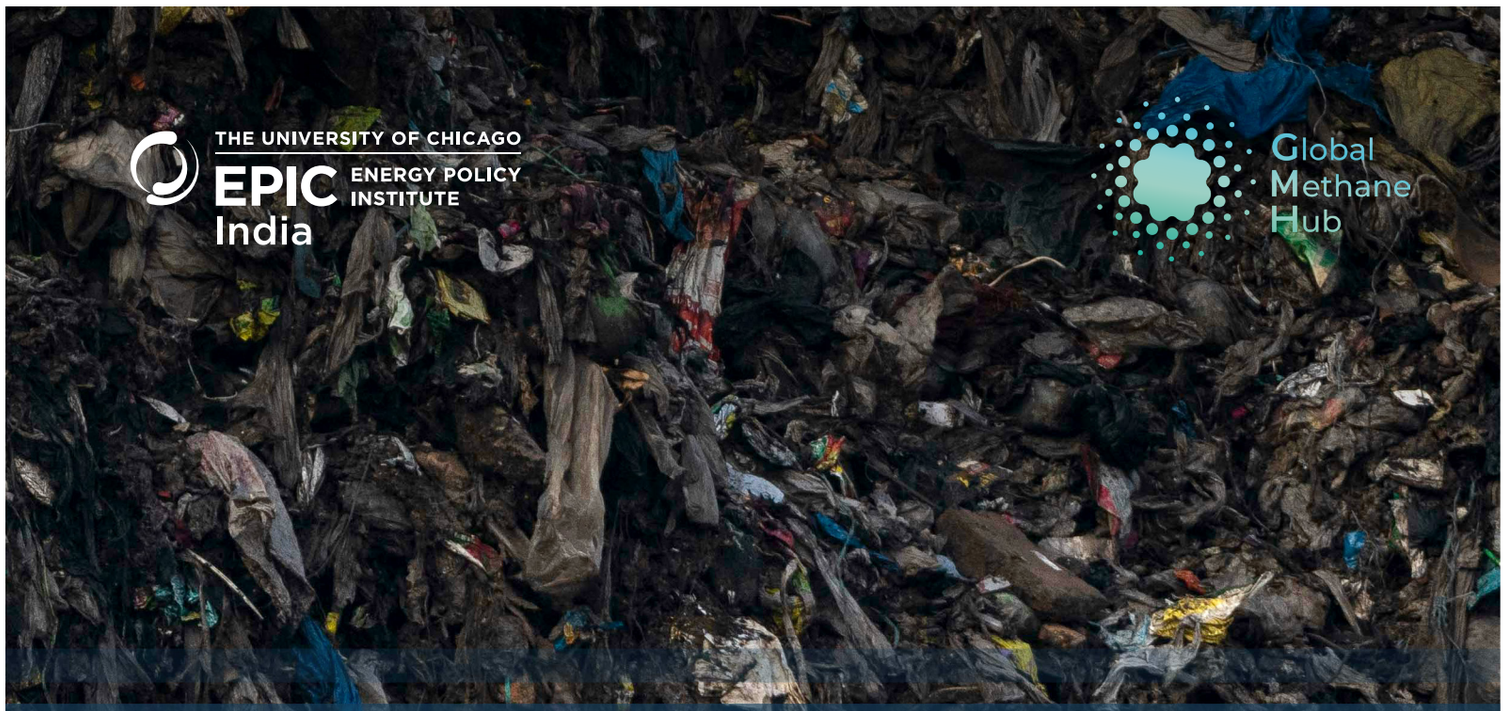
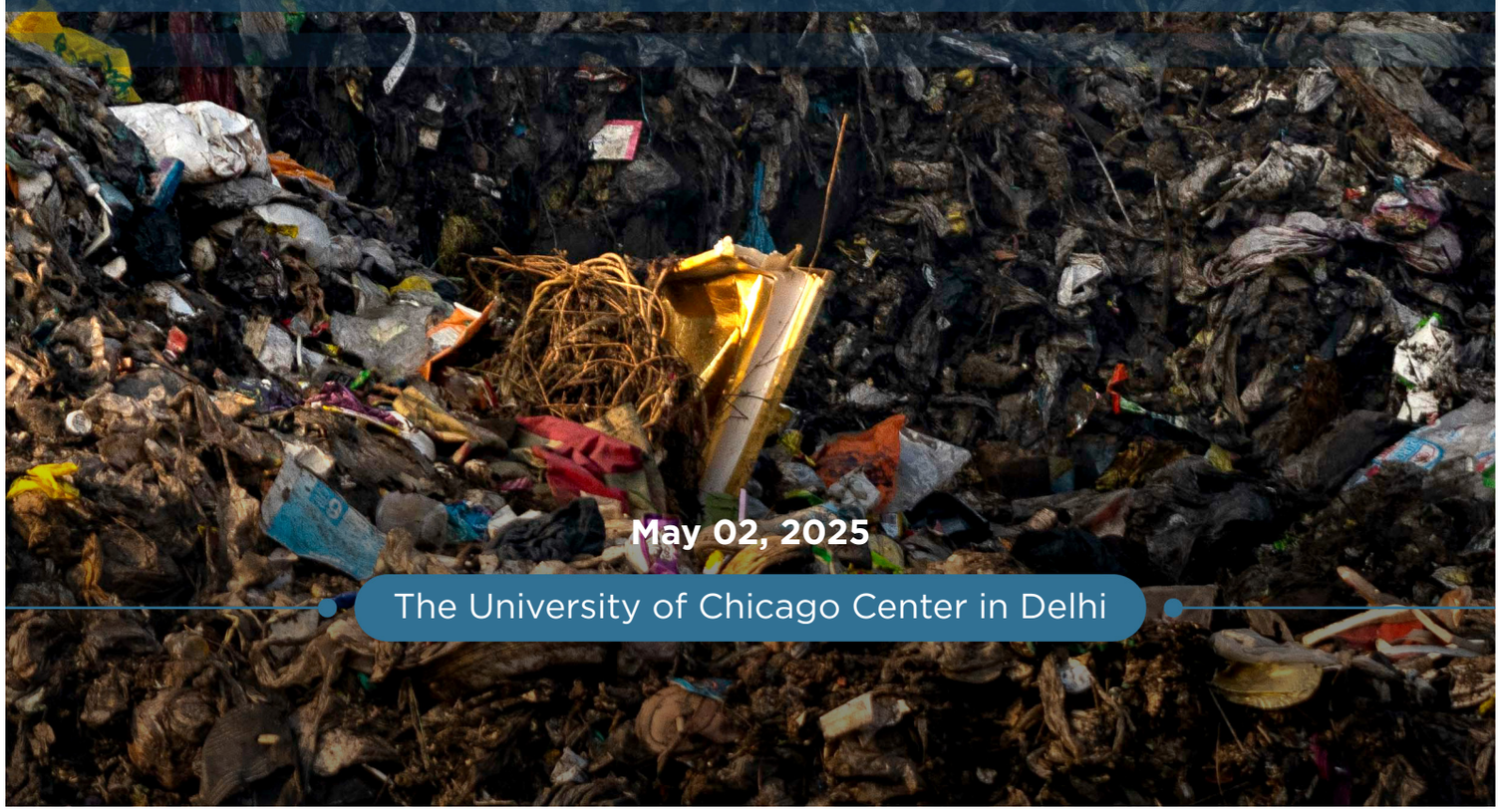


THE UNIVERSITY OF CHICAGO
EPIC ENERGY POLICY INSTITUTE
India

Global Methane Hub

REIMAGINING URBAN WASTE

TOWARDS A LOW-EMISSION FUTURE



May 02, 2025

The University of Chicago Center in Delhi

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INTRODUCTION

India's waste management sector sits at the intersection of its most urgent urban challenges—public health, governance, climate change, and economic opportunity. The stakes are high as India's urban population approaches 500 million and municipal waste generation is projected to jump from 55 to 436 million tonnes annually by 2050, according to the Ministry of Housing and Urban Affairs, Government of India. Cities across the country are grappling with overburdened landfills, rising emissions, particularly methane and the invisible role of informal workers in the waste economy.

On May 2, 2025, the Energy Policy Institute at the University of Chicago (EPIC-India) brought together more than 60 policymakers, researchers, industry leaders, practitioners, and financial institutions at the University of Chicago Centre in Delhi for the conference *Reimagining Urban Waste: Towards a Low-Emission Future*. The objective, identified by EPIC-India and its partner, Global Methane Hub, was to reframe waste not merely as a sanitation issue but as a critical entry point for climate mitigation, methane reduction, data-driven governance, and inclusive growth.

INAUGURAL REFLECTIONS

The day began with a compelling inaugural address by **Dr. Leni Chaudhuri**. Drawing on her extensive background in cross-sectoral research and program implementation, she called for rethinking traditional boundaries between academia, government, and society. "We often speak about the research-to-policy pipeline. But in the waste space, we need to push that pipeline harder, toward underserved regions, informal economies, and overlooked emissions." She urged institutions to focus not only on producing knowledge but also on designing real-world solutions for areas where government and private sector interventions are lacking. Tools like satellite monitoring and open-access data platforms, she argued, must be deployed alongside inclusive research frameworks to bridge critical service gaps.

Dr. Leni Chaudhuri,
Executive Director, University of Chicago Centre in Delhi


RESERVED

KEYNOTE ADDRESSES

National and Global Priorities

Dr. Debolina Kundu,
Director, National Institute of Urban Affairs (NIUA)

> *"Waste is not just an environmental issue, but also a governance and public health issue, along with an economic opportunity."*
>
> ***- Dr. Kundu***

Dr. Debolina Kundu called for a systemic recalibration of how India approaches solid waste management. Her remarks highlighted challenges such as fragmented jurisdiction between urban and peri-urban areas, insufficient traceability of waste streams, slow adoption of Extended Producer Responsibility (EPR), and ineffective financing mechanisms. She cited the success of decentralised, context-specific models like Indore's public-private partnership based waste management and Ambikapur's community-led, zero-landfill approach. Key enablers included fiscal support under the 15th Finance Commission, evolving regulatory frameworks like the Solid Waste Management Rules 2024, and NIUA's ongoing work through the Climate Smart Cities Alliance and Cities 2.0 initiatives.

Dr. Manjyot Ahluwalia, brought the global urgency to the forefront. She urged India to grow and shift its climate finance architecture to explicitly target methane from waste. Highlighting coordination under initiatives like the Climate and Clean Air Coalition and Methane Action Coalition, she noted early signs of progress, including policy pilots in Maharashtra and Madhya Pradesh that integrate food waste management into subnational climate plans. She called for the use of remote sensing and performance-linked financing to move from aspiration to action.

> *"Methane is over 84 times more potent than carbon dioxide over a 20-year horizon. And yet, only 2% of global climate finance is directed toward tackling it."*
>
> ***- Dr. Ahluwalia***

Dr. Manjyot Ahluwalia,
Regional Lead (Asia), Global Methane Hub

INDIA'S WASTE CRISIS AND EMISSIONS IMPACT

A System Under Strain

India's waste sector remains a largely unregulated and fragmented system. While centralised waste collection may cover the bulk of urban populations on paper, practices such as open dumping, burning, and inefficient segregation continue to dominate on the ground.

Dr. K.S. Jayachandran outlined Delhi's efforts to improve its solid waste infrastructure. While the New Delhi Municipal Corporation (NDMC) and the Delhi Cantonment Board (DCB) have achieved segregation rates over 90%, the MCD lags at 58% due to chronic underfunding and administrative inertia, and decision-making constraints like the two-year gap in its standing committee. He underscored the potential of digital platforms to register over 4,000 bulk generators, thereby reducing load on centralised facilities by up to 3,000 tonnes per day. However, he cautioned that decentralised waste-to-energy solutions, if unregulated, can become emission hotspots themselves.

Dr. K.S. Jayachandran,
Special Secretary at the Government of the National Capital Territory of Delhi (GNCTD)

Dr. Shyamala Mani,
Senior Advisor, WASH and Waste Management at Centre for Chronic Diseases Control

Dr. Shyamala Mani reminded the audience that unmanaged landfills are chemically reactive ecosystems. Groundwater around Okhla landfill, she noted, showed the presence of heavy metals like cadmium and chromium up to 5 km away. More alarmingly, informal waste workers, including children, continue to work in unsafe, unregulated environments with no protective equipment or access to health services.

Ms. Paramita Datta Dey pointed to the glaring data deficits. “We project waste quantities nationally but lack micro-level insights into variations across land use zones or household types.” She called for routine waste characterisation studies and a revamp of urban waste data systems such as the Swachhata Portal to include spatial mapping, segregation metrics, and third-party audits.

Ms. Paramita Datta Dey
Head - Waste and Resources at the National Institute of Urban Affairs

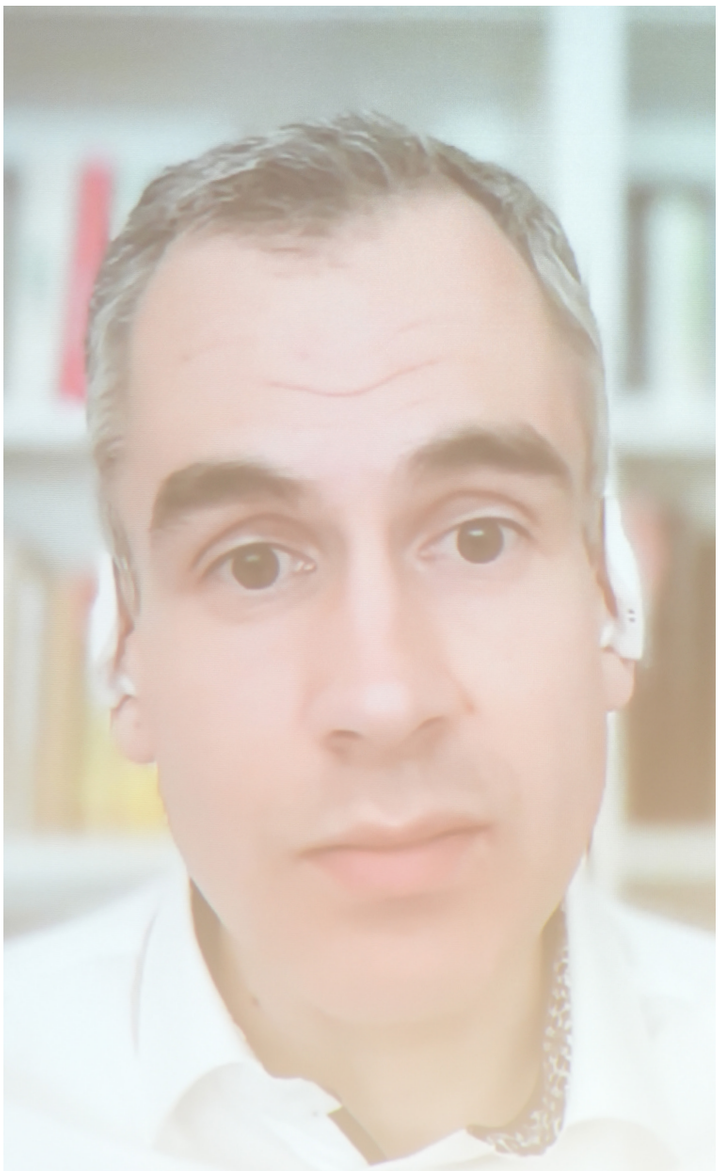
Dr. Suneel Pandey reflected on legacy waste remediation, especially around the Ghazipur landfill in Delhi. He discussed missed opportunities in early efforts, with a lack of clear methodologies leading to delays. Delhi's unique case, being landlocked without clear end-uses for reclaimed waste material, makes this process even more difficult due to jurisdictional and environmental constraints. To complement and clarify the methods of dumping and reclaiming, better data collection over landfills, integrating satellite and ground-level data, will be necessary.

Dr. Suneel Pandey,
Director of Waste Management and Circular Economy at TERI

DATA AND DECISION-MAKING: FROM SATELLITE TO STREET

Closing the Intelligence Gap

In the fight against methane emissions from municipal solid waste, one of the most powerful yet underutilised tools is data, especially when it comes to understanding the emissions profile of rapidly growing urban areas. The session on data and decision-making brought to the forefront the urgent need to move beyond anecdotal evidence and scattered reporting, toward an integrated, transparent, and actionable intelligence infrastructure for India's waste sector. High-resolution satellite imagery, machine learning, and emissions modelling have opened unprecedented opportunities to track methane plumes in near real time. However, converting these insights into operational or regulatory decisions requires bridging what participants repeatedly called the "space-to-ground divide".



Dr. Bram Maasakkers,
Lead scientist at SRON, Netherlands Institute for Space Research,

Dr. Bram Maasakkers presented findings from the TWOS (Targeting Waste Emissions Observed from Space) project, which currently tracks methane emissions at 10+ high-priority global landfill sites, including Ghazipur in Delhi. By using satellites like TROPOMI (with global daily coverage) and GHGSat (with 20–30 m resolution), the project was able to identify not just that landfills are major methane sources, but which specific zones within landfills are hotspots at different times.

> *"Satellites can tell us where emissions are happening, but not necessarily why. That's where local data and contextual understanding come in."*
>
> ***- Dr. Maasakkers***

Dr. Tebogo Maleka,
Programme Manager for WasteMap representing the Global Methane Hub

The discussion moved toward tools that aim to close these blind spot. **Dr. Tebogo Maleka,** showcased WasteMAP, an open-access, decision-support platform built in partnership with Rocky Mountain Institute and the Clean Air Task Force. WasteMAP aggregates satellite and modelled emissions data, simulates policy scenarios, and overlays them with waste infrastructure information. Cities can use the platform to identify methane hotspots, model future emission trajectories, and test the impact of interventions like composting, waste-to-energy, or bio-covers. “Our goal is to make waste and methane visible, manageable, and measurable,” said Ms. Maleka, stressing that WasteMAP is also aligned with the Global Methane Pledge, which aims for a 30% reduction in global methane emissions by 2030.

Mr. Dinesh Yadav,
Former Chief Engineer at the Municipal Corporation of Delhi (MCD)

Mr. Dinesh Yadav, provided an insider’s view of the limitations of city-level data systems. While municipalities like Delhi collect data on waste collection volumes, truck movements, and landfill weight records, there is no systematic capture of emissions from fresh waste, which tends to be the most volatile and methane-generating.

> *“We know where the trucks are going, but we don’t know what emissions they’re leaving behind. That’s a serious blind spot,”*
>
> ***- Mr. Yadav***

Ms. Datta Dey added a critical local governance perspective. She highlighted the data gaps between waste generation and collection. She underscored the need to know how much food waste is going into landfills, what waste streams dominate in commercial zones, and where segregation is most broken, and for periodic waste characterisation studies. These characterisations, along with better geospatial mapping of waste routes, and third-party audits of the Swachh Bharat Mission data are necessary validate claims made by cities.

Another key recommendation was the integration of methane metrics into existing urban planning and climate frameworks. This could include embedding methane tracking into Smart Cities dashboards, State Action Plans for Climate Change (SAPCCs), and the Swachh Bharat Mission's progress indicators. Participants also called for capacity-building initiatives to train municipal engineers and data officers to interpret and act on satellite-generated data. There's no point in having world-class data if nobody at the city level knows how to use it was the consensus. The panel on data, moderated by **Mr. Suyash Nandgaonkar**, converged on a shared understanding: that data must not only be collected, but co-owned and co-interpreted by all actors, scientists, municipal engineers, informal worker unions, and finance departments. True transformation would require breaking down data silos and creating interoperable systems that connect emissions monitoring with financial flows, planning approvals, and citizen engagement.

> *"What gets measured, gets managed."*
>
> ***- Ms. Datta Dey***

GOVERNANCE AND FINANCE: REBUILDING THE RULES OF THE GAME

Fragmented Intent, Fragile Execution

India's urban waste governance framework is ambitious on paper, yet fragile in practice. National missions like the Swachh Bharat Mission - Urban 2.0 (SBM-U 2.0) and regulatory frameworks such as the Solid Waste Management Rules, 2016 (revised in 2024), outline a progressive vision for decentralised processing, circularity, and the inclusion of informal workers. However, translating these aspirations into functional systems has proven difficult due to persistent structural and operational weaknesses across state and local institutions.

This disconnect between policy intent and ground-level reality was sharply articulated by **Ms. Mou Sengupta.** She highlighted how municipal bylaws across most Indian cities remain aspirational and lack enforceability. While segregation at source is frequently mentioned, it is rarely mandated with legal force. Even where rules exist, the absence of monitoring and enforcement renders them ineffective.

She stressed the importance of making segregation provisions binding, enhancing oversight of bulk waste generators like hotels, schools, and institutions, and building strong peer learning networks among urban local bodies (ULBs) to foster implementation consistency and policy adaptation. She pointed to examples such as Gurugram's Management Information System, which actively monitors waste collection and segregation, as models that other municipalities could adapt to close the gap between design and delivery.

Ms. Mou Sengupta,
Program Manager for Solid Waste Management and Circular Economy from the Centre for Science and Environment (CSE).

Mr. Kiran Avadhanula, focused on the financing and institutional bottlenecks that prevent the scaling of successful waste solutions. He noted that the procurement systems followed by most ULBs are rigid and outdated, relying heavily on L1 (lowest bid) models that prioritise cost over quality or innovation. As a result, high-impact technologies or performance-linked waste services often fail to scale beyond pilot phases. Furthermore, most ULBs lack dedicated innovation or planning units capable of evaluating such technologies, vetting business models, or tracking long-term performance metrics.

Mr. Avadhanula proposed that India urgently needs a national knowledge and innovation clearinghouse, hosted by entities like Ministry of Housing and Urban Affairs or NITI Aayog, that could offer technical handholding to smaller cities, document adaptable models, and provide flexible procurement toolkits suited to local contexts.

The conversation also turned to a critical but often overlooked component of India's waste system: the informal workforce. Despite handling more than half of the recyclables in urban areas, informal waste workers continue to remain outside the purview of most policy or financial frameworks.

Their contributions are not reflected in budgeting processes, emission estimates, or urban planning tools. **Ms. Sengupta** argued that any attempt to formalise the waste ecosystem must begin with dignity and protection for the informal workforce. This includes recognising them legally, issuing identity cards or cooperative memberships, and integrating them into city-level contracts and user fee collection systems. She called for the development of Livelihood Action Plans (LAPs) that go beyond token inclusion and offer real pathways to health insurance, protective gear, skill-building, and financial stability.

Mr. Kiran Avadhanula,
Senior Sector Specialist, Sustainable Urban Sector of KfW Development Bank

Financing models, too, need to evolve. The experts advocated for a shift away from capital-heavy, infrastructure-driven funding toward more performance-oriented mechanisms. Metrics such as the reduction in methane emissions, lower incidence of landfill fires, and improved circularity in waste processing could serve as anchors for results-based financing or blended climate finance models. These, in turn, could attract support from global climate funds, development banks, and philanthropic capital. What emerged clearly from the discussion, moderated by **Ms. Swarna Dutt,** was that India's waste governance crisis is not rooted in a lack of ideas or policies. Rather, it is a problem of institutional design, fragmented accountability, and underdeveloped capacity. Unless cities are empowered with greater financial and operational flexibility and supported with tools to innovate, learn, and adapt, the most well-meaning reforms will remain stuck in procedural bottlenecks.

> *"The first step now should be to look at the scale of the problem and ask if the incentive structure is appropriate for consumers, workers, shareholders, and governance stakeholders"*
>
> ***- Dr. Deb***

INCENTIVES AND BEHAVIOUR: CHANGING SYSTEMS BY CHANGING MINDS

The Human Factor

Dr. Shyamala Mani,
Senior Advisor, WASH and Waste Management at Centre for Chronic Diseases Control

If waste is a systems problem, then behaviour challenges are its human face. And changing behaviour, particularly at the household level, remains one of the most persistent challenges in urban waste management. Despite decades of awareness campaigns and multiple waves of city-led clean-up drives, actual segregation practices on the ground remain patchy and inconsistent.

Dr. Mani took Chittaranjan Park in Delhi, for example, a relatively affluent neighbourhood with high literacy, strong civic engagement, and access to waste collection infrastructure. Yet even here, residents often mix wet and dry waste, undermining the effectiveness of downstream recycling or composting systems. This is not just a failure of awareness; it's a failure of system design. People may know what the right thing is, but still find it easier, more convenient, or more habitual to do the wrong thing.

Dr. Kaushik Deb,
Executive Director at EPIC India

Dr. Deb emphasised that the solution to this challenge doesn't lie in more posters or punitive penalties, but in smarter systems that align with human psychology. Systemic solutions would be the right incentive - nudges and mechanisms that make sustainable behaviour the default option, rather than the exceptional one. These are interventions that respect individual autonomy but subtly shift choices toward the desired outcome. He also highlighted the importance of Randomised Controlled Trials (RCTs) in designing and testing these interventions. "We need to move away from intuition-based programs toward evidence-based ones," he said.

What works in one city or neighbourhood might completely fail in another due to differences in social norms, infrastructure, or enforcement culture. RCTs allow policymakers to identify what works, for whom, and under what conditions, before scaling up at the city level.

However, as **Ms. Datta Dey** cautioned, these pilots, while promising, often remain isolated experiments in the absence of systemic integration. "We build capacity, we test innovations, but we don't build accountability. Without institutional structures to reinforce these behavioural nudges, they remain short-lived," she said. It's not enough to hand out smart bins; cities must also ensure that collection systems, data platforms, and citizen engagement programs are working in sync to sustain these changes over time.

The conversation underscored a broader truth: behaviour is shaped by systems. If households are expected to segregate, the system must make it easier to do so and must reward that behaviour visibly and consistently. If waste collectors mix segregated waste after collection, household motivation collapses. If bylaws require segregation but no fines or follow-ups are enforced, norms won't change. It's a loop, and it needs reinforcement from every side.

The experts agreed that lasting behavioural change will require a mix of well-calibrated incentives, inclusive system design, and visible feedback loops. Awareness is important, but awareness without alignment leads to fatigue. Real progress will come when the right thing to do is also the easiest.

Dr. Pandey emphasised the need for policy coherence, urging authorities to align waste collection contracts with citizen efforts to segregate at source. "If citizens are to put in the effort to compost and reduce emissions," he said, "it's only fair that collection systems support, not undermine, that effort..."

CONCLUSION: TOWARDS ACTIONABLE TRANSITIONS

As the convening drew to a close, one message resonated across all sessions: India's waste challenge is not just a sanitation issue; it is a systems issue. And systems can be redesigned.

Mr. Ashirbad Raha, delivering the closing remarks, emphasised that poor waste management is a silent but significant driver of climate change, yet, if addressed effectively, it can become a cornerstone of global climate action. "Not managing our waste efficiently is a wasted opportunity," he remarked.

He highlighted several key takeaways from the discussions: the importance of adopting a regional approach, recognising how small actions can create large-scale impacts, and prioritising robust monitoring systems. He also underscored the strong link between waste management and public health, pointed to policy gaps and the need for scalable solutions. Mr. Raha called for translating practical ideas into real-world action, harnessing the power of data and technology, and aligning our collective energies towards reimagining waste not as a burden, but as a lost resource that can be transformed into worth.

Mr. Ashirbad Raha,
Regional Director - Communications at EPIC India

"This is not just a technical problem. It is **deeply political**, **deeply economic**, and **deeply human**."

SPEAKER BIOS

Dr. Debolina Kundu

Dr. Debolina Kundu is the Director of the National Institute of Urban Affairs (NIUA), the leading public institution in urban policy and research in India. She is recognized for her expertise in urban governance, development studies, and policy innovation for inclusive and sustainable cities. Dr. Kundu brings deep knowledge of India's urban waste policy landscape and practical insights from NIUA's and Ministry of Housing and Urban Affairs' ongoing initiatives in waste system transitions

Dr. Manjyot Kaur Ahluwalia

Dr. Manjyot Ahluwalia is the Regional Lead for Asia at the Global Methane Hub. Her background spans international climate policy, coalition building, and technical expertise and financing for methane mitigation. She contributes a global perspective on financing, partnerships, and measurement frameworks for methane reduction in urban waste systems.

Ms. Paramita Datta Dey

Ms. Paramita Datta Dey is the head for Waste and Resources at the National Institute of Urban Affairs. She is a urban policy and data governance specialist, focusing on structural improvements in waste management. Her expertise includes building capacity at the urban local body level and leveraging data-driven governance for effective waste systems. She brings a nuanced understanding of policy gaps, data utilization, and integrating climate goals into national urban missions.

Dr. K.S Jayachandran

Dr. K.S. Jayachandran is the Special Secretary at the Department of Environment and Forest in Government of National Capital Territory of Delhi, directly responsible for improving and maintaining the overall environmental health of Delhi. He brings critical insights into regulatory and legislative practices, innovating and operationalising policies on reducing Delhi's emissions and improving environmental quality of life.

Dr. Suneel Pandey

Dr. Suneel Pandey is the Director of Waste Management and Circular Economy at TERI. He is an environmental scientist specializing in waste management, emissions data, and circular economy. He is known for bridging the science-policy gap, identifying methane hotspots, and evaluating emerging technologies for legacy waste remediation. Dr. Pandey brings research-driven recommendations for national waste-emissions roadmaps and improved planning decisions.

Dr. Shyamala Mani

Dr. Shyamala Krishna Mani is the Senior Advisor, WASH and Waste Management, Centre for Chronic Diseases and Control. She brings expertise on integrating environmental vulnerabilities and health risks. She provides a unique perspective on waste management with insights into risk communication, health equity, and policy integration for waste-affected populations.

Dr. Kaushik Deb

Dr. Kaushik Deb leads the Energy Policy Institute at the University of Chicago's India team (EPIC India) as the Executive Director. As an applied economist with over 25 years of experience, he has a distinguished career as a strategic advisor to governments and corporates on policy, markets, equity, access, and technology developments. He is a recognized thought leader in energy policy, market transitions, and climate solutions in developing countries.

Mr. Kiran Avadhanula

Mr. Kiran Avadhanula is an a Senior Sector Specialist in the sustainable urban sector at KfW Development Bank, focusing on financing innovation and structuring public-private partnerships in the waste sector. He has expertise in leveraging development finance, and supporting urban local bodies for sustainable investment. Mr. Avadhanula brings practical experience in addressing capacity gaps and enabling long-term policy commitment for waste management projects.

Ms. Mou Sengupta

Ms. Mou Sengupta is the Program Manager for Solid Waste Management and Circular Economy at the Centre for Science and Environment (CSE), with a just transition towards sustainable waste management in the global south. Her expertise includes technical evaluation of waste-related regulations and frameworks, and contributing to holistic sustainable waste systems. She brings ground-level insights from CSE's work in both metropolitan and smaller cities across India.

Dr. Bram Maasakkers

Dr. Bram Maasakkers is a Senior Scientist at SRON Netherlands Institute for Space Research, developing advanced methods for landfill emissions estimation. His expertise lies in integrating satellite and on-ground data for urban methane tracking and applying these technologies in diverse city contexts. Dr. Maasakkers brings technical knowledge on satellitebased emissions monitoring and its application for landfill management.

Dr. Tebogo Maleka

Dr. Tebogo Maleka is the Program Manager for WasteMAP Initiative at GMH, which combines satellite data and scenario modeling for urban waste management planning. Her background includes global project management and leveraging data tools for cities and their waste disposal systems. Dr. Maleka globally connects technology-driven solutions for infrastructure planning and emissions reduction in urban waste systems.

Mr. Dinesh Yadav

Mr. Dinesh Yadav has recently retired as the Chief Engineer in the Department of Environment Management at the Municipal Corporation of Delhi. He has hands-on experience in managing operational practices and tackling environmental challenges throughout Delhi. Mr. Yadav brings a practical perspective on improving landfill operations and future planning based on Delhi's experience.

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