards:** Representative sample-set based insights must be used to identify training needs of the informal sector, and to design certificate programs to address those needs. The informal sector should also be provided professional identification cards, potentially via the multi-stakeholder consortium, that provides them an identification to operate freely without harassment. These capacity building and professional identity details should be included in the national registry discussed in the previous bullet.
- g. **Model for integration with businesses (PIBOs and PWPs):** A working committee should be set-up that includes representatives from stakeholders across the plastic waste value chain, including the informal sector. The goal of this committee would be to set-up the governance structure, policies, and procedures for operationalizing the inclusion focused recommendations of the study. A pilot effort must be launched via a public-private partnership in a small wastepicker community and the lessons learned from the exercise must be used by the committee to update its recommended policies and procedures.

A desirable potential future-state, post-implementation of the recommendations of such a study by a multi-stakeholder multi-disciplinary team, might look something like this:

Table 10: *Contrasting current state of the informal sector with post-inclusion future state*

	SEEMA'S LIFE IN CURRENT SCENARIO	THE IMAGINED FUTURE
1.	Waste picker Seema has no access to sanitation, health insurance, life insurance, pension fund.	Waste picker Seema has access to all of these and knows how to use these schemes.
2.	Seema segregates plastic waste from household waste inside her one-room tin shed home where her two children and husband also live.	Seema has access to a dry waste collection centre (DWCC) where she segregates the waste while wearing personal protective equipment (PPE) and following safety precautions.
3.	Seema and her family are a soft target for extreme heat, drought conditions, and floods, and many such hazards.	Businesses-NGOs-Government work closely together to develop early warning systems, train Seema, keep track of her and her family's well-being, connect her with schemes and NGOs that help address such challenges (for example: heat-proofing the roofs, providing access to shared cool spaces etc.). Seema gets a pucca house (a solid and permanent house), under a government scheme, that is not far from her place of work and has amenities.
4.	Seema could use training/capacity building to do her job more efficiently and safely.	Seema gets trained in some of many certificate training modules curated for the informal sector and backed by government, businesses, and NGOs. These trainings help Seema to upgrade to an aggregator or plastic waste processor.
5.	Seema is harassed by police frequently, has to pay bribes to contractors and municipal officials to allow her access to waste.	Seema's professional identification card serves as her license to operate. This card is endorsed by the local governing body, businesses that benefit from the informal sector, and NGOs. Upon being harassed by a contractor, Seema reaches out to an NGO that supports her, which then connects her to the business consortium, police, and local body to resolve this matter. The traceability introduced in the process via quick barcode scans on the professional identification card allows the businesses to track which suppliers, recyclers, plastic waste processors the contractor works with and take punitive action. Seema's local NGO, the PIBO that her waste reaches, and the local body her operating area comes under are together her support ecosystem.
6.	Seema works more than 8 hours a day, 6 days a week. But her earning by selling plastic waste is not enough to sustain her family.	Seema receives better rates for plastic waste, rates that factor both price of waste and value of her service. When the price of plastic falls below a threshold, the minimum guaranteed price for plastic kicks in.
7.	Seema doesn't have a contract with anyone that would provide her legal rights or continuity of work based on agreed terms.	Seema signs contracts at both ends of her plastic value chain. Her local NGO supports her in this. Any challenges could once again be escalated to her support ecosystem in point 5 above.

SEEMA'S LIFE IN CURRENT SCENARIO	THE IMAGINED FUTURE
<p>8. Seema is never acknowledged for her role in plastic waste EPR by the PIBOs and thus never counted as a part of the supply chain and hence not entitled to ethical treatment.</p>	<p>The entire plastic waste value chain, including the waste pickers, have an assigned barcode. A quick scan of the barcode shows all relevant attributes depending upon the type of stakeholder. Seema's barcode scan traces the journey of her collected plastic waste and where it lands finally. Her barcode connects her to the PIBO as a supplier and she also receives her share of the credit based on EPR certificates that tie back to her based on the traceability enforced. Seema's barcode scan also reveals which schemes are available to her, which certifications she has, which DWCC she has access to and so on.</p>
<p>9. Seema's professional growth is non-existent. Seema can hope to earn more income only by collecting more and more of high-value waste and hope that their rates keep on increasing.</p>	<p>Seema can keep upgrading herself via certificate training programs - there would be multiple training pathways depending upon future aspirations - available to her. Her support ecosystem provides her guidance on what avenues are open to her and how she can upskill for that. The barcode tied national registry allocates a skill tier to Seema based on the training successfully completed by her.</p>
<p>10. Seema decides to move from her home state of Uttar Pradesh to Delhi for better opportunities for her children. But upon her move, she loses access to many social security schemes that were state specific. She has to start from scratch in her profession as a plastic waste supplier.</p>	<p>All social security schemes are now portable just like Aadhar. Seema reports to her allocated local NGO in Uttar Pradesh who inform the potential future partner NGO (for Seema) in Delhi of her move. Seema's barcode is her professional identity which is accepted nationally and allows her to get the same access in Delhi as she had in Uttar Pradesh. Her barcode data also indicates her certification/skills tier and using that information, the Delhi NGO connects her to the plastic waste aggregators.</p>
<p>11. The PIBOs are concerned only with fulfilling their EPR targets in terms of material and do not concern themselves with the supply chain beyond the plastic waste processors or suppliers at first degree of separation.</p>	<p>The PIBOs are plugged into the details of their supply chain beyond just their immediate suppliers. The PIBOs, at the click of a button, can see how many and which waste pickers were part of their extended supply chain, how many earn a fair living, how many have access to sanitation, health insurance, life insurance, education, housing, formal financial systems, early warning systems, climate resilience measures, protection mechanisms against air pollution and much more. PIBOs can drill down to see which of their suppliers treated their suppliers unfairly and can take action against them (downgrade or blacklist them). PIBOs can plan their informal sector inclusion efforts based on data. PIBOs acknowledge these informal waste pickers in their annual reports under the expanded purview of sustainability reporting. PIBOs use these win-win success stories to elevate their own brand as well which helps attract customers, suppliers, employees, and investors and better financial returns in the longer run.</p>



5

Implementation of EPR

The current Extended Producer Responsibility (EPR) rules are largely material-centric, often neglecting both the human element and the geographical constraints that influence the system. These rules suggest that material targets can be met without considering how the materials are sourced, the role played by individuals—especially in the informal sector—who facilitate collection and recycling, or the impact of regional disparities in infrastructure. This oversight diminishes the importance of the people crucial to the success of EPR and overlooks how geographical constraints affect the pricing of EPR certificates across the country. Addressing these gaps would require a more inclusive and adaptive approach to ensure equitable participation and efficiency across diverse regions and populations.

This approach violates the concept of ethical sourcing of plastics for recycling. The overarching focus is primarily on establishing and tracking plastic collection targets for PIBOs, with minimal attention given to the processes and people involved in achieving these targets. By overlooking the human dimension, particularly the contributions of the informal sector and the geographical constraints that impact the pricing of EPR certificates, the current system falls short of promoting a truly comprehensive and sustainable waste management framework. A more inclusive approach that accounts for both human and regional factors is essential for fostering ethical, efficient, and equitable recycling practices.

The United Nations Environment Programme, in its common position Paper – Integrate Extended Producer Responsibility within the International Plastics Treaty – mentions “At an international level, EPR deepens the social and environmental responsibility of companies, thanks to the traceability of the value chain and the better coordination of everyone’s actions.”⁴⁵

With that in mind, below are the recommendations in the context of EPR implementation.

A. EXPAND EPR TO ASSIGN RESPONSIBILITY FOR ETHICAL SOURCING TO PIBOS

Plastic EPR regulations should mandate that PIBOs take full responsibility for the ethical sourcing of plastic waste throughout the entire value chain. This responsibility must extend beyond the materials themselves to include the individuals who sustain the supply chain. PIBOs should be held accountable for assessing and improving their supply chains, and must address critical questions such as: Where does the PWP from which I purchase my EPR certificate source its waste? How do the suppliers of these PWPs obtain their waste? How many informal sector stakeholders are involved in this supply chain, and what roles do they play? Were they treated ethically?

A prerequisite for ensuring the ethical treatment of the informal sector is identifying key indicators of ethical practices. To effectively assess the supply chain along these indicators, PIBOs will require full visibility into every stage of the supply chain.

Such visibility into the entire supply chain cannot be achieved without extensive use of technology and access to real-time data. If a PIBO buys an EPR certificate for 50 tonnes for Category II plastic from a PWP on the Centralized EPR Portal for Plastic Packaging, the PIBO should be able to drill-down into which consignments feed into this certificate, what was the supply chain for that consignment to the lowest-level – the point of generation.

Advanced technologies like blockchain are available globally to support such efforts. Implementing this would require the integration of multiple datasets, including:

- A national registry for the informal sector, capturing demographic, welfare, economic, and skills data of workers.
- Plastic waste supply-chain data, where a simple scan could record the type and quantity of plastic waste sold by each wastepicker. Their professional identity could be linked to the national registry via a barcode.
- The CPCB's Centralized EPR Portal for Plastic Packaging, which contains information on EPR compliance, including EPR certificates exchanged and audit findings for PIBOs and PWPs. Integrating this dataset with the plastic waste supply chain data and the national informal sector registry is crucial for identifying the specific contributions of informal workers to each certificate and ensuring their ethical treatment.

A prerequisite for ensuring the ethical treatment of the informal sector is identifying key indicators of ethical practices. To effectively assess the supply chain along these indicators, PIBOs will require full visibility into every stage of the supply chain.

Such technology-led transformation is indeed a resource-intensive exercise, but the first step towards actualising this is to modify EPR language to hold PIBOs accountable for their entire supply chain, to require a consortium of large PIBOs (revenue above a certain threshold) to develop a roadmap for technology-led ethical sourcing while including the informal sector, and to make this time-bound.

The aspects discussed in the section on ethical sourcing in this document cover all the elements that must be included in such an ethical sourcing model. It needs reiteration here that the study and recommendations around the ethical sourcing model must be a coordinated effort of a multi-disciplinary team that includes stakeholders from government agencies, local governing bodies, businesses, NGOs, informal sector representatives (informal wastepickers and recyclers), scientists (including data scientists), economists, academics, and supply chain experts.

B. STRONGER DISINCENTIVES AND ENVIRONMENTAL COMPENSATIONS

In 2023, the Central Pollution Control Board (CPCB) identified irregularities in the state pollution control boards of Karnataka, Maharashtra, and Gujarat and instructed them to take action against four plastic waste processors (PWPs) for violating Extended Producer Responsibility (EPR) guidelines. These violations resulted in penalties totaling over ₹355 crore.⁴⁶

To strengthen accountability, it is essential to extend these fines and disincentives not only to the PWPs but also to the Producer Importer Brand Owners (PIBOs) engaging with them. The revenue generated from such penalties should be reinvested into monitoring through technological advancements and data management to improve traceability and initiatives focused on upgrading the informal sector, ensuring its integration into a more transparent and equitable supply chain.

C. TECHNOLOGY-LED CONTROLS AND AUTOMATION TO PREVENT POSSIBLE ERRORS

The current EPR portal is characterized by manual entry of plastic waste information, which is supported by the corresponding invoice that is required to be uploaded, and checks and balances in the form of automatic cross-checking of sums of quantities at one end of the process with those at some other point in the process. An example is provided below:

- In the Centralized EPR Portal for Plastic Packaging, the PWP enters, in the procurement section, the Category of waste procured (Category I, II, III, IV or V) and its quantity.
- The PWP also uploads a copy of the invoice/GST e-invoice.
- The quantity of plastic waste in each Category must tie all through the procurement, production, sales, and wallet sections of the plastic waste processing.

However, there is no way of ensuring that the PWP has accurately recorded the Category into which a plastic falls. In fact, since the material flow through the process is separate from the data-recording in the software/portal, the opportunities for errors in data

capture or smudging are plenty. Similarly, the calculation of plastic waste processed is based on the production (output) and the Conversion Factor.

However, once again, the actual process itself is not integrated with the data entry. Consider a factory where a conveyor belt runs and on which different stations perform different tasks to convert a raw material into a widget. And instead of the inventory software of the factory recording the metrics automatically as the conveyor belt moves, a person manually monitors and enters the data into a software that is in no way connected with the conveyor belt. Data integrity and reliability becomes an issue.

Traceability and transparency are foundational to ethical sourcing, especially in plastic waste management. PIBOs cannot afford to operate without a clear understanding of their supply chain. Keeping their supply chain opaque undermines both accountability and sustainability.

Such data integrity issues lead to sub-optimal decisions – garbage in, garbage out, just like any process. These sub-optimal decisions could impact the informal sector as well. For example, accurate information around supply of each Category of plastic waste, the attributes or quantity of processed output, the value stream of each Category of plastic waste, when analyzed in conjunction with other operational data such as costs, will help with better models for pricing (including minimum guaranteed price). Moreover, absence of reliable national-level data for the informal sector, and waste, including plastic waste, has been a persistent challenge. Thus, we need good data that leads to better decisions.

Technologies that minimize subjectivity and human interpretation, such as image-based identification of plastic waste composition, and that interface actual physical processes directly with data capture, such as before and after meter reading for energy generation from waste interfacing directly with the data capture software, will improve integrity, and hence reliability, of data.

D. BETTER TRACEABILITY AND TRANSPARENCY

Traceability and transparency are foundational to ethical sourcing, especially in plastic waste management. Producer Importer Brand Owners (PIBOs) cannot afford to operate without a clear understanding of their supply chain. They need visibility into where their plastic waste originates and the journey it undertakes before becoming a processed product. Keeping their supply chain opaque undermines both accountability and sustainability.

Traceability refers to the ability to track plastic waste through each stage of its lifecycle—knowing exactly where it comes from and following its path until it is processed.

This ensures that every piece of plastic waste can be traced both forward and backward within the value chain or ecosystem.

Transparency provides stakeholders with visibility into the data and processes that govern all supply chain activities. By making this information accessible, transparency fosters trust, ensures compliance with ethical sourcing standards, and highlights the contributions and conditions of those working in the informal sector. Together, traceability and transparency drive a more responsible and sustainable waste management system.

The technology-driven solutions referred to earlier in this section are key to traceability.

- Real-time drillable dashboards that allow exploring each batch or processed plastic waste output, or each batch of incoming procured plastic waste, to the extent that the generation point, the first collector – invariably the informal sector – and the entire flow of material through the value chain can be tracked.
- Integrating informal sector data, such as a national registry of informal sector workers, with existing datasets can significantly enhance decision-making processes. This approach can inform various aspects, including pricing strategies, minimum guaranteed prices, social security schemes, and other interventions aligned with ethical sourcing principles. However, it is crucial that these datasets adhere to stringent data protection standards to safeguard personally identifiable information. India's Digital Personal Data Protection Act 2023 establishes the necessary data protection regulations that must be followed to ensure the privacy and security of such information.
- Access to these real-time dashboards and datasets to all stakeholders – the views provided, and permissions would vary. There must be views of these datasets that can be accessed by the informal sector as well.

World over, businesses are responding to regulatory requirements to adhere to environmental and social sustainability standards and to report on them. For example, Corporate Sustainability Reporting Directives (CSR) in the European Union and Business Responsibility and Sustainability Reporting (BRSR) in India. The requirement to report on the informal sector in the value chain should be a part of the mandate. In addition, most of the large Brand Owners operate across countries. And what they do in one impacts their reputation the world over. Therefore, instead of waiting for the regulations to become more stringent, it would make greater strategic sense for Brand Owners to use traceability and transparency as their differentiator and stay ahead of the curve.

Most of the large Brand Owners operate across countries. And what they do in one impacts their reputation the world over. Therefore, instead of waiting for the regulations to become more stringent, it would make greater strategic sense for Brand Owners to implement universal best practices and stay ahead of the curve

E. SUSTAINABILITY REPORTING FRAMEWORK THAT MANDATES REPORTING ON THE INFORMAL SECTOR COMPONENTS OF THE SUPPLY CHAIN

The Plastic Waste Management (Amendment) Rules, 2024, specify annual reporting requirements for Urban Local Bodies and Gram Panchayats regarding mechanisms of plastic waste management, generation, collection, segregation, EPR implementation, among other things. These bodies are also supposed to specify the number of informal wastepickers engaged in collection, street sweeping, transportation, segregation, processing, and disposal. But the annual reporting does not venture into parameters that will help assess the inclusion of the informal sector.

Secondly, the Centralized EPR Portal for Plastic Packaging requires PIBOs and PWPs to submit annual reports on plastic waste management, but these too are solely material focused. There is no requirement to report on the involvement of the informal sector in the plastic value chain.

Thirdly, certain statutory reports are meant to be published along with the annual reports by organizations. The Business Responsibility and Sustainability Reporting (BRSR) framework by Securities and Exchange Board of India (SEBI) requires businesses to disclose their environmental, social, and governance related activities. This report is limited to just the top 1,000 listed companies in India based on market capitalization. Thus, the scope of this report is limited. Moreover, the framework does not specifically extend to reporting on the role and wellbeing of the informal sector in the supply chain.

The Centralized EPR Portal for Plastic Packaging requires PIBOs and PWPs to submit annual reports on plastic waste management, but these too are solely material focused. There is no requirement to report on the involvement of the informal sector in the plastic value chain.

Below recommendations aim to address these gaps:

- PWM Rules should expand the scope of annual reports to include a separate section on the inclusion of the informal sector in EPR. This section should capture not just the number of wastepickers involved in the value chain, but also on the actions taken, and impact of those actions, for economic, social, and health wellbeing of this sector.
- On similar lines, the annual reporting requirements on the EPR portal and under BRSR must be expanded to include ethical sourcing data and inclusion of the informal sector. A standard set of parameters that apply across all the annual reports will help with triangulation of the true ground reality, connect all the

reports to each other, and result in these reports being used as strategic decision-making tools and not merely administrative, at best regulatory, exercise.

- The scope of BRSR must be expanded to include more than top 1,000 listed organizations, and privately held ones as well. As opposed to reports submitted to government bodies, corporate social responsibility reports that are easy to consume and are easily accessible in the public domain, could be a strong catalyst for public discourse on the subject. As discussed earlier, consumer pressure is an able complementary lever to regulatory requirements to induce action from businesses.

F. ROBUST AUDIT

The Centralized EPR Portal for Plastic Packaging will eventually have seven sections. Currently only three are active – one of the non-active ones is Third-Party Audits. The audits will be conducted by the auditors empanelled by the CPCB. The auditors will be empanelled in offline mode, following standard official procedures, and then the database of the auditors on the EPR portal will be updated.

The audits will be conducted based on the audit plan that includes criteria to select a subset of PIBOs and PWPs each year, some of which will be selected via random selection, and assigning them to the empanelled auditors. The audits will be conducted based on checklists created from the existing PIBO and PWP reported data on the portal. The status of each audit, audit reports, and details of non-compliances will be available on the portal, and Environmental Compensation will be levied based on non-compliances identified.

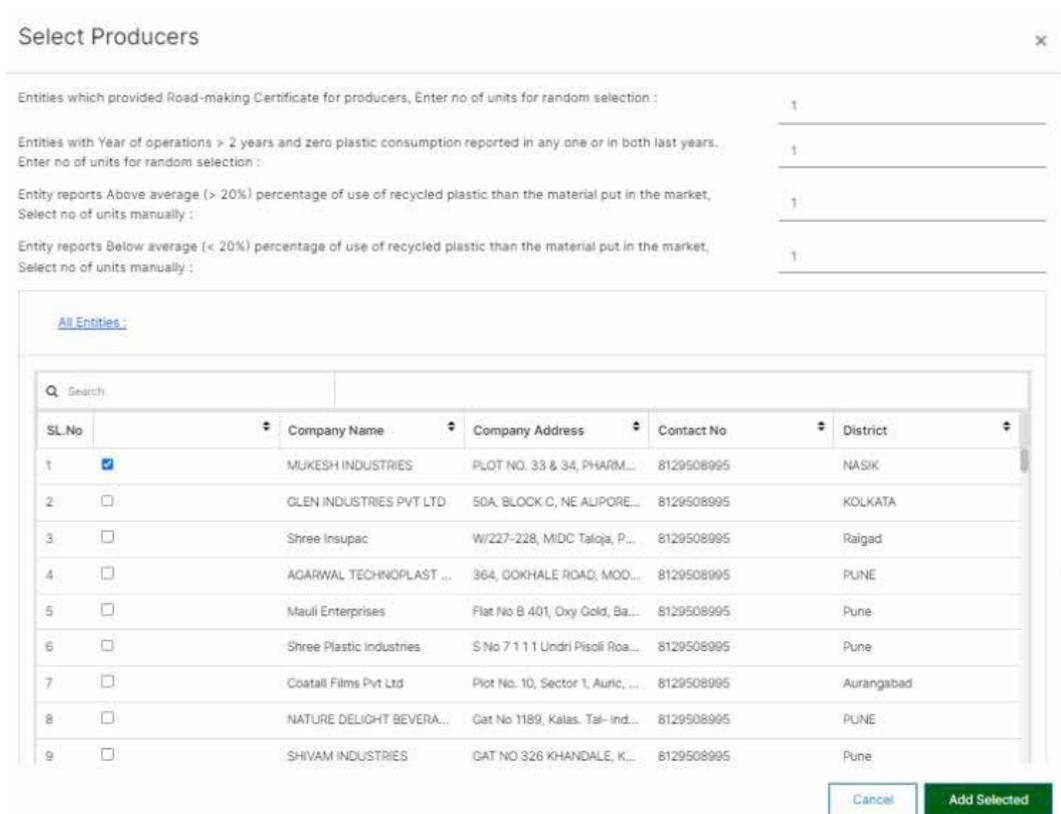
As the decision-makers set up the mechanisms of third-party audits, the following aspects should be considered.

- Taking the example of PIBOs, as per the guidance manual for the EPR portal, a certain number of entities satisfying certain criteria will be selected for audit and a certain number by random selection. The criteria include those PIBOs that have reported use of recycled plastic less than or greater than the average, that have submitted road making EPR certificates, and that have reported zero plastic packaging consumption and number of years of operation is greater than two. In addition, the manual also says that a criterion of selection is “Specific entities to be audited based on VIP Complaint etc.” This represents a few challenges. First, since selection criteria are public, even though some entities will be selected randomly, it is possible for entities to stay under the radar and reduce the possibility of their selection. Second, from the screenshots in the guidance manual, it appears as though the selection will not be completely random. The screenshot (see Image 2) from the manual shows a list of entities from which a few would be selected. This could bring in human bias.
- Machine learning and predictive analytics capabilities exist currently that allow large datasets to be scanned and high-risk entities flagged that could be then audited. Such analysis though requires accumulation of data over a period of time, and thus with time, the models become more robust. For third-party audits

in EPR, the vision should be to down the line use predictive analytics to flag high-risk entities for irregularities and only audit them. The planning for what goes in such a model should begin now itself to ensure that right parameters are being captured.

- As ethical sourcing parameters get added as mandatory information that must be reported, performance on these parameters must also be used as criteria to select entities for audit. For example, understating the number of informal wastepickers in the supply chain, as compared to the baselines based on the multi-disciplinary, multi-stakeholder study referred to earlier, could trigger a red flag for audit. These ethical sourcing parameters must be part of the predictive model as well.

Image 2: A screenshot from the guidance manual on the third-party audit module



- Human intervention in selecting random samples must be eliminated.
- Finally, a typical pain point in multi-module software implementation is how the various modules interface with each other. For the future-state being recommended in this report to actualise, data captured in modules such as Registration of PIBOs, Registration of PWP, and Levy of Environmental Compensation must interface seamlessly with the Third-Party Audits module.

G. BREAKUP OF TARGETS BETWEEN POST-PRODUCTION AND POST-CONSUMER PLASTIC WASTE

Presently, the recycling industry predominantly prioritizes post-production waste originating from manufacturing processes due to its relatively streamlined collection and lower contamination levels.

However, the obligation to address post-consumer waste is underscored by its significant contribution to landfill accumulation and environmental degradation. Moreover, focusing on post-consumer waste presents an opportunity to empower wastepickers, typically operating within informal sectors, by providing them with viable livelihoods through involvement in waste collection and recycling activities.

The EPR targets are currently applied based on the Category of plastic – targets are not broken up between post-production and post-consumer plastic. Breaking up the targets under EPR in this fashion could be an incentive to make the shift to prioritizing post-consumer plastic waste. This target break up would be even more effective for lower-value plastics, such as those in Category III, since the high-value ones, such as those in Category I, are still collected due to their intrinsic economic value. The informal sector is best placed to collect the low-value plastic, but needs an economic incentive to collect it. A minimum guaranteed price that incentivizes collection of low-value plastic by the informal sector would be an effective approach to take plastics out of mixed waste and landfills and back into the EPR value chain while including the informal sector in this process. EPR funds should not be restricted to paying for collection and disposal alone, but also offer financial viability for the collection of low value wastes. In light of previous discussions on the role of the informal sector in plastic recycling, it is vital that wastepickers be paid for both their services and the material they collect. EPR funds should ensure low value plastics are financially viable to be collected in the first place. Without this, the very spirit of EPR is deflated.





Conclusions

For the EPR model to succeed in sustainable management of plastic waste, the material-centric approach must be replaced by a human-centric approach in alignment with the principles of ethical sourcing. Data shows that the cornerstone of the plastic waste supply chain is the informal sector. Acknowledging the informal sector's role and including them as a key stakeholder group is a necessary condition for an effective and inclusive plastic EPR model.

- **A seat at the table for the informal sector**

Any discourse around plastic waste management cannot exclude the informal sector, a key stakeholder group, and one that will be impacted directly from the outcomes of any such dialogues.

EPR regulations and Plastic Waste Management Rules must be amended to include the informal sector as a recognized entity in the plastic value chain, and to acknowledge the crucial involvement of the informal sector in plastic waste management.

Addressing the inclusion of the informal sector effectively requires a clear understanding of the current landscape, identifying existing gaps, and developing comprehensive frameworks, policies, and procedures to address these issues. This process should involve a multi-stakeholder consortium that includes informal sector representatives, government agencies, local authorities, NGOs, businesses, scientists, academics, and other experts.

However, it is crucial not to delay action until the complete picture is fully established. Drawing an analogy from software development, where a linear waterfall model is traditionally used once the scope and requirements are clear, the current need is more akin to an agile approach. Unlike the waterfall model, which follows a sequential process, the agile approach emphasizes short, iterative phases, incremental development, and continuous feedback from stakeholders. This flexible and adaptive strategy is essential for effectively integrating the informal sector and ensuring timely, responsive adjustments to evolving needs and conditions.

- **Assign responsibility for ethical sourcing to PIBOs**

Under plastic EPR laws, PIBOs must be held accountable for the materials and the people in their supply chains. This accountability must extend beyond the PWPs to include the informal sector.

- **Map the informal sector plastic waste supply chain**

The first step to managing the supply chain is knowing the supply chain. A multi-

stakeholder study must be conducted to map the informal sector supply chain. Mapping would entail identifying each informal worker and their geographical, demographic, economic, social, and skills data. It would also include identifying who they sell their waste to and where they pick their waste from.

Note that this would not be a one-time exercise, but the beginning of an ongoing process. This mapping would form the basis of businesses supply chain traceability and also of the proposed national registry of informal sector – a live and breathing database that is tied to each informal sector worker via a barcode/code.

- **Implement traceability and transparency in the supply chain**

Traceability refers to the ability to trace something forward or backward in a process, value chain, or ecosystem. It is important for all stakeholders to know at any given point in time, where did each unit of plastic waste come from to the PWP – who were the suppliers, what were their earnings, were they treated fairly. It is also important to have forward traceability from PWPs onwards that could pinpoint plastic from which informal workers are being factored in the EPR certificates for which PIBOs, thereby holding the PIBOs accountable as well.

Such traceability is not possible without leveraging technology across the supply chain. The data and information generated as a result of traceability in the supply chain must be shared with stakeholders.

- **Use better price modeling and acceptable minimum guaranteed prices to incentivise collection while providing a living wage to the bottom of pyramid workers, i.e, the informal sector**

The informal wastepickers are some of the lowest paid and most marginalized communities in India who highly subsidize the costs of PIBOs and the local governing bodies. They receive very little per kilo for the material they collect, particularly from the low value plastics under EPR. Additionally, the collection process uses their labour, their segregation and storage space, their networks and their capacity to offer last mile services. The earnings of the informal sector currently reflect only the price of plastic, not the value of the service and additional infrastructure.

For a fair economic transaction, the daily plastic waste prices should be modelled such that the service fees are factored in the payments to the informal workers. Moreover, minimum guaranteed prices should kick-in if the prices, due to supply and demand dynamics or any other macro-economic conditions, fall below a certain threshold.

The prices of low-value plastics, such as multilayered plastic, should be assessed and adjusted to provide an economic incentive for collection by the informal sector. In the absence of an economic incentive, the post-consumer low-value plastic waste invariably ends up in landfills as part of mixed waste, thereby defeating the purpose of PWM Rules and plastic EPR, while adding to the plastic pollution.

- **Establish a national registry of the informal sector**

The previously discussed mapping exercise should be integrated into a national registry dedicated to the informal sector, which must be continuously maintained as

the definitive source of data on this workforce. This registry should comprehensively capture geographic, demographic, economic, social welfare, skills, and professional certification information related to the informal sector.

When combined with traceability data, this registry will enable PIBOs to evaluate how they can ethically support the informal sector within the supply chain, aligning with ethical sourcing principles.

Even on its own, the registry data will be valuable for government agencies, local authorities, and NGOs to develop targeted interventions and schemes. It is essential that this registry is updated in real-time. The multi-stakeholder group responsible for overseeing the inclusive plastic waste management and EPR regime should subsequently form smaller, specialized teams. One such team should consist of grassroots NGOs, businesses, and local authorities to act as intermediaries between on-the-ground data and the central registry, where informal sector led organizations are not available for this.

To effectively integrate the informal sector, large-scale awareness campaigns should be conducted, utilizing grassroots organizations with strong community ties. These campaigns will be crucial for onboarding the informal sector and institutionalizing the processes necessary to maintain the national registry. Given the historical mistrust in sharing personal data among this group, robust awareness efforts alongside formal inclusion in plastic waste management regulations and EPR will be essential in bridging this gap.

- **Provide a professional identity card tied to the national registry**

Each informal worker must be provided a professional identity card that is endorsed by the local governing body and the consortium of businesses, NGOs and other stakeholders. This is important to prevent the frequent harassment of workers and to dignify their profession. The identification number or barcode on the identity card would serve as the primary key that connects the national registry with supply chain traceability.

- **Set-up certificate programs and training pathways for the informal sector**

Public, private, and non-profit stakeholders must collaborate to establish training pathways and certification programs tailored for the informal sector. These programs should focus on upskilling workers and include a framework for ranking their skills—potentially in tiers—based on their certifications. This ranking system will standardize skill assessments and facilitate professional mobility. Skill rankings should be incorporated as a key attribute in the national registry.

The training programs must be designed for accessibility across various devices and should require minimal infrastructure, such as low internet bandwidth. They should also be self-paced and engaging to minimize dropout rates. Furthermore, training outcomes must integrate seamlessly with the national registry to ensure the timely and accurate updating of skill rankings.

- **Organize local level multi-stakeholder group support ecosystem for the informal sector**

The decentralized multi-stakeholder local teams should serve as the support ecosystem for the informal sector. Each informal worker should be allocated to one such local support group that serves as the go-to body for the informal worker for any economic, social, natural, and professional hardship that the worker faces. This body also serves as the conduit between the ground data and the national registry. This body could also provide oversight into the inclusion of the informal sector in EPR and hold the PIBOs accountable.

- **Define key ethical sourcing parameters for the informal sector that the PIBOs must track, contribute to, and report on**

The flow of activities in the inclusion framework could be summarized as follows – we understand the ground reality, we address the challenges, we report on them. While there is a reasonable consensus on what constitutes part of a workforce’s wellbeing or ethical sourcing, it still requires defining for the specific context for the informal sector in India. The defining process should include, what are the inclusion and ethical sourcing metrics that matter, how do we measure them, what are the basic minimum thresholds that these metrics should meet. These metrics and thresholds must be revisited at regular intervals and adjusted.

- **Mandate consistent reporting across platforms and include reporting on the ethical sourcing parameters**

PWM Rules, EPR regulations, and annual public disclosure by businesses should all be required to report on the same basic set of standard parameters, which should also include parameters on ethical sourcing from the informal sector. The additional metrics that each reporting framework requires must be built on top of these standard basic metrics that would be mandatory across platforms.

- **Establish technology-driven controls and checks and balances in the EPR mechanism**

Traceability, audits, data-entry in EPR systems – all require investment in technology. The goal should be threefold:

- ❑ Minimize manual data entry or selection (selection as in the case of audits).
- ❑ Use predictive analytics to identify high risk entities for audits.
- ❑ Ensure seamless linkages and interfaces between software, modules, and datasets - handling different aspects of the process. Ensuring seamless linkages and interfaces between these modules is crucial for the system’s overall effectiveness and efficiency.

- **Prioritize ‘Ready for Reuse’ by Informal Sector (IS) via Micro-enterprises and NGOs**

The EPR mandates reuse of rigid plastic packaging (as per clause 7.3 (b)-Plastic Waste Management (Amendment) Rules, 2022⁴⁷. Wastepickers enterprises or wastepicker inclusive enterprises should be given priority to undertake these, and supported to do this. This ensures that the formalized or semi-formal informal sector, particularly women wastepickers, is included and supported in a structured, transparent manner, reducing their exploitation while promoting livelihood opportunities and sustainable practices.

Appendix A

Calculations, assumptions, and sources of data (in the footnotes) for estimating the quantity of PET that would have to be collected to meet the EPR target.

Table 11: Provisional targets under EPR for FY 2023-24

Category of plastic under EPR	Target (in tonnes) for FY 2022-23 ⁴⁸	Provisional target (in tonnes) for FY 2023-24 ⁴⁹	Comments
Category I (Includes PET and other Rigid Plastics)	17,32,332	24,74,760	Provisional EPR Target for 2023-24 = (EPR Target for 2022-23)/(0.7) This calculation is based on CPCBs notification dated June 14, 2023.
Category II	17,21,769	24,59,670	
Category III	3,80,482	5,43,546	
Category IV	11,472	16,389	
Total Provisional Target for FY 2023-24		54,94,364 tonnes	

Table 12: Estimation of potential quantity of PET collected under EPR

Total PET waste estimated to be generated in India daily (A)	3,800 tonnes ⁵⁰	
Total plastic waste estimated to be generated in India daily (B)	26,000 tonnes ⁵¹	
PET waste generated in India daily as a percentage of total plastic waste generated in India daily (C)	14.6%	$C = (A/B) * 100$
Using the percentage calculated above (C) as a proxy for what percentage of plastic collected under EPR for FY 2023-24 could be PET, the quantity of PET under EPR is estimated to be (D):	8,03,022 TPA	$D = C * (\text{Total Provisional Target for FY 2023-24})$ See Table 1 for 'Total Provisional Target for FY 2023-24'

Appendix B

Bottom-Up Analysis: Calculations, assumptions, and sources of data (in the footnotes) for estimating the quantity of PET that is collected by the informal sector

Table 13: *Bottom-Up analysis to estimate quantity of PET collected by the informal sector*

		Formulae
Average daily plastic waste quantity collected by 1 waste picker (A)	11 kg ⁵²	A
Average percentage of PET in the daily waste collected by each waste picker (B)	17.6% ⁵³	B
Quantity of PET collected each day by each waste picker based on this percentage (C)	1.94 kg	$C = A * B$
Number of waste pickers in India (D)	15 lakh ⁵⁴	D
Average quantity of PET collected by all waste pickers in India each day (E)	2,904 ton	$E = D * C$
Estimated quantity of PET collected by all waste pickers in India in one year (F)	10,59,960 tonnes	$F = E * 365$

Two key variable, percentage of PET in waste collected (variable B) and number of wastepickers (variable D), are varied in the below sensitivity analysis to see how that impacts the estimated quantity of PET collected annually by wastepickers.

Table 14: *Sensitivity analysis by changing percentage of PET and number of wastepickers*

	23,00,000	21,00,000	19,00,000	17,00,000	15,00,000
22%	20,31,590	18,54,930	16,78,270	15,01,610	13,24,950
20%	18,46,900	16,86,300	15,25,700	13,65,100	12,04,500
18%	16,62,210	15,17,670	13,73,130	12,28,590	10,84,050
16%	14,77,520	13,49,040	12,20,560	10,92,080	9,63,600
14%	12,92,830	11,80,410	10,67,990	9,55,570	8,43,150

Appendix C

Top-Down Analysis: Calculations, assumptions, and sources of data (in the footnotes) for estimating the quantity of PET that is collected by the informal sector

Table 15: *Top-Down analysis to estimate quantity of PET collected by the informal sector*

		Formulae
Average daily plastic waste generated in India (A)	26,000 tonnes ⁵⁵	A
Estimated plastic waste generated per annum in India (B)	94,90,000 tonnes	$B = A * 365$
Estimated percentage of plastic waste collected/recycled by the informal sector annually (C)	60% ⁵⁶	C
Estimated quantity of plastic waste collected/recycled by the informal sector annually (D)	56,94,000 tonnes	$D = C * B$
Average percentage of PET in a waste picker's basket for recycling (E)	17.6% ⁵⁷	E
Estimated quantity of PET collected by waste pickers in India in one year (F)	10,02,144 tonnes	$F = E * D$

Two key variables, daily quantity of plastic waste generated (variable A), and percentage of plastic waste collected/recycled by the informal sector (variable C), are varied in the below sensitivity analysis to see how that impacts the estimated quantity of PET collected annually by wastepickers.

Table 16: *Sensitivity analysis by changing daily quantity of plastic waste generated and percentage of plastic waste collected by the informal sector*

	35,000	30,000	25,000	20,000	15,000
65%	14,61,460	12,52,680	10,43,900	8,35,120	6,26,340
60%	13,49,040	11,56,320	9,63,600	7,70,880	5,78,160
55%	12,36,620	10,59,960	8,83,300	7,06,640	5,29,980
50%	11,24,200	9,63,600	8,03,000	6,42,400	4,81,800
45%	10,11,780	8,67,240	7,22,700	5,78,160	4,33,620

Appendix D

Table 17: *Estimation of cost savings provided by the informal sector to PIBOs*

Note: The following is an indicative estimation intended to provide a directional understanding of the potential scale of financial subsidization contributed by the informal sector in plastic waste recycling. The analysis assumes that the monetary compensation currently received by informal waste workers reflects only the value of the plastic waste collected and does not account for the value of the essential services they provide—such as segregation, storage, and transportation.

To approximate this gap, the minimum wage is used as a proxy to estimate what additional costs Producers, Importers, and Brand Owners (PIBOs) would incur if they were to engage service providers to perform these functions. This analysis is not intended to yield an exact figure, but rather to serve as a tool for reflection and to highlight the under-recognized economic value generated by informal waste workers.

		Formulae	Assumption/Rationale
Average daily income of a waste picker from selling waste (A)	₹ 226 ⁵⁸	A	
Average daily income of a waste picker from selling plastic waste (B)	₹ 93 ⁵⁹	B	
Percentage of income of a waste picker from selling plastic waste (C)	41%	$C = (B/A)*100$	
Minimum daily wage of an unskilled worker (D)	₹ 258	$D = 8,000/31$	The minimum wage varies significantly across the country. While in Delhi, for an unskilled worker, the minimum wage stands at close to ₹ 17,000, in Nagaland it is close to ₹ 5,000. But a weighted average, instead of just a simple average, fits better to arrive at average wages since most of these waste pickers operate in the higher paying cities with more, and more densely packed, waste. Therefore, ₹ 8,000 has been assumed to be the monthly minimum wage. This is a conservative estimate – also on account of the fact that these are not unskilled workers.
Estimated annual income of a waste picker based on this minimum wage (E)	₹ 94,194	$E = D*365$	
Estimated portion of the annual income of a waste picker that is subsidizing the costs of PIBOs (F)	₹ 38,761	$F = 41\%$ of E	The service provided by waste pickers is subsidizing costs of many stakeholders, including the municipal bodies, PIBOs, citizens etc. The assumption made here is that the subsidy provided by the waste pickers to PIBOs is in proportion to the percentage of their income that currently comes from selling plastic.
Estimated annual cost savings currently being provided to PIBOs by the informal sector (G):	₹ 5,814 crores	$G = F*15,00,000$	15,00,000 are the estimated number of waste pickers in India. ⁶⁰

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Return to



Sender*

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Please return credit to the wastepickers



Chintan Environmental Research and Action Group

238 Sidhartha Enclave, New Delhi-110014

Tel: +91 11 46574172

Email: info@chintan-india.org

Website: www.chintan-india.org