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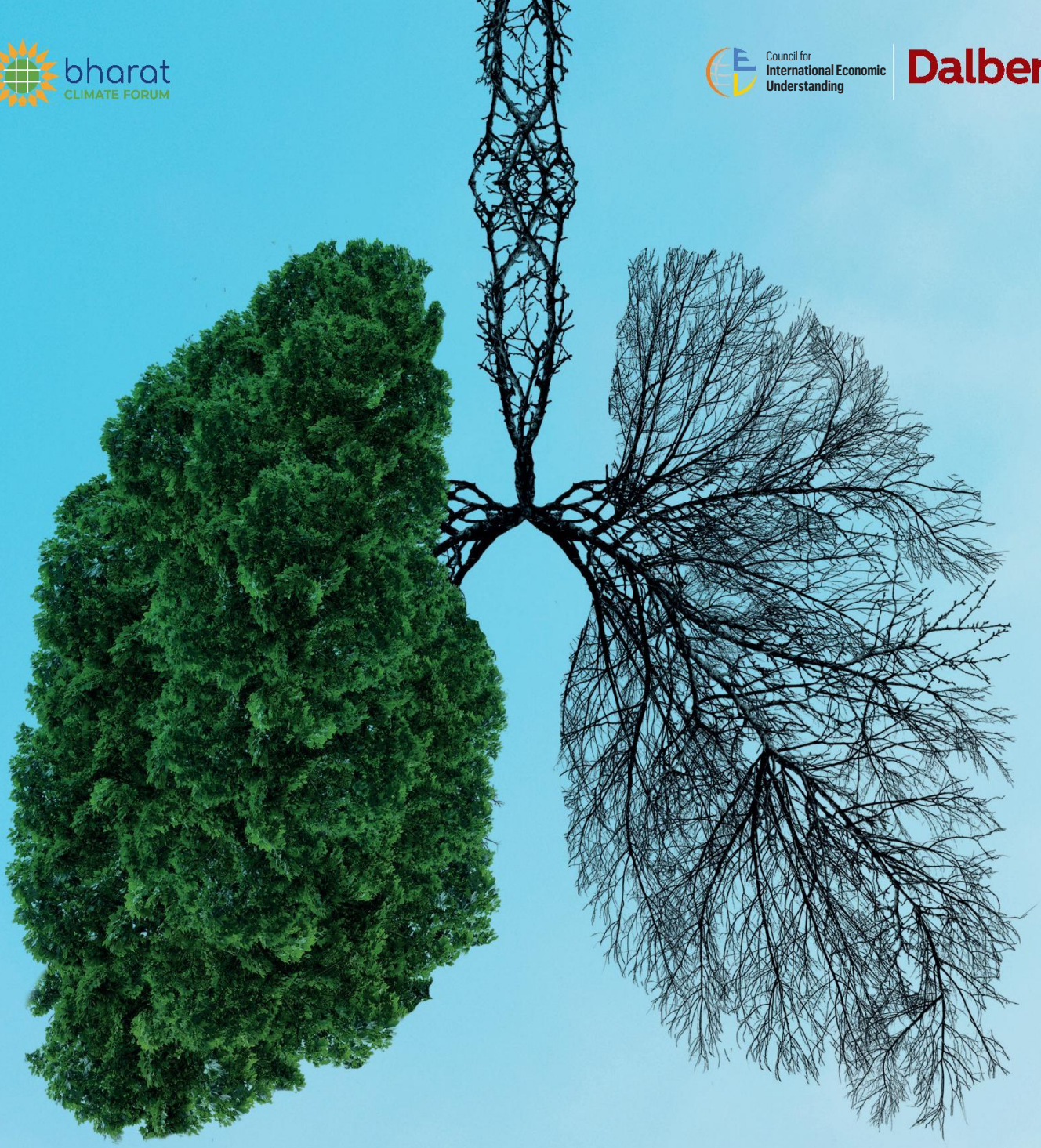


# Aironomics 2025

## Unlocking India's Blue Skies Economy

**Date:** May 31, 2025 | **Location:** ITC Maurya, New Delhi

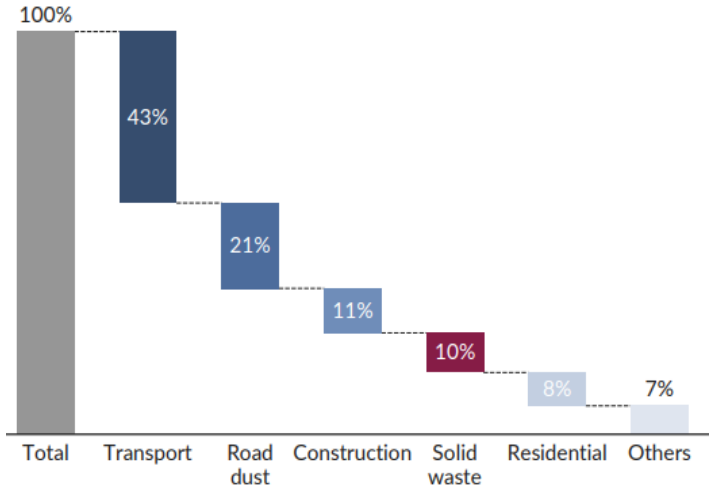
# Rags to Riches

## Turning Trash into Clean Air Opportunity

## Context and rationale

**Solid waste burning is a major contributors to air pollution in India.** India generates over 1,70,000 tonnes of municipal solid waste daily,[1] with up to 24% of it burnt across cities.[2] In cities like Delhi, solid waste burning contributes to 10% of total air pollution originating in the city.[3]

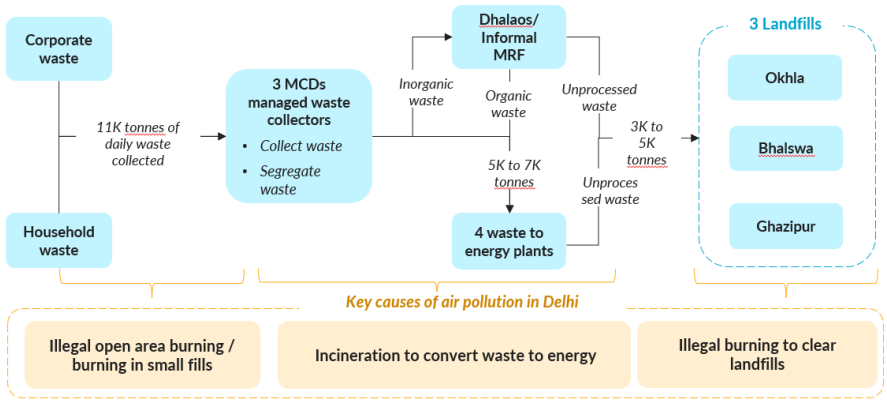
*Figure 1: Contribution of solid waste burning to air pollution originating in Delhi*




**This burning occurs at three points along the waste management value chain.** Burning of solid waste occurs during illegal open area burning in small fills, incineration at waste-to-energy (WTE) plants, and illegal burning to clear landfills, with each releasing harmful pollutants into the air. Inadequate waste collection in informal settlements leads to illegal dumping and a rise in garbage burning, with Delhi recording ~5,000 incidents of open garbage burning in 2024 alone.[4] These practices emit black carbon, a potent climate pollutant, and also contribute to the release of airborne microplastics through the weathering and burning of plastic waste. WTE plants tend to exceed permissible pollution norms due to weak regulatory enforcement and methane-induced fires at landfills, exacerbated by dumping of fresh waste, continue to worsen air quality.

[1] MoEFCC, Electricity from Garbage
[2] WRI, Combating Open Waste Burning to Reduce Air Pollution
[3] TERI, Cost effectiveness of interventions for control of air pollution in Delhi
[4] ThePrint, Illegal garbage burning adds to Delhi's air pollution woes. 2024 saw most instances since 2020

*Figure 2: Air pollution from the burning of solid waste in Delhi occurs at three points along the waste value chain*



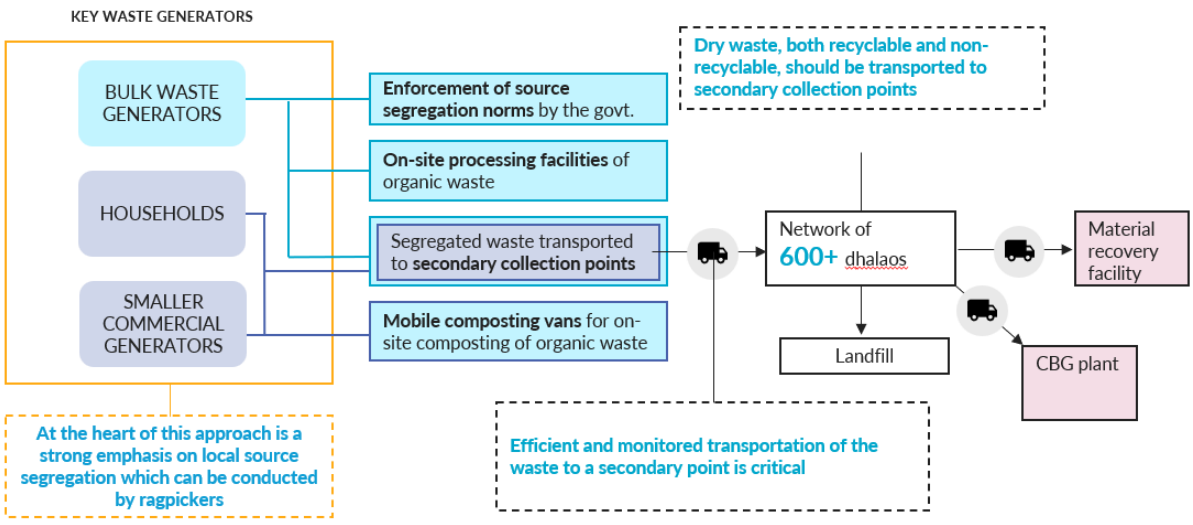

**India has a robust policy framework for solid waste management, which focuses on local accountability, scientific methods, and private sector involvement.** The 2016 Solid Waste Management Guidelines aim to improve waste management by mandating source segregation, extending local authorities' responsibilities, and promoting waste-to-energy plants. The 2021 Swachh Bharat Mission (Urban) 2.0 allocated ₹39,000 crore to enhance urban waste management, with a focus on developing MRFs, door-to-door waste collection, and remediating dumpsites. Additionally, the 2022 Extended Producer Responsibility (EPR) guidelines strengthened producer accountability, introduced recycling targets, and streamlined processes through an online portal, while encouraging reduced use of virgin plastics.

**The national framework has led to on-ground action, largely driven by decentralized efforts by municipal bodies and private sector players.** At the local level, the Municipal Corporation of Delhi has committed to enhancing waste processing by adding 3,000 tonnes per day (TPD) in capacity by 2026, replacing outdated dhalaos with modern MRFs, and clearing legacy landfills such as Bhalswa.[5] Similarly, the Brihanmumbai Municipal Corporation has set targets to process 15,000 tonnes of waste daily (vs ~8,000 currently) and close the Mulund dumping ground by June 2025.[6] Large corporate players such as Hindustan Unilever and Tata Consumer Products are fully compliant with EPR rules and regulations, with EPR credit purchase plans in place and plastic footprints timely submitted.[7] In parallel, organizations like Chintan and Sahaas Zero Waste play an active role by running decentralized waste management programs and working with wastepicker enterprises or community-level collectors to manage primary segregation and collection. In Delhi, for example, Chintan has been organizing zero waste colonies and campuses, including enabling IIT Delhi to go shift to a circular, zero waste model and dump less than 19% of its waste in landfills. It also operates 10 micro-MRFs and a larger MRF.

[5] Business Standard, Will process 3k tonne more solid waste per day in Delhi by 2026: MCD in SC
[6] Free Press Journal, Mumbai: Mulund Dumping Ground Closure Faces Delay; BMC Sets Target To Process 15,000 Tonnes Of Waste Daily By June 2025
[7] Hindustan Unilever, Business Responsibility and Sustainability Report

**Centralized Material Recovery Facilities (MRF) and Compressed Biogas Plants (CBG) further drive efficient waste management.** After decentralized waste collection and segregation, dry waste, both recyclable and non-recyclable, can then be transported to secondary collection points (e.g., dhalaos in Delhi). From there, inorganic waste is directed to centralized MRFs, where it is sorted and baled, with recyclables sold to end-buyers. Organic waste is treated through a mix of technologies such as composting, which requires strong linkages to ensure access to market, and routing to CBG plants where it is converted to biogas that can be used for transportation or pipeline networks. Only inert or contaminated waste that cannot be recovered is ultimately sent to landfills.

*Figure 3: Centralized and decentralized solid waste management*



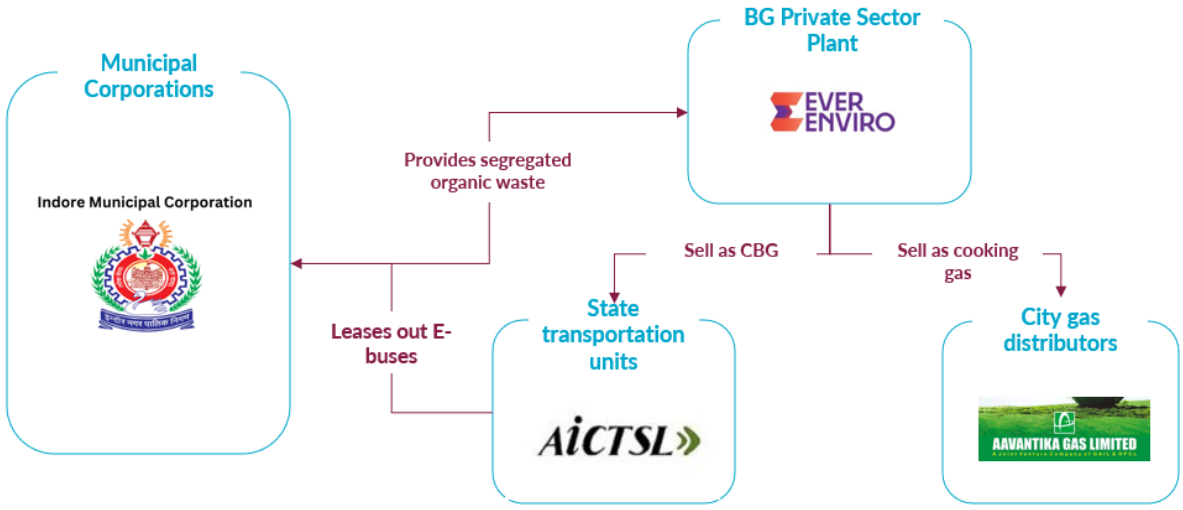

**However, inefficient source segregation, challenges in access to finance, and weak coordination with local bodies, along with a lack of integration with formal sector, hinder the scalability of MRFs and CBG plants.** Source segregation of waste remains low, even in metropolitan cities like Delhi where only 55% is segregated at source,[8] with the low-quality input driving reduced operational efficiency of MRF and CBG plants. Both require high upfront capital—Rs 25–35 crore for a 100 TPD CBG plant and Rs 80 crore for an MRF—and face challenges in securing funding due to long payback periods driven by time taken to establish operations and steady revenue stream, perceived sectoral risk driven by the lack of proven operational track records among many private players. Weak coordination with urban local bodies for land access and permissions and consistent supply of waste further constrain scalability. At the same time, inclusion and formalization of informal sector actor, enabling them access to run MRFs, and thereby ensuring safer working conditions and improved waste management, is critical for sustainable operations.

**Successful solutions are emerging through government partnerships, blended finance, and monetization of plastic and carbon credits.** MRF player NEPRA's public private partnership with the Ahmedabad Municipal Corporation combines subsidized public land

[8]Hindustan Times, 55% of waste segregated at source, MCD tells SC

support with private sector execution. Indore has successfully piloted a model where the Indore Municipal Corporation provides solid waste to EverEnviro's CBG plant that in turn sells biogas for transportation and LPG. Blended finance can ease lending terms, like DFC's $15 million concessional funding to Eco Spindles and Coca-Cola's MRF facility in Sri Lanka. Additional revenue streams can also be tapped through carbon and plastic credit monetization, as done in World Bank's Plastic Waste Reduction-Linked Bond to enhance the financial viability of recycling projects in Ghana and Indonesia.

*Figure 4: Case Study: Indore's successful pilot for CBG operations*




**Scaling these solutions can unlock a multi-billion dollar economic opportunity for India.** Nationwide targets to set up 5,000 CBG plants could generate investments of over $20 billion, creating over 4 lakh jobs.[9] There is an additional opportunity to unlock ~$3 million capital by diverting ~50,000 tonnes of waste per day to 300+ material recovery facilities, creating ~15,000 jobs.[10] Chintan, for example, has created and enhanced livelihoods for over 5000 wastepickers via decentralized solid waste and waste management.

This roundtable, "***Rags to Riches: Turning Trash into a Clean Air Opportunity",*** will bring together public and private sector leaders to identify scalable models, unlock inclusive and financing pathways, and chart a roadmap for transforming waste into a driver of cleaner air and economic value.

## Potential Opportunities and Challenges

The potential to scale solid waste management in India, especially through MRFs and CBG plants, is underscored by multiple emerging opportunities, driven by a large domestic market, supportive policies, and advancing technologies.

[9] Indian Biogas Association, Rural employment generation through biogas production in villages of India
[10] Dalberg analysis

- **Reducing PM 2.5 and GHG emissions through the diversion of solid waste from burning:** Redirecting solid waste burned to MRF and CBG plants can significantly curb PM 2.5, by upto 10% in cities like Delhi.[11] Each MRF, recycling 150 TPD, can abate ~3,700 tonnes of $CO_2$ annually by avoiding waste burning while a CBG plant handling 500 TPD can abate ~35,000 tonnes of $CO_2$[12] by avoiding waste burning and displacing the combustion of CNG. Additionally, redirecting the waste reduces the overall volume of waste sent to landfills, which further reduces emissions by reducing the risk of methane-induced landfill fires.
- **Creating large-scale employment across the waste value chain:** Nationwide deployment of 5,000 CBG plants and 300+ MRFs could create over 4 lakh jobs across the value chain, including skilled engineers, semi-skilled construction workers, and unskilled workers for daily operations.
- **Unlocking a multi-billion dollar circular economy opportunity:** India's targets to establish 5,000 CBG plants could generate $20 billion (~Rs 1.7 lakh crore) in investments, with corporates like Reliance setting up 100+ CBG plants across the country by investing $600 million - $1.2 billion (~Rs 5,000 – 10,000 crore).[13] Additionally, diverting 50,000 TPD of waste to MRFs represents a $3 million capital opportunity, with companies like NEPRA which operate waste management solutions like MRF raising $18 million (~Rs 150 crore) from investors.[14]
- **Monetizing carbon and plastic credits to enhance financial viability:** MRFs and CBG plants have the potential to generate tradable plastic (for MRF) and carbon credits (for MRF and CBG) by recovering plastic waste and reducing emissions from waste burning. Instruments like the World Bank's $100 million Plastic Waste Reduction-Linked Bond for plastic recycling projects in Ghana and Indonesia tied investor returns to Plastic Credits and Verified Carbon Units. With India's Carbon Credit Trading Scheme in place and its first carbon market set to launch by mid-2026, these credits could offer critical supplementary revenue. There is further potential to integrate carbon and plastic credit benefits across the value chain, including waste workers.
- **Leveraging progressive policy momentum to accelerate adoption:** Policies like Solid Waste Management Rules (2016), Swachh Bharat Mission 2.0, and SATAT scheme provide a robust policy base for scale. These can be further strengthened through national-level incentives like viability gap funding, standardized PPP frameworks with municipal corporations, stronger enforcement norms for source segregation, and recognition of carbon and plastic benefits in financing schemes.

At the same time, several financial and operational challenges limit the scalability of MRF and CBG solutions:

[11] TERI, Cost effectiveness of interventions for control of air pollution in Delhi
[12] Dalberg analysis
[13] iamrenew, Reliance to spend Rs 5,000 Cr on 50 CBG plants in 2 years
[14] Economic Times, Aavishkaar, Circulate invest $18 million in NEPRA Resource Management

- **Large upfront capital investments**: MRFs and CBG plants require substantial upfront capital, ~Rs 80 cr for an MRF and Rs 25–35 crore for a 100 TPD CBG plant.
- **High perceived risk due to uncertain MRF revenue streams and low CBG capacity utilization**: MRFs take time to establish operations, secure contracts for recyclable material collection, and build a steady stream of revenue, with most having an unproven operational track record. Additionally, most CBG plants operate well below capacity due to poor waste segregation. This deters commercial lenders, who offer high interest rates, low LTV ratios, and short tenures, further raising the cost of capital.
- **Fragmented coordination with urban local bodies**: MRF and CBG projects often face delays in securing land leases, licenses, and consistent waste supply from urban local bodies, along with the expectation of royalties despite narrow margins, if not negligible.
- **Nascent plastic and carbon credit markets**: Although plastic and carbon credit monetization could offer supplementary revenue streams, India's plastic and carbon credit market remains nascent. There is some momentum towards India's carbon market with the launch of the Carbon Credit Trading Scheme, however, the plastic credit market is at a much earlier stage, lacking clear frameworks for certification, trading, or integration with EPR mandates.

## Key Focus for Discussion

With the aim of unlocking clean air benefits by scaling MRF and CBG solutions for solid waste management, this session will explore:

- ***Standardizing and scaling public-private partnerships***
  - How can public-private partnerships be standardized to mitigate hurdles in securing land permissions and supply of waste?
  - What models (e.g., Indore Municipal Corporation) have worked across Indian cities to enable effective collaboration between municipalities and private waste processors, and how can these be replicated?
- ***Strengthening collection and segregation systems***
  - How can decentralized waste collection, such as through wastepicker entrepreneurship, be strengthened and formalized to improve segregation, secure livelihoods, and integrate with centralized MRF and CBG systems?
  - What role can behavior change campaigns play in improving participation in waste segregation at the source?
  - What technologies, such as AI-based sorting and real-time monitoring, can governments adopt to improve secondary segregation and enable better tracking of waste flows, littering, and leakages, while also ensuring preservation of livelihoods, particularly for poor and women waste workers?
- ***Financing and scaling MRF and CBG solutions***
  - What financing structures, such as blended finance, credit guarantees, or outcome bonds, can help de-risk upfront investments and attract private capital into MRF and CBG plants?

- How can policies such as the Carbon Credit Trading Scheme best support and encourage carbon credit monetization from MRF and CBG plants and enable funder discovery?
- What regulatory steps are needed to develop a robust plastic credit market in India, and how can it be aligned with EPR mandates to drive investment into MRF?
- How can co-benefits such as livelihood creation and health benefits be leveraged to enhance innovative financing solutions and what role can philanthropy play in doing so?

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