



# Circular Approach for Cities: Transforming solid waste into resources

## Expert group meeting

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Center for Water and Sanitation (CWAS)-CRDF-CEPT University in Collaboration with Faculty of Planning, CEPT University

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**CWAS** CENTER  
FOR WATER  
AND SANITATION

**CRDF** CEPT RESEARCH  
AND DEVELOPMENT  
FOUNDATION

**CEPT**  
UNIVERSITY  
FACULTY  
OF PLANNING

# 1 Background and context setting

Urban India generates approximately 1,61,157 MT/day of solid waste (PIB, 2025), and this volume continues to rise due to population growth and shifting consumption patterns. While solid waste collection coverage has improved across many cities, with processing facilities now equipped to handle nearly 80% of the waste generated (PIB, 2025)—significant challenges still persist. A circular economy approach has become central to the Swachh Bharat Mission (SBM), as cities are increasingly moving away from traditional waste disposal practices and moving towards resource-centric solid waste management. By recognising waste as a valuable input, cities can significantly reduce dependence on open dumping/landfills, strengthen value chains for recyclables and organic waste, and curb greenhouse gas emissions. The SBM vision of Garbage Free Cities, along with India's Solid Waste Management (SWM) Rules (2016), reinforces this transition by emphasising resource recovery, sustainable materials management, and systemic circularity across the waste management ecosystem.

Given the evolving national focus, an Expert Group Meeting was organised by Center for Water and Sanitation (CWAS), CRDF in collaboration with Faculty of Planning, CEPT University to deliberate on strategies, innovations, institutional arrangements, and financing mechanisms to accelerate the transition towards circular waste management systems in Indian cities. The meeting was a platform to deliberate on enabling a circular economy approach for solid waste management (SWM) services in urban areas, with a specific focus on translating policies into actionable, measurable outcomes in context of small and medium towns. The discussion involved representation from sector partners, academia, government, municipal bodies, civil society organisations, private sector, and independent consultants.

## Context Setting

A presentation was delivered by CWAS team which outlined key national-level policy landmarks and initiatives of the Government of India to promote solid waste management, along with the increasing focus on circular economy in SWM. It traced the evolution of Swachh Bharat Mission's approach from the traditional 3R framework (Reduce, Reuse, Recycle) towards a broader 5R perspective, while highlighting that the central challenge in enabling a circular economy lies not in the absence of policies but in gaps in execution and misaligned incentives. The presentation also drew attention to the distinct operational and financial constraints faced by small and medium towns in comparison to larger municipal corporations and underscored the occupational health and safety risks encountered by workers in the waste sector. The session concluded by posing a guiding question for discussion on why, despite the presence of national and state-level rules and guidelines, on-ground implementation

of solid waste management continues to remain a significant challenge for small and medium towns in India.



With the end of presentation, CWAS team encouraged the experts to use the platform to jointly identify practical, scalable, and context-appropriate solutions to support a shift from linear waste disposal practices to a circular approach that treats waste as a valuable resource and strengthens sustainable and efficient SWM services. It was also discussed how this overall discussion will be translated to bidding urban professional through the academic linkages with the Faculty of Planning, CEPT University. It was noted that the insights from the roundtable would serve as an important resource for strengthening the academic curriculum and planning studios, enabling students to develop critical thinking, gain a deeper understanding of current and emerging challenges in the urban sector, and engage with real-world issues.



## 2 Opening remarks

The opening remarks were delivered by Mr. M. Thennarasan, Principal Secretary, Urban Development & Urban Housing Department, Government of Gujarat, who set the context by emphasizing the need to view solid waste not merely as a disposal challenge but as a valuable resource. He highlighted how countries worldwide are adopting varying levels of circularity, from the basic 3Rs to more comprehensive 12R approaches. He highlighted the scale of pollution caused by unmanaged waste, citing large legacy dumpsites such as Pirana in Ahmedabad as visible examples of the consequences of inadequate waste management. He emphasized that the circular economy offers three major benefits: reduction of pollution, conservation of resources through reuse and recycling, and regeneration of natural systems, particularly in the case of biodegradable waste.



He further underlined that circular economy principles are closely aligned with the Sustainable Development Goals as well as the Hon'ble Prime Minister's Mission LiFE (Lifestyle for Environment) goals. Drawing from Gujarat's experience, he shared several examples, including bio-mining of legacy waste at Pirana, where inert material has been reused in the

Dholera Highway project, and the use of reclaimed waste materials in riverfront development and Gandhi Ashram land development. He also referred to the state's waste-to-energy policy supported by Viability Gap Funding and risk-sharing models, including a 14 MW waste-to-energy plant in Ahmedabad processing approximately 1000 metric tonnes of waste per day, along with initiatives such as RDF-based steam supply to industries, biocoal projects, composting, and decentralized biomethanation plants.

Mr. Thennarasan also informed experts about the ongoing development of the Gujarat Circular Economy Action Plan by the Gujarat Pollution Control Board. He highlighted progress in plastic waste management, e-waste regulations, and the implementation of Extended Producer Responsibility, with a target of achieving 80 percent compliance by 2027. In addition, he shared insights on liquid waste management, emphasizing the reuse potential of treated wastewater and the upcoming Treated Water Policy 2.0, aimed at increasing industrial uptake of recycled water and conserving freshwater resources. He concluded by reiterating the importance of circular economy models for sustainability and intergenerational equity, and expressed openness to feedback, innovative ideas, and policy inputs from the expert group meeting.

### 3 Key discussion on approaches to promote circular economy in SWM

Drawing on the opening remarks and context setting presentation, structured discussion sessions were moderated by CWAS team that focused on understanding implementation gaps across the solid waste management value chain which hinder the progress towards circular economy approach. Following key discussion points emerged during the discussion:



#### Waste Segregation a non-negotiation action to achieve circularity in waste management:

The discussion initiated around the source component of the SWM value chain focused on segregation versus mixed-waste treatment, considering necessity, feasibility, cost, and scalability. Experts highlighted mixed-waste processing technologies such as waste-to-energy and mechanical sorting which are proposed as alternatives. They currently face financial and environmental limitations that affect their suitability for managing fully mixed municipal waste at scale in the Indian context. Experiences from India as well as global cities showcase that segregation at source is essential for safe, efficient waste management and for enabling resource recovery within a circular economy framework. Experts emphasized that understanding the source, composition, patterns, and trends of waste generation is a critical prerequisite for designing effective segregation systems. Life-cycle assessments comparing segregation-led systems with centralized mixed-waste approaches highlighted that mixed waste treatment is a temporary operational alternative and not ideological decision, with segregation consistently offering better alignment with circular economy objectives, environmental outcomes, and long-term sustainability.

Experts further highlighted the need to scale segregation beyond motivated households, emphasizing that conventional incentives alone are insufficient, particularly in small and medium towns with limited administrative capacity. Segregation must be treated as a civic responsibility, supported by reliable collection, transparent processing, accountability, and visible enforcement. Key actions for cities include mapping and analysing waste generation patterns, implementing simple system-

integrated incentives, penalties (discomfort more impactful than monetary penalties), strengthening monitoring and reporting, and ensuring segregated waste is handled separately throughout the value chain. Regular and consistent monitoring was identified as critical to enforcing waste segregation, as residents' compliance tends to decline once monitoring is withdrawn. In places where monitoring and feedback systems are in place, compliance has improved over time, showing that supervision does matter.

At the policy level, discussions emphasized the need to strengthen contract frameworks by adopting integrated contracts that link waste collection and processing with a clear focus on resource recovery. Integrated contracts were identified as a preferred approach for ensuring the collection of segregated waste, as they align the operator's responsibility across the entire service chain. By making the performance of processing facilities dependent on the quality of collected waste, such contracts create incentives for private operators to ensure effective segregation at source. In contrast, fragmented contracts limited to door-to-door collection tend to encourage cost-minimization approaches, often at the expense of collecting and maintaining segregated waste streams. In this context, the experts emphasized the need for locally rooted enterprises, social enterprises, cooperatives, and regionally experienced operators may be more suitable than large national players, as they are better positioned to adapt to local conditions and engage over the long term.

### Context specific approaches for strengthening door to door collection services:

Door to door (D2D) waste collection acts as one of the critical components of SWM value chain. Reliable D2D ensure minimisation of the waste littering and reduction in development of Garbage Vulnerable Points (GVP). The discussions emphasized that collection timings must be regular, predictable, and strictly enforced, based on consultations with key stakeholders such as residents, commercial establishments, and institutions. Similar to scheduled water supply services, consistent waste collection timings help build trust among stakeholders and encourage sustained participation in the system.

The discussion was also framed around practical challenges faced by ULBs with limited vehicles, human resources, and financial capacity. While daily collection of wet waste was broadly acknowledged as critical for maintaining sanitation, the discussion emphasized that dry waste collection does not always require a daily schedule. Alternate-day or staggered collection models were seen as viable options, provided they are well planned, clearly communicated to households, and consistently enforced. Experts stressed that collection frequency should be guided by local context and operational capacity rather than uniform mandates. Furthermore, experts highlighted the softer aspect such as IEC campaigns, local volunteers, capacity building of youth and engaging them as citizen

level monitoring components and ensuring the sanitation worker occupational safety are required for the ensuring proper functioning of D2D waste collection service.



### Cluster based and other approaches for processing waste of small and medium towns:

The participants discussed the feasibility of processing solutions for small and medium towns that generate relatively low quantities of waste than large municipal corporations. These small volumes pose limitations for setting up standalone processing facilities and require alternative planning approaches. Cluster-based models were discussed where multiple towns share centralized processing infrastructure operated by a lead city. Earlier experiences in Gujarat with clustered landfill and processing facilities were discussed, offering important insights into operational and governance factors that need to be strengthened for sustained performance. While clustering may offer economies of scale, its success depends heavily on governance arrangements, clear ownership, operational responsibility, and assured financing. Without an anchor institution and defined accountability, clustered infrastructure risks remaining underutilized or non-functional.

Experts also raised scientific concerns about decentralised plastic processing. Different plastics melt at different temperatures and mixing them without proper sorting can result in burning rather than controlled processing. This can create environmental risks, especially in small-scale pyrolysis units. While regulators have historically been cautious about pyrolysis due to past misuse, limited pilot approvals have been granted with emissions testing undertaken by accredited agencies. Views differed on whether plastic processing should be centralized or decentralized, with some warning that smaller towns may struggle to manage the risks associated with decentralized systems. At the same time, villages and towns with low volumes of plastic waste face high transportation costs if they send plastics to centralized facilities which would work for the best. Some groups therefore experimented with decentralized catalytic pyrolysis models using mobile equipment that can serve multiple villages and towns. These models can be explored considering various aspects such as distance between various towns, capacity of vehicle, plastic waste generation and more. Material Recovery Facilities (MRFs) were described as industrial operations that require proper weighing, recording, and tracking systems. It was noted that municipalities often resist new equipment until they can observe the

benefits firsthand, making demonstration sites important for building trust. Several emerging products from mixed plastic boards to activated carbon from coconut waste were shared as examples of circular solutions, though many still face challenges related to commercialization and market demand.

Organic waste processing was also discussed in terms of efficiency. Pure municipal waste without agricultural residues can reduce biogas performance, while composting often faces complaints related to smell and flies. Biogas systems, although promising, require trained operators and a sense of ownership to prevent breakdowns. The discussion closed with a reminder that technology alone cannot achieve circularity. If procurement, finance, and contracting departments are not aligned, monitoring dashboards and grievance systems may exist only on paper, without influencing real operations.

### Monitoring and accountability- a mandate to sustain the services:

Monitoring and accountability emerged as key focus areas for ensuring the sustainability of services. Experts noted that many towns already have basic monitoring tools such as GPS tracking, route plans, and attendance systems but these are often underutilised due to weak follow-up, limited accountability, and the absence of data-driven decision-making rather than technological gaps. Alert-based monitoring systems were recommended to optimise monitoring mechanisms and support decision-makers in improving service delivery. Regular updates and systematic review of application-generated reports on private operators were emphasised as essential for strengthening oversight and enhancing the accountability of service providers.

Digital complaint platforms were also discussed. While these allow citizens to register complaints with photographs, the data does not always reflect ground realities. Because some performance indicators are linked to rankings, complaints are sometimes repeated or manipulated to show better performance on paper. To support more real-time spatial monitoring, some large cities have begun experimenting with drones to track dumping, encroachments, and other urban activities, though adoption is still limited. Attempts to track segregation at the household level using scanners or Near-field communication (NFC) tags were found to be impractical because they slowed down waste collection and required constant maintenance. Practitioners suggested that random checks combined with proper house numbering may be a more realistic method, especially for rural areas or small towns. In many towns, daily monitoring continues through simple tools such as WhatsApp groups, where workers report weights, attendance, and machine-related issues.



### Plastic waste management and formalising the informal sector:

The discussion on plastic waste brought attention to the role of the informal sector, particularly in small and medium towns where a substantial network of informal workers already operate outside formal municipal systems. There is a large disconnect between this informal plastic recovery ecosystem and municipal solid waste management systems. While informal workers efficiently collect, sort, and channel plastic waste into recycling markets, their operations typically function without formal agreements, data reporting, or coordination with ULBs. This gap was seen as a missed opportunity. The discussion therefore explored how such informal systems could be constructively linked to municipal frameworks without disrupting existing livelihoods.



Approaches such as formal recognition through MoUs can align informal recovery efforts without disrupting livelihoods. On financial linkages, structured payment mechanisms or revenue-sharing arrangements could be routed through local governments which were seen to stabilize incomes, improve traceability of plastic flows, and align informal recovery efforts with broader city-level plastic waste management goals. Experts also added word of caution against excessive formalization which could weaken the flexibility of these systems. Conditions of wastepickers can also be improved through the formation of Self-Help Groups (SHGs), capacity building, and integration into the solid waste management value chain. Initiative by the Government of Karnataka, under development policy with aim of eliminating unsafe ragpicking and enabling dignified livelihoods, was cited as promising step. Overall, the discussion reinforced that building institutional bridges with the informal sector is essential to advancing a circular economy and achieving sustainable plastic waste management.

## Need to bridge policies and create demand in the market for promoting circularity:

Reuse and circularity were discussed in relation to existing Solid Waste Management Rules, which already encourage the utilization of processed waste within a defined geographical radius. These provisions could be strengthened through a more explicit reuse-oriented policy framework for solid waste, similar in intent to wastewater reuse policies. Such a framework could help standardize approaches for reuse of compost, recyclables, refuse-derived fuel, and other processed fractions. Attention was also directed to the market dimension of the waste value chain, particularly the need for stable demand for compost, recyclables and other recovered materials. Some cities have demonstrated how organic waste can be converted into gas for commercial use, with the by-product used as fertilizer. In one of the case examples shared in Karnataka, these systems took years to become financially viable due to low conversion efficiencies, but recent developments such as pipeline integration by gas utilities and government purchase at 1.5 Rs per kg for farmer as manure indicate growing market support. It was considered that to cultivate such markets responsibilities must be distributed between local governments, private sector and state-level procurement systems.



When discussing plastics and circular models, experts emphasized that processing needs to be scientifically sound and matched to the type of plastic. Successful circular systems are more likely to scale when they are integrated into government systems rather than run as standalone pilots. The conversation also highlighted financing challenges. While CSR, ESG, funds can support pilots, government buy-in is required for scale. Many operators struggle to access EPR funding in practice, and carbon credit processes remain expensive relative to project revenues. As a result, market-based circular models often face financial barriers even when they are technically viable. To effectively promote recycling and enhance its economic viability, targeted government interventions are required, particularly given the significantly lower cost of virgin plastics compared to recycled materials. Supportive policies and fiscal incentives, including subsidies, could encourage both local governments and private operators to invest in and scale recycling operations, thereby strengthening circular economy outcomes.

The session ended with a reminder that embedding accountability and behaviour change at scale is difficult, but necessary. Good practices should not remain isolated success stories; they need to become part of standard operating procedure so that they no longer require special recognition. Popular media such as films and television were also mentioned as potential tools for shaping public understanding of waste and sanitation.

The organisers concluded by thanking experts and also noted that insights from the roundtable would inform ongoing work across multiple cities and states.



Table 1 .List of Experts

Sr. No.	Name	Organisation
1	Alap Mankodi	Trashcon
2	Anil Roy	CEPT University
3	Darshan Parikh	CRDF, CEPT University
4	Devanshu Pandit	CEPT University
5	Deepika Patel	District Office, Mehsana (SBM)
6	Dhaarna	CEPT University
7	Dileep Mavalankar	Indian Institute of Public Health, Gandhinagar
8	Divya Tiwari	Saahas
9	Hetal Jalad	Saahas
10	Himanshu Bhai	District Office, Mehsana (SBM)
11	M. Thennarasan	Urban Development & Urban Housing Department, Government of Gujarat
12	Manas Rath	Leap Cities
13	Maitri Patel	Independent Consultant
14	Meghna Malhotra	UMC
15	Mona Iyer	CEPT University
16	Nalini Shekar	Hasiru Dala
17	Prabhjot Sodhi	CEE, Delhi
18	Prachi Mende	AIILSG–RCUES
19	Rajesh Shah	VIKAS Centre for Development
20	Sangeetha Raghuram	ERM
21	Sandeep Choudhary	JTC
22	Siddh Doshi	CEPT University
23	Dinesh Mehta	CWAS, CRDF, CEPT University
24	Meera Mehta	CWAS, CRDF, CEPT University

Sr. No.	Name	Organisation
25	Dhruv Bhavsar	CWAS, CRDF, CEPT University
26	Aasim Mansuri	CWAS, CRDF, CEPT University
27	Upasana Yadav	CWAS, CRDF, CEPT University
28	Jigisha Jaiswal	CWAS, CRDF, CEPT University
29	Aditi Dwivedi	CWAS, CRDF, CEPT University
30	Jay Shah	CWAS, CRDF, CEPT University
31	Priyadarshini Choudhary	CWAS, CRDF, CEPT University
32	Dhwani Shah	CWAS, CRDF, CEPT University
33	Saubiya Sareshwala	CWAS, CRDF, CEPT University
34	Gaurav Kushwaha	CWAS, CRDF, CEPT University
35	Karan Patil	CWAS, CRDF, CEPT University
36	Viral Chauhan	CWAS, CRDF, CEPT University
37	Mayuri More	CWAS, CRDF, CEPT University
38	Sagar Gamit	CWAS, CRDF, CEPT University
39	Dhara Shah	CWAS, CRDF, CEPT University
40	Mansi Shinde	CWAS, CRDF, CEPT University
41	Devanshi Shah	CWAS, CRDF, CEPT University
42	Aishwarya Makwana	CWAS, CRDF, CEPT University



## CENTER FOR WATER AND SANITATION

The Center for Water and Sanitation (CWAS) is a part of CEPT Research and Development Foundation (CRDF) at the CEPT University in Ahmedabad, India. CWAS undertakes action-research, implementation support, capacity building and advocacy in the field of urban water and sanitation. Acting as a thought catalyst and facilitator, CWAS works closely with all levels of governments - national, state and local to support them for delivery of water and sanitation services in an efficient, effective and equitable manner.

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