National Centre for Good Governance

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Countering The Plastic Governance Challenge In New Delhi

UNNATI SHARAD

INDIAN SCHOOL OF PUBLIC POLICY

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Abbreviations

BWG	Bulk Waste Generator
CPCB	Central Pollution Control Board
EPR	Extended Producer's Responsibility
HDPE	High Density Polyethylene
HH	Household
IEC	Information, Education, and Communication
IRS	Informal Recycling Sector
LDPE	Low density polyethylene
MCD	Municipal Corporation of Delhi
MLP	Multilayered Plastic
MoHUA	Ministry of Housing and Urban Affairs
MRF	Material Resource Facility
SWM	Solid Waste Management
NDMC	New Delhi Municipal Corporation
NGT	National Green Tribunal
O&M	Operation & Maintenance
PET	Polyethylene terephthalate
PIBOs	Producers, Importers, Brand Owners
PP	Polypropylene
PPP	Public Private Partnership
PS	Polystyrene
PVC	Polyvinyl chloride
TPD	Tonnes Per Day
WtE	Waste to Energy

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Introduction

> *"The economics of recycling is not able to catch up with the volume of plastic waste being produced in Delhi."*

Delhi's population is estimated to be 30 million by 2023. By 2028, New Delhi, is projected to become the most populous city on the planet (UN News, United Nations Department of Economic and Social Affairs (DESA), n.d.). Although India's per capita plastic consumption in 2014-15 – at 11 kg – was much below global average of 28 kg and just about 10% of per capita consumption in the US, by 2031, plastic waste generation in India is expected to grow by more than 3 times from current levels, amounting to 31.4 million tons per annum (GIZ India, 2022). Plastic waste in India is projected to jump 10 times by 2030. What role will Delhi, the highest plastic polluting city in India, play in this?

In terms of waste composition, dry waste is 60% and wet waste is 40% in Delhi (Kumar). In every state except Delhi and Goa, the opposite would be true. For example, in Pune, wet waste composition is 76% (Ghanshyam, 2023). Delhi's plastic waste generation is predicted to be around 15%, out of which a major fraction is single use plastics (nearly 5%) (Gupta, 2023). The estimated amount of plastic waste generated in Delhi is approx. 2,30,525 tonnes per annum, which is 7% of total amount of plastic waste generated in India. The per capita plastic waste generation rate in Delhi is 13.5 kg per year, which is second highest among all states in India (Indian Pollution Control Association, Delhi Pollution Control Committee, Government of NCT, 2022). As per a DPCC report, only 2.4% or 271 TPD (out of a total of 11,500 TPD of Solid Waste generation per day) of is recycled per day through MRFs in Delhi (Status Report on Behalf of Government of NCT of DELHI, Delhi Pollution Control Committee, 2023). There are at present no plans to increase the recycling infrastructure and value chain in the city, due to the implementation of the Extended Producer's Responsibility Rules, 2016 (amended 2022), which puts the onus of the management of plastic waste on the producers, importers, and brand owners of the plastic products.

Plastic minimisation comes at an economic cost. Plastic pollution comes at an environmental, social, and economic cost. India is projected to become a global economic superpower. The growth rate of the Indian plastics industry is one of the highest in the world, with plastics consumption growing at 16% per annum. India also has one of the highest plastics recycling rates in the world. With the introduction of

Extended Producers Responsibility Rules, India is making a shift to the circularisation of plastic waste in the Indian economy.

60-80% of plastic is recycled in the informal sector. Plastic waste has a thriving market – literally. With fluctuating rates based on demand and supply, and a well-organised supply chain in the "unorganised" wastepicking sector, Delhi's plastic market recycles and diverts waste from landfills.

With three operational plants, one expansion being planned (Okhla plant), and 2 being set up to be completed by the year 2027, Delhi's waste-to-energy plants will be able to account for the volume of waste being produced in the city as of 2023 production (Status Report on Behalf of Government of NCT of DELHI, Delhi Pollution Control Committee, 2023). However, with the predicted population growth comes an increase in consumption and then waste. More affluent a city is, the more waste is produced. Without a recycling chain being created in the capital city with decentralised recycling infrastructure, both in the formal and informal capacity, Delhi will not be able to keep up with the volume of waste being produced.

Waste Management in metropolitan cities is increasingly attracting the attention of large-scale institutional investors, due to the increasing volume of generated waste, its metabolic density, and proportion of recyclable materials. Waste to Energy (WtE) appears as an attractive option, with the processing capacity in Delhi being close to 7500 MT/day (Ghanshyam, 2023). Delhi produces 11,500 MT of waste per day. Out of which, it is unclear how much remains to be plastic waste. It is roughly estimated that plastic waste generated per day lies between 690 MT to 2000 MT (according to waste management experts consulted for this research project). Waste to Energy (WtE) plants are required to recover and process recyclable content (South Delhi Municipal Corporation, 2017)according to MSW Rules, but not only are no provisions arranged to do so, but the ragpickers who engage in this occupation are not allowed authorisation to collect such plastic waste from dumpsites.

There exist unanticipated gaps in plastic waste management in Delhi that must be addressed. There is a gap in processing of solid waste management of 6462 TPD, which is planned to be addressed through 11 Proposed Waste Processing & Disposal Facilities (Status Report on Behalf of Government of NCT of DELHI, Delhi Pollution Control Committee, 2023).

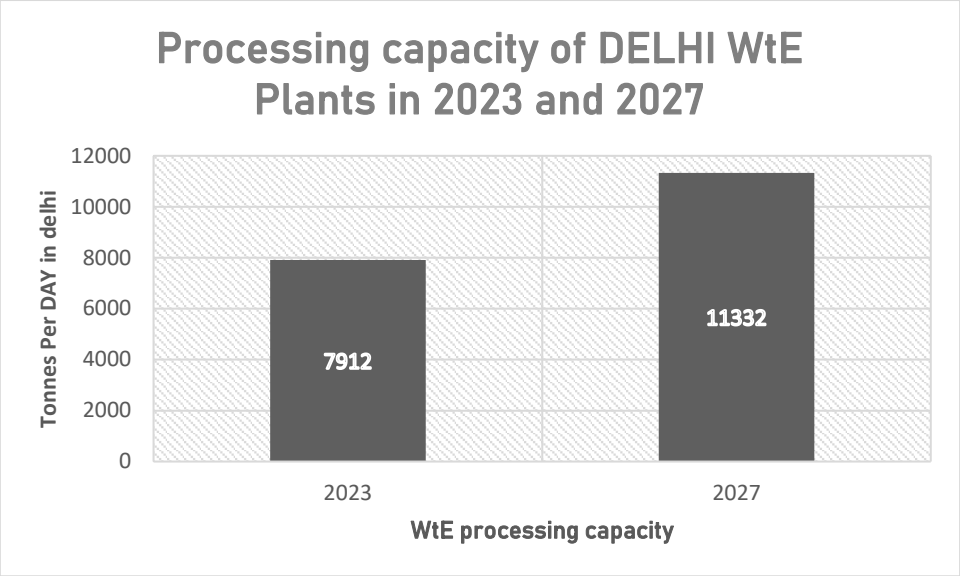


Figure 1 SWM processing capacity of WtE plants in Delhi (Actual and Projected)

In 5 years, the processing capacity of the Waste to Energy plants will be sufficient to meet the needs of Delhi's current population, and not its growing population.

This can be changed through certain measures. The first and the most important is that waste can make wealth. The market for recycling plastic has saved Delhi from choking under the weight of its waste. However, some plastics like LDPE and MLP are tough to recycle. The cost of recovery of these plastics is more than the benefit received by recycling it. However, MLP like plastics are indispensable in the production of certain consumer goods. These plastics are littered across the city, ruining its aesthetic design and leading to public health effects. The second is that recycling majorly takes place in the informal sector. Not only does it go unaccounted for, but can lead to devastating health effects due to the use of unscientific methods. Thirdly, the rules for plastic waste management formulated in 2016 clearly lays down the guidelines for proper channelisation and recycling of plastic waste. However, lack of adequate enforcement and monitoring mechanisms, capability, motivation, and technology lead to it remaining an on-paper aspiration and vision.

Ultimately, plastic waste management in Delhi is a shared responsibility, and must be viewed as such.

Channel Of Plastic Waste Management In Cities

Delhi, the national capital, contains 5 administration zones – Delhi Cantonment Board, New Delhi Municipal Corporation, South Delhi Municipal Corporation, North Delhi Municipal Corporation, and East Delhi Municipal Corporation. With the introduction of the Plastic Waste Management Rules,

producers are responsible for the collection and recycling of plastic waste generated by them, and municipal bodies are required to set down guidelines for plastic waste management in the city.

As per a report submitted by the National Green Tribunal, 1,100 tonnes of plastic is generated in Delhi daily, of which 755 tonnes are co-processed in the three WtE plants (Times of India, 2022). There are no plans to increase MRFs in the city, according to MCD officials.

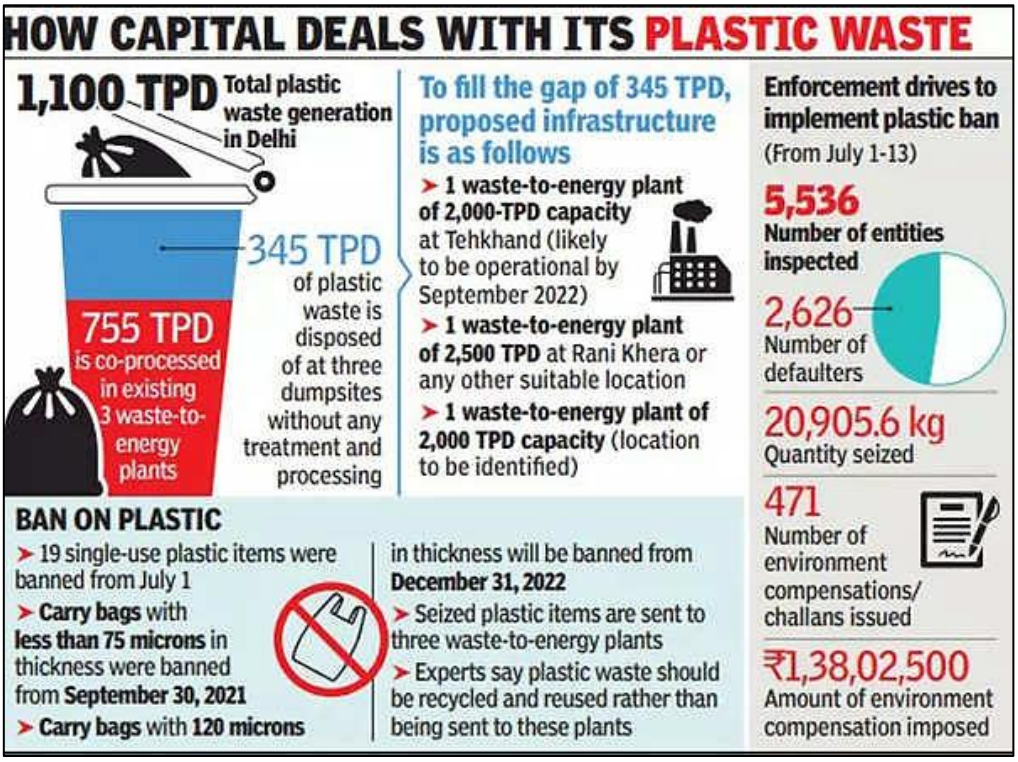


Figure 2 Times of India, Delhi: Why recycling, not waste plants, is key to tackling plastic waste

The municipal corporation of Delhi is not responsible for recycling of any plastic waste. There are currently no revenue streams for the MCD from Solid Waste Management activities in the city. There is just cost, but no profit. Since the Extended Producer's Responsibility Rules was recently implemented as of 2022, the system has not been streamlined yet. Bulk Waste generators and households have to segregate their waste into three separate streams – wet waste, dry waste, and domestic hazardous waste. Bulk Waste Generators means and includes buildings owned and operated by State or Central Government institutions, Hospitals, Commercial establishments, Markets, etc. having an average waste generation rate exceeding 100 kg per day.

Municipal bodies collect the plastic from the declared storage containers using human resources and machines like tipping trucks, and transport the segregated waste from source in a closed vehicle to the final disposal point. The comprehensive operation of street cleaning, waste transportation, and waste disposal is done by the MCD. The secondary collection and transportation of MSW from dhalaos (secondary storage points) is done through private concessionaires in 7 zones.

Delhi has 4 WtE plants located in Okhla, Ghazipur, Tehkhand and Narela. They process nearly 7500 tonnes of waste per day (Ghanshyam, 2023). It produces 52MW of electricity. Segregated high-calorific non-recyclable value plastics is supposed to be incinerated in WtE plants. However, it is found that low-value plastic content and content with high moisture (mixed waste that is wet) is incinerated in these plants, leading to anaerobic combustion. The good news here is that high-value recyclable waste rarely ends up in landfills (Kumar). This valued waste finds itself in a leaked channel, ending up in the hands of informal workers.

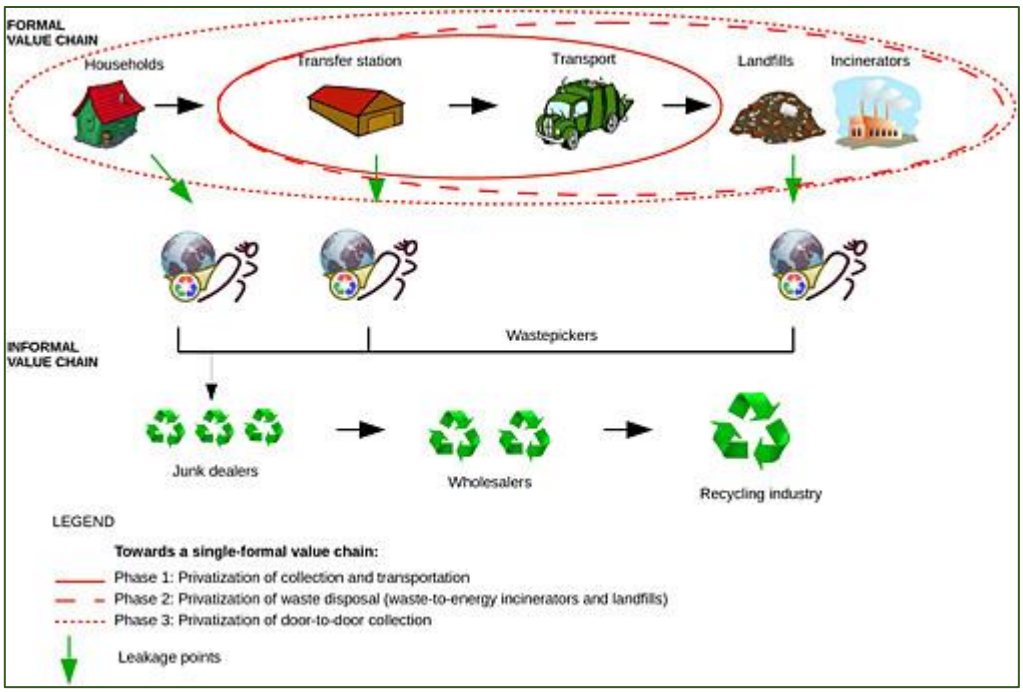


Figure 3 Federico Demaria, Contesting Urban Metabolism: Struggles Over Waste-to-Energy in Delhi, India

From primary collection (from households and BWGs) and secondary collection (from common collection points located in public spaces), waste is transported in one vehicle with segregated compartments with wet waste, dry waste, and mixed waste to a secondary storage facility, or directly dumped in the landfills. A senior official in Delhi stated that all waste is mainly being dumped in landfills. However, one saving grace has been valuable plastic leaking out into the informal chain, where it is recycled.

Wastepickers in the informal channel are of two types-

1. Wastepickers who pick high value recyclable waste from households and bulk waste generators, otherwise known as “kabadiwallahs”
2. Ragpickers who scour through waste in landfills for recyclable waste to sell.

They collect the waste and sell it to a small-scale trader, who in turn sells it to a big recycler/large aggregator. Large aggregators sell the segregated plastic waste to recyclers. Small scale traders and

wastepickers do not have the capacity to store the waste. However, recycling is a lucrative business, and it is also an industry that deals in specialisation. Recyclers deal in specialised types of plastic – PVC (polyvinyl chloride), PP (polypropylene), PET (Polyethylene terephthalate), LDPE (Low density polyethylene), PS (polysterene), and others.

Recycling is, as mentioned, lucrative. 60-80% of plastic recycling happens in the informal sector. These represent leakages in the waste channel, as the recycling has environmental benefits but goes unmonitored. Monitoring and accounting for the quantities of waste that are recycled is necessary:

a) To better calculate and address the plastic footprint of households and industries
b) Ensure unscientific methods of recycling is not carried out, which causes more environmental harm than good
c) To make certain that rejected unrecyclable waste is not littered in public spaces.

Plastic waste leakage is a governance challenge, and addressing it requires policy interventions at the households, market/bazaar, and government level.

Wasteaware Indicator For The City Of Delhi

To assess the governance challenges in the city, the WasteAware Indicator method has been adapted from to present a visual understanding of the gaps that need to be addressed for proper plastic waste management. The Wasteaware ISWM (integrated sustainable waste management) benchmark indicators are a tool to assess the performance of the municipal solid waste management and recycling system in a city. The focus here will not be on the performance of SWM services in Delhi, but rather it is a framework of indicators intended to dig out the weak points in the recycling framework in the city. The Wasteaware indicator has been used as it has been designed by the University of Leeds, UK, for developed and developing countries. Each indicator has 6 subpoints that need to be calculated to arrive at a number. The Wasteaware indicators have been prepared through

(a) Field studies
(b) A consultative session with a MCD official.
(c) Data from Swacch Survekshan[i] indicators for MCD (2022-23)

Disclaimer: The attempt and focus of the theoretical model is not on the performance of the municipality, but on the governance challenges and gaps in the recycling framework. It has been loosely adapted from the Wasteaware Indicators, and is based on strong judgements of a few stakeholders, and should not be cited in other research papers without permission from the author.

	City	New Delhi			
	Country	India			
B1	Country income category	World Bank income category			
		Lower-middle income	GNI per capita		
B2	Population	Total population	$2380		
B3	Waste Generation	Total municipal solid waste generation (tonnes/year)	3,29,41,000		
			11,332		
No	Category	Data/ Benchmark Indicator			
Key Waste-related data	Data			Results	
	W1	Waste per capita	MSW per capita		
			kg per year		
W2	Waste composition	Summary composition of MSW for 3 key fractions	kg per day		
W2.1	Organic	Organics (food and green wastes)			
W2.2	Paper	Paper/Glass/Textiles	40		
W2.3	Plastics	Plastic	25		
W2.4	Metals	Metals	15		
	Others	17	3		
Physical Components					
		Public health - waste collection			
		1.2 Waste captured by system		HIGH	
		Quality of waste collection service		MEDIUM/HIGH	
		Controlled treatment and disposal		LOW/MEDIUM	
		Quality of environmental protection of waste treatment and disposal		MEDIUM	
		Recycling rate of plastics			
		Quality of 3Rs			
Governance Factors					
4U		Inclusitivity	User		
4P		Provider			
5F	Financial Stability	Financial Stability		MEDIUM/HIGH	
6N	Sound institutions, proactive policies	Adequacy of national solid waste management framework		LOW/MEDIUM	
6L		Local institutional coherence		MEDIUM	

A background of the city – The 5 ULBs in Delhi were unified recently. The MCD alone manage almost 95 % of the total area of the city. The above authorities are supported by a number of other agencies. The Delhi Development Authority (DDA) is responsible for siting and allotment of land to MCD for sanitary land filling. Delhi Energy Development Agency (DEDA) under Delhi Administration (DA) is responsible for solid waste utilization projects aiming at bio-gas or energy generation in consultation with the Department of Non-Conventional Energy Sources (DNES), and Ministry of Environment and Forests, Climate Change (MoEFCC). There are other important agents who play their part in the overall scheme of solid waste management in the city. They are 575,000 private sweepers and garbage collectors employed by the people for cleaning privately owned premises, waste pickers, waste dealers and recycling industries, which consume recyclable waste to produce recycled products. Most of the plastic recycling happens in the informal sector through unorganised wastepickers. The current population of Delhi is 3 crores, and 11,500 Tonnes Per Day (TPD) of SWM is produced, out of which 15% (estimated) is said to be plastics. 5% out of this is single use plastic.

Recycling Rate in the city (Formal & Informal)

(A) 3R Principles

This indicator assessed the MCD's efforts to reduce waste generated by households/commercial establishments.

3R initiatives have been introduced in more than 45% wards in 2022 in Delhi, according to Swacch Survekshan Data. One indicator of 3R speaks of the integration of the community and/or informal recycling sector (IRS) with the formal solid waste management system. There is a high focus by the MCD administration on this front. IEC campaigns are consistently and committedly administered to multiple wards, and RWAs are encouraged and incentivised to take up solid waste management activities by themselves. Nearly 300 colonies have composting pits, and 100 have been named zero waste colonies. The NDMC has integrated the IRS into sorting of recyclables in two MRF plants, in collaboration with the civil society organisation – Chintan Environmental Research Action Group.

In terms of environmental protection in recycling, another sub-indicator, the field visit to the UNDP MRF showed high compliance to PPE kits, but however, sorting at a primary level happens out of mixed waste. The truth is that the recyclables that land up in MRFs are more than often mixed waste. To sort and clean it takes a lot of time, effort, and water.

Women are primarily in-charge for this part of the recycling process. 18 of the workers interviewed did not know a word of Hindi, so it was tough to communicate the importance of wearing gloves.

Moreover, 80% of the recycling that happens in the informal sector, especially in Tikri Kalan, happens in a scientifically-unsound manner.

(B) For the benchmark indicators for Governance Aspects:

There is implementation of comprehensive, culturally appropriate public awareness raising programmes, in more than 45% of wards of the MCD, and this number has increased to 60% in 2023. There has been a high level of involvement of the public in SWM planning and implementation. Resident Welfare Associations are active in the planning processes. The MCD also has a helpline number for public feedback.

However, one indicator under "User Inclusivity" speaks of effectiveness in achieving behaviour change through IEC activities. However, there has been very low segregation at source. This is because the users of SWM believe that all the waste they painstakingly make efforts to segregate clean and dry recyclables and minimise mixed waste ultimately gets dumped in the landfills itself.

In terms of Provider Inclusivity, the formal channel of SWM services, which is based on a PPP model (Public-Private Partnership) has ensured high compliance with the sanitary guidelines of MoHUA. Waste services are mutually beneficial, with the MCD handling transportation and collection, while the responsibility of disposal lies with the private sector (WtE plant operators).

However, except for one ULB, there is no evidence of acknowledgement and recognition of the role of the organised informal sector within or alongside the formal solid waste management system. However, this must be addressed as the reality in many developing country cities is that the informal sector is providing services for waste collection, recycling, and reuse.

Key Takeaways from Delhi's Wasteaware Indicators:

1. The Informal Recycling Sector is missing from the overall solid waste management system.
2. Recyclables that land up in MRFs are more than often mixed waste.
3. There is a lot of potential for PPP in not only disposal, but also processing functions, like recycling plants.

Challenges For Plastic Waste Management In Delhi

1) **Increase in volume of plastic waste, decrease in standard of living for Delhi's residents**

   Rapid urbanisation → More money to spend due to increased incomes → Money spent on products that have plastic → Annual increment in plastic waste generation → More

volume means more waste to be picked up from trash dumps by informal sector → more employment → Increase in migration → Major shortage of land which is now occupied by the scattered illegal settlements → Increase in spread of diseases due to unhygienic and dangerous nature of wastepicking occupation in unsanitary conditions → An unemployable, sick, depraved, and dependent section of society that renders the informal sector unproductive, thereby reducing the rate of recycling from 80% to 20%.

2) **Lack of recognition of informal wastepickers in official channels.**

There are 2 lakh informal wastepickers in Delhi. Informal wastepickers face constant challenges to their livelihood. From privatisation of doorstep collection to Waste to Energy plants to health hazards, this section of society remains marginalised and socially ostracised due to the nature of their work. Except for the North Delhi region, who has partnered up with an NGO (Chintan), ragpickers have been bribed by caretakers of dumpsites, landfills, and dhalaos before they can enter these places to collect plastic waste.

They cannot gain formal recognition due to the lack of legal documentation, nor do they understand how to gain access to rights and benefits as they are uneducated and poor. Prices for the plastic they collect fluctuates, and they are frequently taken advantage of by small aggregators who sell their trade for a way larger margin to recyclers. Lack of business acumen and low awareness of the market for recyclables leads them in an impoverished and insecure state.

3) **Low segregation of plastic at source**

A study shows that only 29% of households in Delhi segregated at source (Kaveri Kala et al, 2022). This leads to inefficient recovery of valuable plastics from mixed waste. Why? Citizens in Delhi see it as a cumbersome effort to undertake as they believe their efforts would go waste as even if they segregate it, it will be transported in one truck and dumped in the same place. They are not wrong to think this because that is what is happening currently in Delhi.

However, a field study showed that if the information asymmetry is addressed by reverting back to the beneficiaries of SWM services, and they are made aware of how their efforts contribute towards the beautification of the city they live in, there will be a

perceived change in their behaviour and increase in segregation efficiency at source (Shivani Wadehra, 2017).

4) **Implementation of EPR in starting stages, exclusion of MSMEs**

The Extended Producer's Responsibility that puts the onus of plastic waste recycling on plastic producers, importers and brand owners (PIBOs) recently got implemented, and while there has been a compliance to the rules, the ambitious targets and goals set by the policy have clear gaps in governance – starting with inadequate guidelines surrounding monitoring and implementation. The MSME-dominated plastic industry, both in terms of plastic production and plastic recycling, are exempted from the policy for now.

5) **Low Value plastics have a higher cost for recovery and recycling, and end up in the environment**

As per a source in the Municipal Corporation, a recent study conducted shows that 10% of SWM is plastic waste, out of which 5% is single-use plastic.

6) **Lack of shared responsibility**

Plastic waste management requires a multi-stakeholder effort. However, it is currently seen as the problem of the PIBOs, with the introduction of EPR.

7) **Single-use plastic dominates plastic use in Delhi**

Single use continues being used in the city, even after several bans and guidelines being implemented. Single use production takes place underground, and it is hard to monitor and penalise those producing it. Plastic use is a supply-driven market. No consumer would actually prefer to use single use plastics over its alternatives. But lack of an inexpensive alternative and the ready availability of these plastics makes it a convenient source for packaging. It is difficult to monitor and ban the complete use of these packages. The main reason is due to the fact that the production of these bags happens covertly, as the size of the operation is small and well-hidden. Information, Education & Communication (IEC) campaigns in communities and schools can bring about change in using these plastics.

8) **No single-window clearance for recycling businesses.**

Recycling businesses require multiple clearances thus delaying the set-up while unorganized sector continue to run their businesses without any clearances.

An Inside View: Plastic Circularity

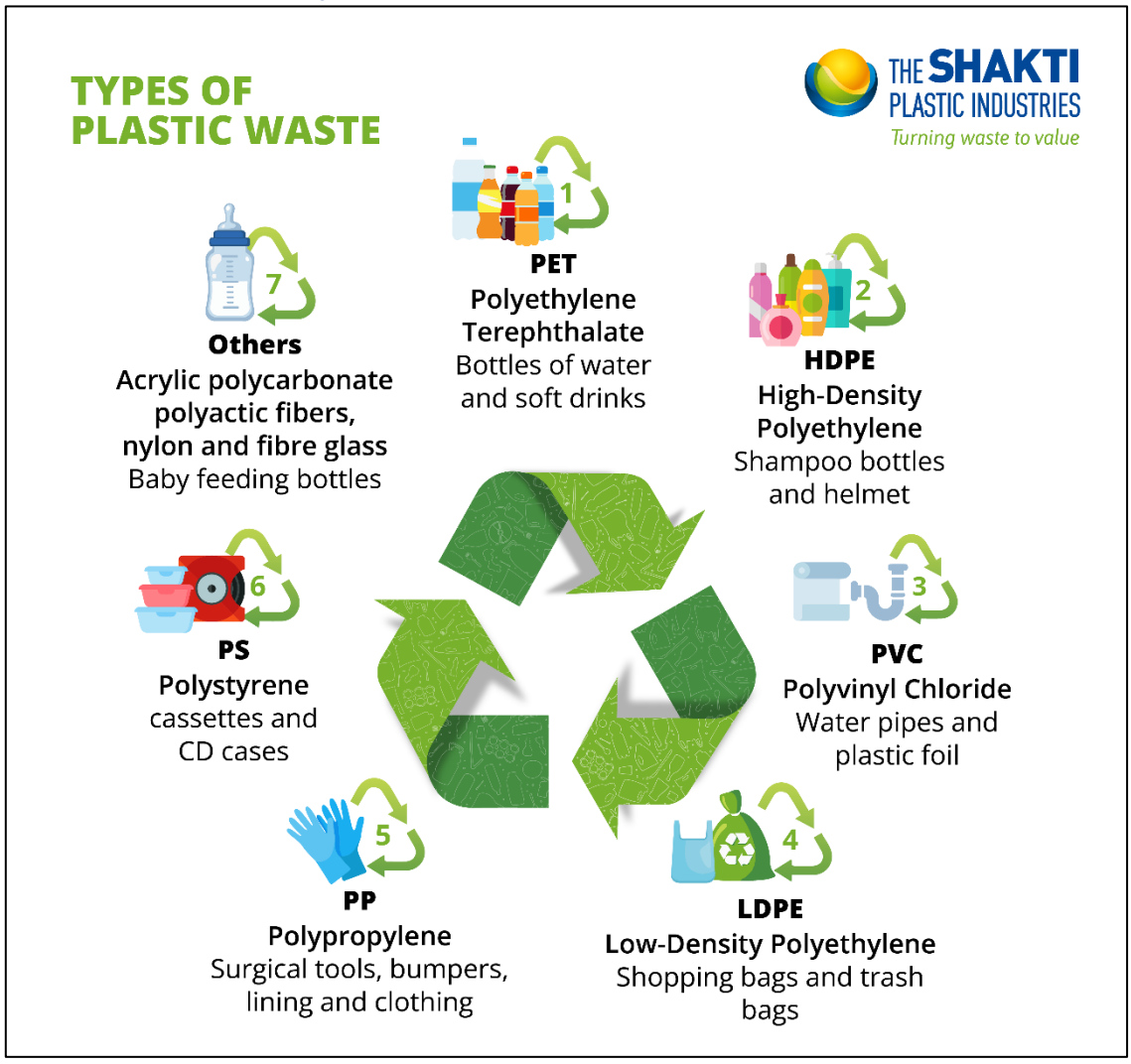


Figure 4 Shakti Plastics - Factsheet

Plastics are broadly of 7 types. The ones most commonly recycled are PET, HDPE, and PP. PS and PVC are difficult to recycle and therefore are collected less. LDPE is recyclable, but loses value in the recycling process.

Under Extended Producer's Responsibility, there is another classification of these plastics –

Category-I: Rigid plastic packaging.

Category-II: Flexible plastic packaging of single or multi-layer plastic sheets, covers, and the likes.

Category-III: Multi-layered plastic packaging.

Category-IV: Plastic sheet and similar material used for packaging purposes as well as carry bags made of compostable plastics

Multilayered plastics are difficult to recycle, along with low-value plastics. It is difficult to recycle these products due to its heterogenous materials. The cost of recovery is more than the benefits from

recycling. These are often the plastics found littered in roads, forests, beaches, hilly areas, and other public areas.

To complementarily align with India's ambitious economic goals, it is necessary that plastic circularity is streamlined and implemented. Plastic needs to retain its true value. An analysis by MoHUA identifies significant potential for resource recovery from these waste categories through circular economy. For example, dry waste recycling has a potential to generate approximately 11,836 crores per annum (Ministry of Housing and Urban Affairs, 2021).

A circular economy approach entails creating incentives for businesses to innovate models to reduce the plastic quantity or enhance the recyclable/reusable quality of their product, thereby addressing the waste challenge (Ministry of Housing and Urban Affairs, 2021). The design of the Extended Producer's Responsibility Rules is such that it aims to incentivise recycling at the product design stage itself, by leveraging high fees based on the "polluter pays principle".

EPR – Foreseen Governance Challenges

In terms of environmental law, the polluter pays principle aims to make the party responsible for producing pollution also pay for the damage done to the natural environment. The EPR targets for recycling is set to start from 2024. As of now, PIBOs are required to collect and dispose of their plastics. However, there are anticipated problems that may arise with this policy –

i. EPR Rules are not geographically specific. PIBOs aim to fulfil their obligations by handling waste in metropolitan cities, whereas their products are pan-India. Plastic thrown in hills and beaches will now have a low probability of being collected and disposed of.
ii. The plastic credit model does not require producers to recycle their own packaging, but to ensure an equivalent amount of packaging waste is recycled and recovered.
iii. The financial exchange of plastic credits takes place without being traced on the EPR portal.
iv. The EPR mechanism does not incentivise a shift to cleaner plastic production. The firm will continue producing plastics which have little to no value, and they will only have to pick up a certain portion of it. The long-term environmental impact the left-out plastic will go unaccounted for.
v. The concept of Producer's Responsibility Organisations has been removed from the EPR policy. However, it is instrumental to have competing recycling organisations to create a market for recycled goods.
vi. High regulatory costs are imposed on Central Pollution Control Board and its subsequent state committees.

vii. EPR will also take away valuable waste from the informal recycling segments, such as the ragpickers. They are dependent on this waste.

viii. Though the EPR regimes intend for reduction of government involvement, governments have to involved because EPR systems require not only sound policy design, but also effective governance to operate effectively.

Sources say that as of 2023, the EPR mechanism has been operating smoothly. Plastic is being collected; certificates are being brought. Time will tell. For now, infrastructure capacities must be increased and policy interventions targeting waste generators (like households and BWGs) and wastepickers must be implemented and adhered to. EPR is meant to account for rising population growth, but will it be able to recycle and collect back how much is being disposed of, without plastic waste management being viewed as a collective responsibility of the public, the PIBOs, and the municipal authorities?

Current Government Initiatives to Manage Plastic Waste

Delhi currently has 7 Semiautomatic Material Resource Facility overseen by the Municipal Corporation of the city.

- Under CSR initiative of SBI Card IPCA has established 4 Material Recovery Facilities in Delhi NCR, with a cumulative plastic processing capacity of 9 TPD
- UNDP plant in collaboration with waste economy start-up Trashonomy with a plastic processing capacity of 5 TPD.
- 2 MRFs managed by Chintan Environmental Research Action Group, in New Delhi Railway Station and IIT-Delhi campus which processes 8 TPD a day.
- One MRF in Raghubir Nagar, managed by ITC.

Additionally, the Union Territory has 150 dhalaos being converted to FCTS (Fixed Compactor Transfer Stations), to increase the segregation rate in the city by following the 3Rs concept i.e., ‘Reduce, Reuse, and Recycle’.

In terms of EPR Rules, only in Delhi, the ULBs are not responsible for monitoring and implementation. The responsibility lies with the Delhi Pollution Control Committee.

Delhi bye-laws for plastic waste management are currently under process of being implemented. A few notable rules in the bye-laws include

i. Segregated plastic waste will be put in the bins with the colour blue

ii. Waste generators will be responsible for depositing their segregated waste, which shall not be transported along with MSW to the designated landfill site.

iii. The primary responsibility for collection of used multi-layered plastic sachet or pouches or packaging is of Producers, Importers and Brand Owners who introduce the products in the market. They need to establish a system for collecting back the plastic waste generated due to their products. This plan of collection to be submitted to the DPCC while applying for Consent to Establish or Operate or Renewal.

iv. Concerned Local Bodies (LBs) shall facilitate construction, operation and maintenance of Material Recovery Facility (MRF), plastic waste processing facilities and associated infrastructure on their own or through any agency for optimum utilisation of various components of plastic waste.

v. Concerned LBs shall endeavour to create a market for consumption of Refuse Drive Fuel (RDF).

And, most importantly

vi. Concerned Local Bodies (LBs) shall make efforts to streamline and formalize plastic waste management systems and endeavour that the informal sector workers in waste management (waste pickers) are given priority to upgrade their work conditions and are enumerated and integrated into the formal system of plastic waste management

The MCD spends lakhs and crores on IEC activities for proper segregation at source, hoping for a behavioural change to take place. Recently, close to 100 residential colonies in Delhi declared themselves as ‘zero waste colonies’, with women community leaders leading the initiative for 100% segregation at source. The Municipal Corporation of Delhi is also offering an incentive of 5 per cent of the property tax paid to zero waste colonies recognised as participatory colonies (The Print, 2023).

The initiatives taken by the Municipal Corporation is definite step towards managing growing waste in the city in a sustainable manner. There still remains a problem of plastic litter that originates from a market system that continues to be dependent on plastic products.

Case Story 1 UNDP MRF Plant in Dwarka, Delhi

Trashonomy is a for-profit enterprise working towards providing professional waste services to households and BWGs. They ae the operating partners for the UNDP and MCD funded MRF in Dwarka, New Delhi. They process 10 metric tonnes of waste dry waste per day, of which 5 TPD is plastic. The cost of setting up the MRF was 2 crores, and in terms of O&M, Mr. Chawla (CEO of Trashonomy) states, "It is a self-sustainable, or even profitable model for us." Wealth out of waste is created not only for Trashonomy, but also for the 300 workers from the informal sector being trained and employed in the plant.

Primary sorting is done by women.

The semi-automatic plant produces black pellets out of plastic waste, which is then transported to recyclers outside of Delhi. Two challenges were brought up by Mr. Chawla. First, MLP is hard to recycle. To recover MLPs costs more than the benefits of recycling it. Secondly, even seemingly easy to recycle products like PET bottles pose challenges for recycling technologies. Plastic products are commonly made out of more than one plastic

type. The bottles may be made out of PP plastic, and the labels out of HDPE. When the plastic bottle is shredded, what comes out is a mixed product with several types of plastic, now indistinguishable. When water is run through to separate the products so that it may be sent to different recyclers, it is found that PP and HDPE settle on the top, and PET on the bottom. This complicates the process of separating plastics to be sent to recyclers.

Altering Our Perspective on Plastics

As seen from Case Story 1, it becomes important to incentivise the producers and brand owners to design sustainably, design for recycling. Recycling must be made an easier process, to lead to a circularity in the lifecycle of a plastic product.

Reusing is higher up on the waste hierarchy, and brand owners are aware of this fact. However, it is expensive to manufacture reusable products. Additionally, people in urbanising cities look for convenience, which is why markets and shops are alternatively called convenience stores. Sustainable

packaging is available for people of a higher income level, while majority of the population belongs to lower-income levels, thereby consuming more products with less sustainable packaging. Behaviour economics speaks extensively about the rational consumer. Brand owners and Producers must be directed to bear the responsibility under EPR guidelines to devise plastic minimisation efforts by using pricing mechanisms to incentivise consumers to choose a more sustainable lifestyle (LiFE – Lifestyle for Environment). Low cost, low effort (Figure 5) means products that are cheap also tend to have MLP and low recyclable material packaging. The common person in India cares about how much they spend. So, alternatively, brands can incentivise consumers by offering discounts to induce environmentally sustainable behaviours in their everyday consumption and lifestyle.

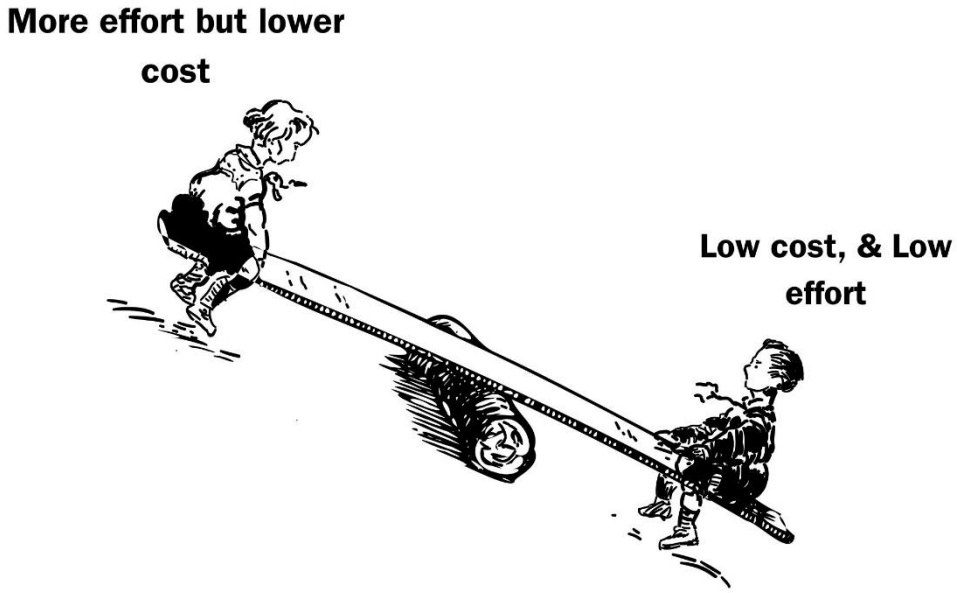


Figure 5 Principles for incentivising green consumer behaviour

By incentivising the industries by way of constantly holding EPR Monitoring Consultative Workshops and inculcating recycling into the mainstream by encouraging the firms to trust that their consumers would be rational and adopt sustainable ways. For example, instead of buying milk packets, Mother Dairy installed 900 token milk dispensing booths that has saved 850 tonnes of plastic per day (ETInsights, 2023).

A Pune-based startup called Ashaya has created what it claims to be the "world's first recycled sunglasses" made from discarded packets of chips. These glasses are highly functional as they are UV-polarized, durable, bendy and comfortable. Customers can also scan a QR code on the side of the

sunglasses to see how many packets were used to manufacture them, which waste pickers collected the packets etc (ASHAYA, 2023).

Recommendations For Plastic Waste Management And Governance

1. Scaling up of the decentralised waste management system through setting up digitally monitored MRFs via innovative Public Private Partnerships.

2. Incentivising recycling for households, bulk waste generators, PIBOs, and wastepickers.

3. Planning ahead for the city's growing population (and predicted future generation of plastic waste) by integrating the informal sector into the plastic recycling framework of Delhi.

The implications of the three suggestions to improve plastic waste management and governance are:

IMPLICATION 1: Scaling up of the decentralised waste management system through setting up digitally monitored MRFs via innovative Public Private Partnerships.

Good governance is future-proofness, inclusive, and participatory. The wasteaware indicators show that it is not enough just to "manage" plastic waste in Delhi, but rather increase the recycling rate in the highest polluting city to promote a circular economy. This can be done by integrating the informal sector into a new decentralised and adequately monitored plastic waste management system.

There is huge potential of Public-Private Partnership in this venture. As observed with the case study of Trashonomy (Refer. Case Story 1). The MCD partnered with the UNDP to build the facility, and transferred the management to Trashonomy. Plastic recycling makes the MRF plant situated in Dwarka not only a self-sustainable venture, but also a profitable one. There are profits in plastic.

Along with creating stable employment for nearly 2 lakh wasteworkers in the informal sector, this will enhance the recycling process due to the indigenous expertise they hold.

Delhi is planning to shut down its dhalaos and instead institute MRFs. This can be a transformative opportunity for two reasons –

a. It provides a closed a contained space for dry waste to be segregated and sent to recyclers.
b. Allows the monitoring of plastic waste being generated and processed in these facilities via the Sansaadan app (developed by the Ministry of Housing and Urban Affairs)

c. The top 50 plastic waste generating PIBOs can be invited to the bid auction and set up MRFs to collect back their waste and streamline the EPR Process in the highest plastic waste generating city.

It is an opportunity for bazaar, samaaj, and sarkar to recycle plastic waste in the city using a streamlined process-driven and profit-seeking model.

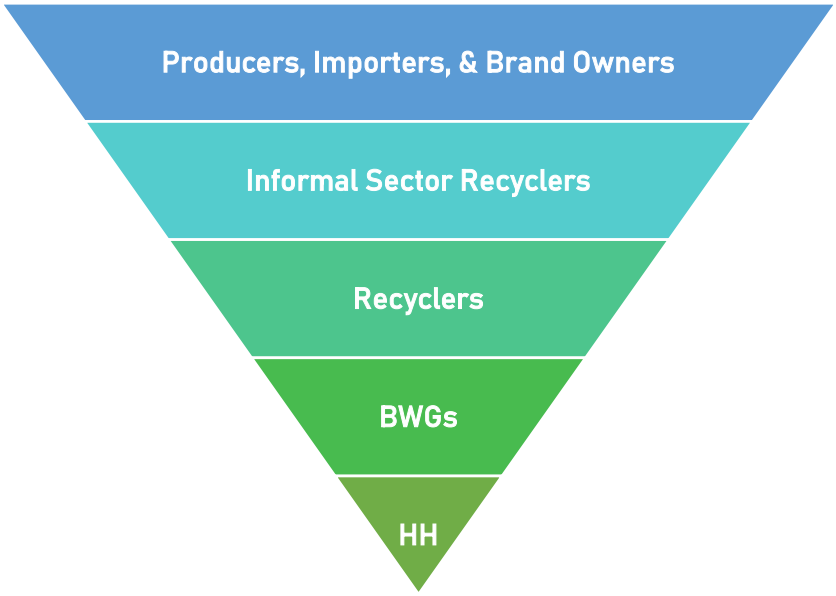
A space for waste makes all the difference. Thus, this participative decentralised waste model will make recycling mainstream and visible in the city, without ruining the aesthetics. Collection and transportation cost sometime outweighs the intrinsic value of the dry waste item. Decentralized collection infrastructure needs to be developed to reduce logistics cost and enhance collection by informal sector.

It can be created as an inclusive model that generates employment for nearly 30 people/10 TPD. The current MRF capacity in Delhi is between 257 to 317 TPD. Unlike waste to energy plants, the work at the Material Resource Facilities does not get impacted by rain. It can generate employment, especially for the 1000-2000 unemployed women in Seemapuri and Ghazipur. This gender-inclusive model of plastic waste segregation and recycling can enhance the livelihoods of slum communities, who can now enhance their children's nutrition and education with their increased income, in double-earning families. This enhances future choices for these young school-going children, who may now dream a better life for themselves.

These MRFs represent a future-proof model, as Delhi's waste-to-energy plants capacity is currently 7550. It is projected to be 11,550 by 2027. Delhi is the highest-growing city in terms of population growth. There is massive land constraint in the city, which is burdened by a growing population unable to afford even low-cost housing. This section of society takes up land near waste landfills, and fall ill due to the toxic chemicals and general unhygienic conditions. WtE plants will not be able to keep up with the growing demand for foods with cheap plastic packaging that is disposed off in the environment. This decentralised MRF system is cheaper and easier to scale up than the complex technological WtE model. Material recycling facilities can help improve recovery from ₹5,187 crores/annum to ₹17,023 crores/annum by 2025 thus adding ₹11,836 crores to economy per annum (Ministry of Housing and Urban Affairs, 2021). This makes it a future-proof innovation that creates jobs not only in O&M functions but also in construction. Each MRF handling 10 TPD of plastic waste can generate employment for nearly 31- 50 people (Chawla, 2023).

Recycling of plastic creates value, and generates socio-economic development. EPR obligations will lead to plastic becoming a profit-making market.

IMPLICATION 2: Recycling at all levels



At Household Level (HH)

In Delhi, there is a belief that efforts to segregate go wasted, as the waste is ultimately dumped in landfills rather than reused or recycled (Shivani Wadehra, 2017). While this is true, the MCD plans on changing the status quo to incentivise recycling. Overcoming the information symmetry in plastic waste management will make a significant change in the plastic that ends up in landfills.

With the introduction of Sansaadan app by MoHUA and Technical Partner GIZ India, MRF's will be required to report the daily tonnes of plastic received[ii]. Making this accessible to the public, and also including information of the plastic diverted from landfills per day from MRF closest to a particular neighbourhood will drastically increase the probability of people committing to achieving 100% segregation at source in their homes.

Even in low-income households, recycling can be incentivised by making them aware of the economic gain they would receive by selling their recyclable plastics to authorised wastepickers connected to a private company.

Incentivise households to segregate waste at source by making it a community and collective action commitment. MCD has offered a rebate of 5% of Property Tax for Delhi zero waste colonies, to be used in developmental projects for the neighbourhood and its people. Common interest would signify a collective organisation that aims to convert their living space into a zero-waste colony. By instituting a neighbourhood mechanism that rewards households that segregate well, and have them be recognised on the MCD website will positively incentivise all households to segregate responsibly for a chance to be rewarded by their RWA and Municipal body.

For Bulk Waste Generators (BWGs)

Bulk Waste generators need strict guidelines for segregation of plastics. Delhi as an urban metropolitan and urbanising city Is divided into clusters/regions. Strategically placing Depots for recycling specifically for industrial, commercial, and office complexes will not only generate employment but will also ensure an increased rate in recycling of plastic waste.

75 percent of plastic waste generated from bulk generators is MLP, 7 percent is PET, 8 percent is LDPE, 9 percent is Polystyrene while HDPE is a lowly 1 percent. Installing garbage bins by conducting a study in each of these areas and accordingly installing waste management facilities to fit the needs of the waste generator will facilitate better plastic waste management.

For Recyclers

Research by CSE in 2019 showed that PP was partially recyclable. PP is used primarily in food packaging and beverage containers. Of the types of plastics recycled in India, PVC (polyvinyl chloride) accounts for 45 per cent, LDPE (low density polyethylene) for 25 per cent, HDPE (high density polyethylene) for 20 per cent, PP (polypropylene) for 7.6 per cent and other polymers such as PS (polystyrene) for 2.4 per cent.

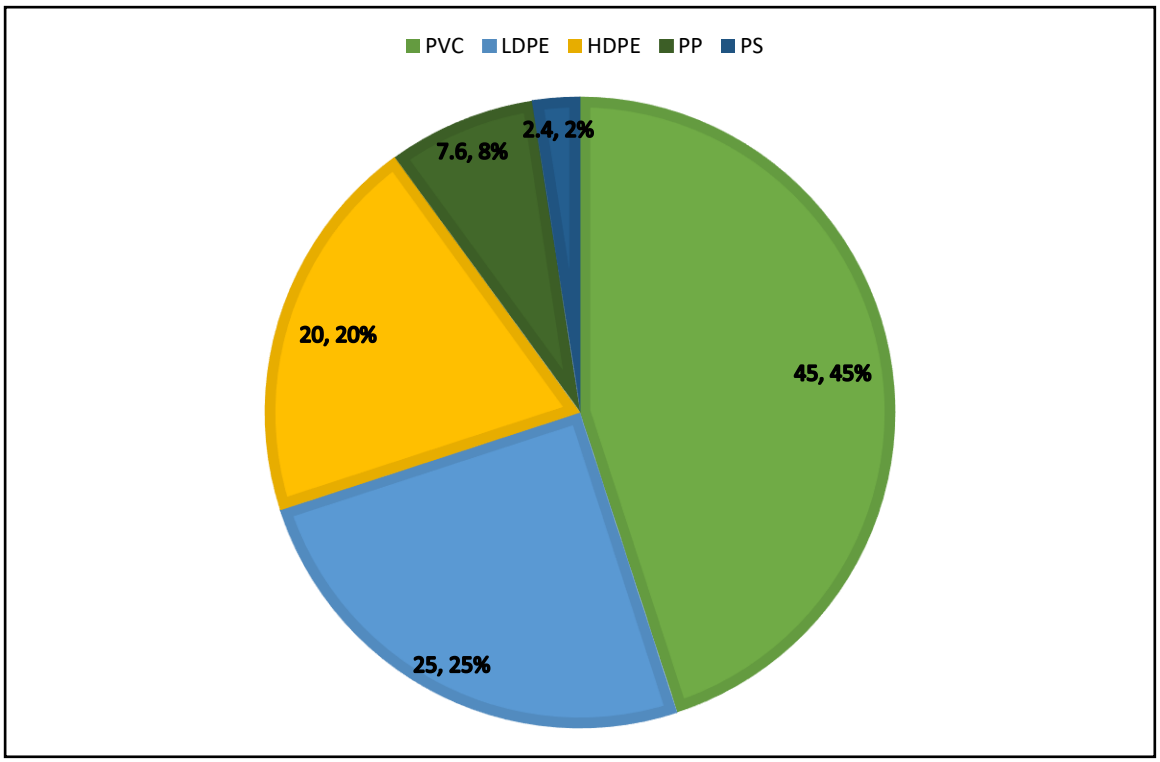


Figure 6 CSE Plastic Datasheet

However, a study by GIZ India shows that PET, PP and LDPE recycling rate is over 40 percent. The lowest recycling rate is that of PVC. HDPE and Polystyrene enjoy recycling rates of close to 30 percent

from the waste that is generated and collected in Delhi. Data collected from recyclers of materials shows that PP does not reach recyclers while small aggregators were making a huge margin.

Recyclability potential of plastic in Delhi is influenced by 3 factors (GIZ India, 2022):

1. Presence of a recycler
2. Market for the recycled material
3. Materials covered under EPR

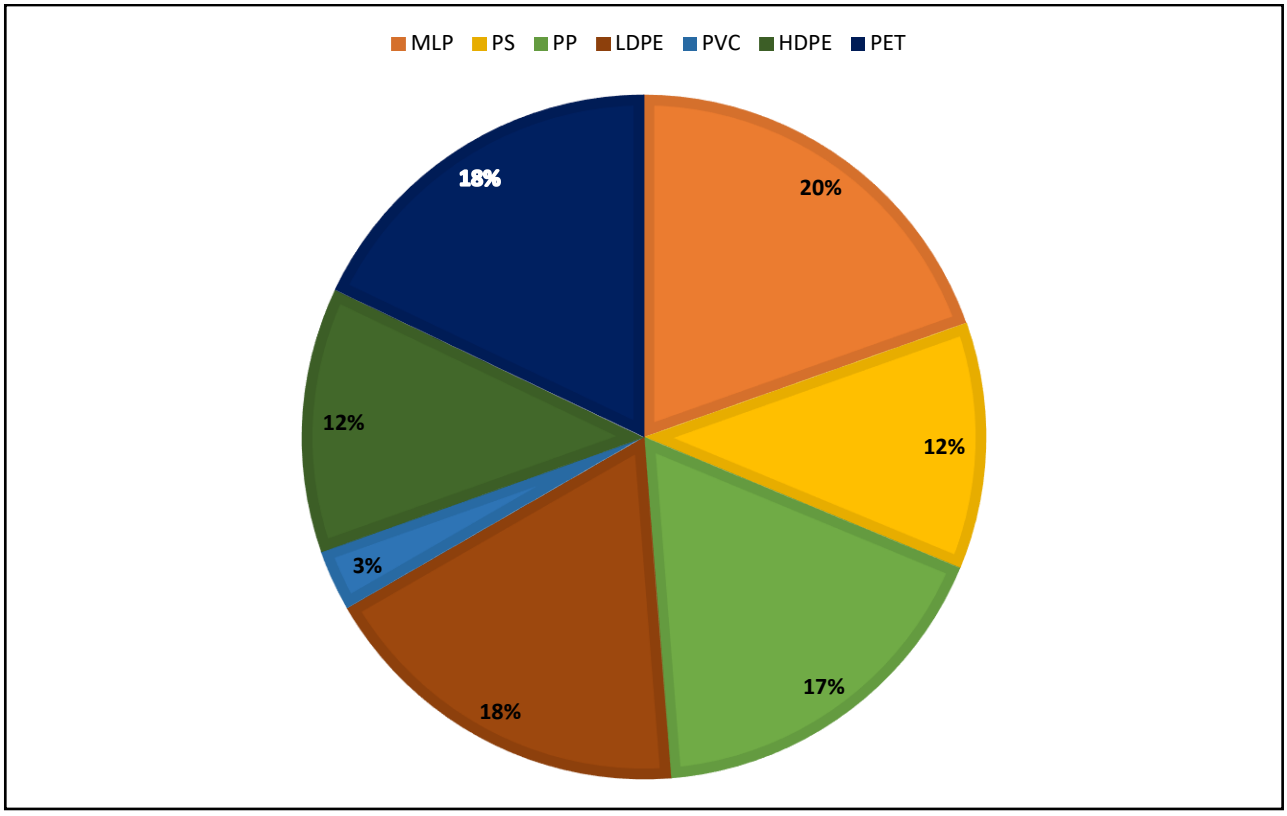


Figure 7 GIZ dry recyclables

PVC and polystyrene (PS) do not have recyclers in and around Delhi, and PP is captured and processed by the informal sector (unmonitored!). Therefore, it becomes necessary to create a framework for incentivising recycling in Delhi, in Narela, Bhawana, Bahadurgarh, and Kirti Nagar. Virgin plastic produced by the MSME-dominated plastic industry must be carefully monitored and registered on the EPR Portal. The sector can create nearly 1 crore jobs by 2027, and already exports consist of Rs. 35000 crores worth of plastic. However, green jobs are predicted to also create nearly 1.5 million jobs by 2030 in India. So, if what continues to be produced is recycled and/or converted to more recyclable or compostable type of plastic, the payoff in the long-term would be tremendous, leading to India's economic & green growth.

For PIBOs

In Delhi, 72 percent of plastic waste generated by households of MLP, which is the commonly used material for packaging of consumables these days, 6 percent of plastic waste is PET, 7 percent is HDPE, another 7 percent is PVC, a further 6 percent of from LDPE while PP and polystyrene are lower at 1 and 2 percent respectively (GIZ India, 2022).

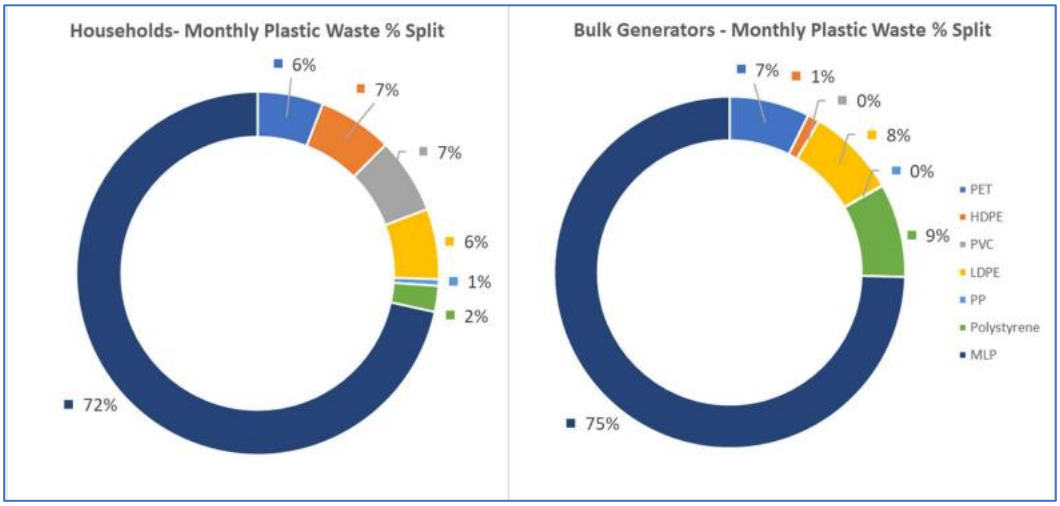


Figure 8 Disposal of plastics from households and BWGs - Delhi

75 percent of plastic waste generated from bulk generators is MLP, 7 percent is PET, 8 percent is LDPE, 9 percent is Polystyrene while HDPE is a lowly 1 percent (GIZ India, 2022).

Conducting a waste composition study in plastic hotspots and accordingly installing Hi-Tech Recycling Depots will enable PIBOs to fulfil their EPR obligations and also generate and sell EPR certificates via trading to other PIBOs. This is an opportunity for PIBOs to facilitate a market system for recycling, and be pioneers in bringing about a plastic green revolution in Delhi, the city with the second highest per capita plastic waste generation.

For The Informal Sector Recyclers

An in-depth study in the area is lacking, but there is informal recycling happening in clusters situated in the outskirts of the city – like Kirti Nagar and Tikri Kalan. These recyclers do not register themselves or claim to recycle used post-consumer plastic waste, as they use unscientific methods that can impact public health and would fail environmental norms of the Central Pollution Control Board. These recyclers can benefit from the EPR Rules Mechanism, by generating certificates that can be bought by PIBOs who need to fulfil their environmental commitments. However, they will not be able to do this unless:

(a) The fees for signing on to the EPR portal is made affordable for these MSMEs in the informal recycling sector

(b) They receive technical assistance and assurances from a trusted technical partner like GIZ India to help them navigate the nuances of the EPR portal

(c) They receive financial assistance via government schemes to switch to more cleaner recycling technologies.

Average Selling Price (SP) and Buying Price (BP) of Waste for Different Players in Rs per kg								
Waste Material	Prices	Doorstep waste collector	Rag Picker	Itinerant buyer	Scrap Trader	Small Aggre-gator	Large Aggre-gator	Re-cycler
PET	BP	4.00	0.00				10.21	16.50
	SP	12.33	11.00	6.20	11.60	10.00	14.75	80.00
HDPE	BP	1.50	2.00		5.00		11.00	12.50
	SP	10.00	19.00		6.00		14.25	35.00
PVC	BP	2.50					12.00	16.00
	SP	14.33					14.60	32.00
LDPE	BP	2.40	1.40		9.00	11.00	11.14	10.00
	SP	10.75	10.75		12.00	12.50	14.67	75.00
PP	BP	3.50	0.00		16.00	44.00	11.50	
	SP	15.00	15.00		18.00	80.00	13.00	
Polystyrene	BP	2.50			7.00			
	SP	14.00			10.00			
MLP	BP	3.09	1.17	2.60	8.88	7.20	10.00	12.00
	SP	8.33	8.47	6.20	11.60	10.00	14.75	80.00

Figure 9 Buying and Selling price of plastic items across all value chain actors – Delhi, GIZ India Report

GIZ Study on Delhi's plastics shows that the presence of a recycler within a 48 km distance also leads to lower logistics cost for the collector which helps them to earn higher margins. As stated in Figure 8, the wastepickers do not make much of a wage because of the gap that exists in the buying and selling price of plastic at the lowest level (ragpickers) to the highest level (recyclers). Bridging the gap and allowing wastepickers to move up the chain will alleviate and streamline higher recycling rates, by cutting time and costs and increasing money earned.

Additionally, the margins earned from each step is dependent on the distance of the recycler from the city, as logistics costs are embedded in the value. Incentivising the creation of recycling clusters located can really enhance the collection rates for the informal recyclers. Infrastructure capacities need to be enhanced through decentralised waste management, to cut down the logistics cost.

Case Story 2 Ghazipur observational study

The Ghazipur landfill in East Delhi is the oldest landfill in the city containing at least 12 million tonnes of waste. The Ghazipur residents often meet their ends by digging through mountains of waste in the landfills. They know plastic is valuable. Plastic for them is a source of income, of survival. What most do not give a second thought to while disposing plastic, they scrummage in the most unhygienic conditions to find it.

Fires frequently break out in the Ghazipur landfill site, reportedly due to the huge amounts of plastic that sits as legacy waste, and produces methane that causes large fires.

1500 ragpickers with 350 rupees a day for a family of 6 to survive on.

A compositional study of the collected plastic shows that PET bottles are the most collected commodity. The belief was that MLPs are recycled the least, however, gutka packets were bundled up and are being reportedly sold for Rs. 20/kg. EPR obligations are being met, especially for hard-to-recycle multilayered plastics.

Figure 10 Chintan Report (2018)

The informal waste chain detaches the ones who undertake painstaking efforts of collecting and segregating different types of plastic from the recyclers who recycle the plastics in one quick motion. A resident of Ghazipur even mentions that she has never seen a recycled product. The time and effort is not matched by the wages and lifestyle that accompanies the occupation.

The Ghazipur WtE plant at one point in 2019 provided a source of income to a few residents, including women. All prepped with protective equipment, the power plant engaged these informal workers by giving them salaried jobs. However, within a few months, the women were laid off and their jobs outsourced to others more skilled, outside of Ghazipur colony. Capacity-building and upskilling ragpickers into an Integrated Solid Waste Management (ISWM) system for the city can provide a source of livelihood for the unemployed women workers living in Ghazipur. Digital enhancement measures for plastic waste management must enhance, capacitate, and include the informal sector to truly bring about a transformative change in the city.

IMPLICATION 3 Integrate the informal sector into the plastic recycling framework of Delhi

A major fraction of plastic waste is being recycled by informally by wastepickers. When asked why a similar model of organising wastepickers in Pune (SwaCh) and Bangalore (Hasiru Dala) was not possible in Delhi, many suggested that Delhi is a city of migrants. Without a personal sense of responsibility to keep their city clean, such an organised cooperative would not be possible. Also, legal documentation would not be available with many of the informal sector wastepickers.

Wastepickers collect the plastic for a way lesser amount than what they sell it to small aggregators for. Poor living conditions and occupational health hazards leave this section worse-off, despite their role in contributing towards environmental sustainability. Recycling by the informal sector also helps save energy as making products from recycled materials requires less energy than sourcing and processing virgin raw materials (Centre for Science and Environment, 2021).

In a report that was prepared after the "Round-Table Discussion on Inclusion of Waste-pickers in Solid Waste Management in Delhi", two suggestions were brought up on how wastepickers could be inculcated into the formal waste management system: -

1. Wastepickers should have the rights to buy and sell waste in the Material Recovery Facilities
2. They should have the right to access dry, clean and segregated waste. In fact, in many localities in Delhi, the wastepickers arrive earlier than the municipal tipping trucks and collect valuable plastic. This prevents it from landing up in the landfills.

Transforming EPR into an efficient and inclusive recycling structure will lie with the municipal authorities. To fulfil their obligations, PIBOs will soon be tasked with setting up infrastructure facilities like Hi-Tech Recycling Depots, or hiring recycling agencies. Making use of the local knowledge that lies with traditional wastepickers by hiring them in these facilities can enhance the plastic waste management process for more than one party. 50 workers are needed to operate 10 TPD recycling plant (Chawla, 2023). 150 wasteworkers are needed for collection of waste of an area the size of Najafgarh region in Delhi. 200 workers may be employed in such an occupation.

Replicating such a structure near Ghazipur in East Delhi can save 300 MT of plastic waste from landing up in the landfill site.

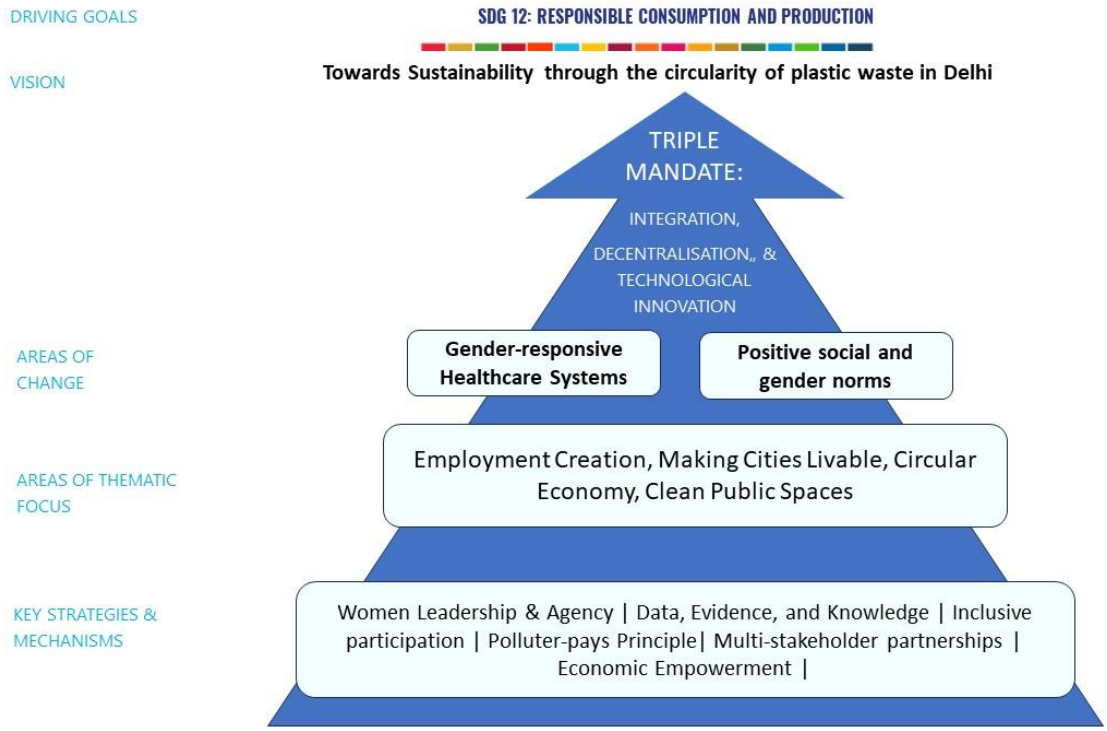


Figure 11 Gender Empowerment in IRS & Plastic Circularity in Delhi

Observation shows that women wastepickers are primarily engaged in sorting, more than collection and actual recycling of materials. Women make 33% lesser wages from wastepicking, even though 49% of wastepickers are women. In one of Chintan's MRFs, a woman leads the MRFs operations. Capacity building and enabling training of women in plastic waste management apart from just sorting materials becomes necessary in order to enhance their agency. When women fall sick, they do not get access to healthcare services, hoping that they can save the money for when their son or husband gets sick. Wastepicking contains severe health hazards. They were forced to migrate from towns of Bihar and UP to Delhi by their husbands, who lured them with hopes of finding better economic opportunities in metropolitan cities. By making them leaders and increasing their awareness of their capabilities, they will be more upfront in asking and thereby receiving healthcare services, which they will be able to pay out of their own earned income.

MRFs are located at a distance from these women, which restricts their ability to move up the recycling chain from waste picker to small aggregator. Mobility, safety, accessibility, and purchasing power are all reasons why a decentralised system for plastic waste management with a special focus on inclusion and capacity-building of women workers should be facilitated by public and private contractors responsible for the O&M of the MRFs

A Way Forward For Good Governance In Plastic Waste Management

Delhi Development Authority has started to fulfil its compensatory afforestation obligations in neighbouring states, owing to land constraints. Delhi has set a target of June 2024 to increase its waste recycling and managing capacity so that it can recycle all the plastic waste it generates per day. Increasing the capacity of the Waste to Energy plants is one step, but what needs to accompany this to promote circularity is a focus on promoting recycling.

The way forward includes -

- Communicate the chosen purpose – using technology to digitally track the plastic consumption, generation, and recycling, and communicating the same to all stakeholders can imbibe a sense of responsiveness to plastic recycling for a green and clean city.

- Under EPR initiatives, brand owners or producers might provide financial help to construct the infrastructure and machinery needed for Material Recovery Facilities.
- Creating a market for recycled products.
- All plastic packaging made to be 100% reusable, recyclable or compostable
- More effort must be placed into integrating the unorganised sector of waste pickers in plastic recycling.
- Incorporate sustainable innovation in the plastic packaging of products.
- Mainstream recycling in Delhi's socio-cultural environment through public awareness and behavioural change initiatives.

Around 150 acres are being occupied by Delhi's mountainous waste sites. MRFs usually take up less than 1 acre of land. These will be functional throughout the year, unlike WtE plants. A recycling waste value chain has to be inculcated into the SWM chain, for promoting India's economic growth and sustainable development. Delhi needs a robust policy for phasing out single-use plastics, as it is difficulty to monitor its production. Brand owners and producers have to invest in sustainable packaging that will be affordable for Delhi's lower and middle-income population, a section that makes up nearly 95% of Delhi's population. It is a governance challenge, and with EPR, even if the onus shifts to the producers, it needs monitoring and evaluation. The MCD must weigh in on these aspects and institute a policy for monitoring plastic generation and recycling.

Thus, plastic waste management in Delhi must be countered quickly, before its citizens chokes under its mountains of waste.

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[i] Swachh Survekshan, conducted by MoHUA since 2016, is the world's largest urban sanitation and cleanliness survey. It has been instrumental in fostering a spirit of healthy competition among towns and cities to improve their service delivery to citizens and towards creating cleaner cities

[ii] Sansaadhan is a digital monitoring platform that enables national, state, and city level agencies to regularly monitor the progress of material recovery facilities (MRFs) under their jurisdiction. The newly-launched platform also establishes information exchange mechanism between MRFs and companies engaged in recycling activities and energy recovery- facilitating movement of materials back to circular economy loop.