



Waste to Worth Transformation



Confederation of Indian Industry

# TOP ISSUES IN INDIA RELATED TO **WASTE TO WORTH SECTOR**



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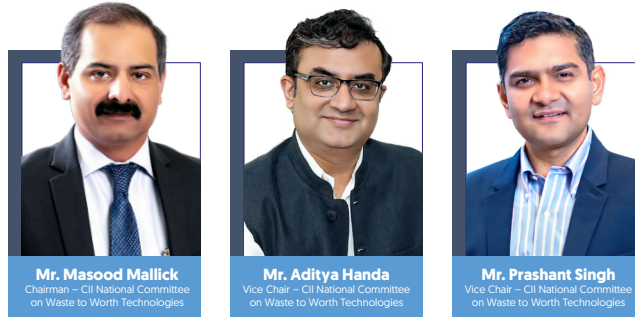
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# Foreword

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The Confederation of Indian Industry (CII) is pleased to present this white paper, which focuses on the waste-to-worth sector in India and its potential to address the dual challenges of waste management and resource recovery. CII has been actively engaged in promoting sustainable development practices across various industries, and recognizes the pivotal role of the waste-to-worth sector in achieving a circular economy. Through its various initiatives, CII has been working closely with the government, industry, and other stakeholders to advocate for policies and practices that support the growth and development of the waste-to-worth sector.

India's rapid urbanization, industrial development, and economic growth have led to a substantial increase in waste generation. The effective management of this waste is crucial for public health, environmental protection, and sustainable development. The waste-to-worth approach, which emphasizes transforming waste into valuable products and energy, offers a promising solution.

Despite generating an immense volume of municipal, industrial, construction, e-waste, and other forms of waste, India's potential to transform these materials into valuable resources remains largely underutilized. This white paper delves into the multifaceted challenges confronting the waste-to-worth sector in India, including policy gaps, regulatory hurdles, economic constraints, infrastructure limitations, and social barriers. It also provides a comprehensive set of recommendations to overcome these challenges and unlock the sector's true potential.

We believe that this white paper will serve as a valuable resource for policymakers, industry leaders, researchers, and other stakeholders committed to advancing sustainable waste management practices in India.

We would like to express my sincere appreciation to all the individuals and organizations that contributed to the development of this white paper. Their expertise, insights, and dedication have been instrumental in shaping its content and recommendations.

We are confident that this white paper will stimulate further dialogue and action toward creating a more sustainable and circular economy in India.

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## A. Background

The waste-to-worth sector in India presents a compelling opportunity to address the country's mounting waste management challenges while simultaneously contributing to resource recovery. This approach, which emphasizes transforming waste into valuable products and energy, aligns with the principles of a circular economy and holds significant potential for sustainable development. However, the sector faces various obstacles that hinder its widespread adoption and full potential.

While the nation generates an enormous volume of waste – encompassing municipal solid waste, industrial waste, construction waste, plastics and e-waste, end of life vehicles, and more – the potential to transform this waste into valuable resources remains largely untapped. This white paper delves into the most pressing issues hindering the growth of the waste-to-worth sector in India, examining the technological, economic, social, and regulatory barriers that must be overcome to unlock the sector's true potential and pave the way for a robust and thriving waste-to-worth industry in India.

Informed by insights from industry professionals, this white paper analyses key issues, categorized into:

- Policy gaps and regulatory challenges
- Economic and financial challenges
- Infrastructure and technology limitations
- Capacity building and skill development
- Public awareness and social barriers

Some issues are common across various sectors, while others are unique to specific sectors. For each identified issue, specific, actionable recommendations are proposed to guide policymakers and stakeholders towards more sustainable and circular waste management models.

## B. Identified Issues by Stakeholders and Suggested Recommendations

### 1. Policy Gaps and Regulatory Challenges

Key issues related to [a] the absence of policy, [b] the need for policy amendments, and [c] the insufficient enforcement of existing policies are outlined below, accompanied by recommendations for resolution.

#### 1.1. Lack of Standardized Infrastructure and Financial Models for Sustainable Waste Management

**Issue:** Despite advancements in waste management technology, many Urban Local Bodies (ULBs) in India, including major cities, continue to rely on open dumping of Municipal Solid Waste (MSW). This practice poses significant environmental and public health risks. The absence of standardized infrastructure and appropriate financial models hinders the development and implementation of sustainable waste management solutions across the country.

**Concerned Authorities:** Ministry of Environment, Forest and Climate Change, Bureau of Indian Standards, Department for Promotion of Industry and Internal Trade, Central Pollution Control Board, Ministry of Housing and Urban Affairs, and Urban Local Bodies.

## **Recommendations:**

### **A. Standardized Infrastructure:**

Incorporate Model Concession Terms into the Agreement outlining comprehensive infrastructure requirements for Integrated Waste Management Facilities. This should include:

- Material Recovery Facilities (MRFs).
- Facilities for energy recovery (e.g., biogas, waste-to-energy).
- Leachate treatment plants.
- Engineered landfills.

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### **B. Detailed Specifications:**

Define clear specifications and standards for all facilities and plants to ensure quality and efficiency.

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### **C. Transparent project allocation and processing fee model:**

Implement a “transparent project allocation and processing fee” based bidding model for waste management projects, where the bid variable is the processing fee per tonne of waste along with transparent project allocation of the successful bidder. This fee is mandatorily required to meet the expenses for processing and recovery of resources net the revenue accrued from resource recovery. This encourages competition and transparency in project allocation.

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### **D. Eco-City Recycling Parks:**

Promote the development of Eco-City Recycling Parks or Recycling Hubs with similar standardized infrastructure to facilitate resource recovery and circular economy initiatives. This is to be mandatorily provided in the industrial zone / estate in each city.

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### **E. Enforcement and Monitoring:**

Strengthen regulatory oversight and monitoring mechanisms to ensure compliance and prevent open dumping.

## **1.2. Inconsistent Enforcement and Unsustainable Practices in the Registered Vehicle Scrapping Facility (RVSF) Sector**

**Issue:** While the introduction of Registered Vehicle Scrapping Facilities (RVSFs) in India aims to formalize and improve the ELV recycling process, certain challenges persist. There is a wide disparity in operating standards and some RVSFs operate with inadequate equipment and technology, potentially compromising environmental standards and worker safety. This creates an uneven playing field for responsible players, given that RVSFs compete for procurement of ELVs.

**Concerned Authorities:** Ministry of Road Transport and Highways

## Recommendations:

Establish and enforce mandatory minimum standards/requirements for infrastructure and technology used in RVSFs. This includes specifying technical requirements for equipment, ensuring compliance with environmental regulations, and promoting worker safety.

### 1.3. Lack of Domestic Cell Manufacturing and Refining Capacity for Lithium-Ion Batteries

**Issue:** Lack of domestic cell manufacturing and the lack of domestic refining capacity for battery-grade materials from recycled lithium-ion batteries in India creates dependence on other countries. For manufacturing li-ion cells the output from recycled material has to be converted into battery grade before it can be used as cathode active material. At present the black mass from batteries is being exported to other countries. To secure resources for Li-ion battery ecosystem, we have to develop in-country refining capabilities and a thriving domestic cell manufacturing ecosystem.

**Concerned Authorities:** Ministry of New and Renewable Energy, Ministry of Finance, Ministry of Commerce and Industry

## Recommendations:

- A. The Indian government should establish a Joint Venture [JV] or Public-Private Partnership [PPP] model to incentivize foreign companies to establish cell manufacturing facilities in India. This initiative should prioritize:  
.....
- B. **Technology Transfer and Skill Development:** Focus on employing and training local workforce to operate and manage these facilities, ensuring long-term self-sufficiency.  
.....
- C. **Policy Support:** Implement measures similar to the US Inflation Reduction Act to stimulate the growth of the entire Li-ion battery ecosystem in India.  
.....
- D. **Focus on Circular Economy:** Encourage the processing of black mass within India, reducing reliance on exporting it for refining and ensuring a closed-loop supply chain for battery materials.

### 1.4. Lack of National Policy for Cluster-Based Waste Management for Smaller Urban Local Bodies (ULBs)

**Issue:** WTE plants are often not viable for smaller ULBs generating less than 150-200 TPD of waste due to economic and operational inefficiencies. Smaller ULBs may not generate sufficient waste to meet the operational needs of a WTE plant, leading to inefficiencies and higher costs. This makes it challenging to attract investment in WTE projects in such areas, limiting their potential for waste management and energy generation.

Swachh Bharat Urban 2.0 Operational Guidelines 2021<sup>1</sup> states that ULBs with population of 10 lakhs and above or projects with assured input of 150-200 TPD of non-recyclable, high-calorific value segregated dry waste shall be financially and operationally viable. Relevant clause has been provided below:

1. <https://sbmurban.org/storage/app/media/pdf/swachh-bharat-2.pdf>



6.6.5 “It is stressed that waste to electricity projects are financially and operationally viable only with assured input of minimum 150 – 200 TPD of non-recyclable, high-calorific value segregated dry waste (RDF). Ideally, only ULBs with population of 10 lakhs and above (individually or in cluster) may opt for waste to electricity projects. While approving Waste to Electricity projects, ULBs are advised to ensure adequate quantity of waste/RDF of specified calorific value”.

**Concerned Authorities:** Ministry of Environment, Forest and Climate Change, Ministry of Housing and Urban Affairs, States and Urban Local Bodies

## Recommendations:

### A. Formulation of a Comprehensive Cluster-Based National Policy:

Government of India should develop a comprehensive national policy on cluster-based waste management (“national policy”). This policy should provide a clear legal and institutional framework for Urban Local Bodies (ULBs) to promote regional-level Waste-to-Energy (WTE) facilities for Municipal Solid Waste (MSW) management. This will enhance the viability of projects contributing to the Swachh Bharat Mission by ensuring scientific waste disposal. The national policy should explicitly clarify the economic model to ensure the viability of regional WTE facilities. It should mandate the following:

- Lead ULB shall be appointed to implement MSW project on regional levels.
- Lead ULB/Nodal Agency will bear the costs of transporting waste generated within the region to our Regional WTE plants.
- Disposal of ash or inert to the sanitary landfill from the regional WTE facility shall be the responsibility of Lead ULB.

Under National policy, WTE plants will get adequate waste supply from nearby region, making these plant viable in long run.

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### B. Transition from Single City MSW based WTE Plants to Regional MSW based WTE Plants:

To streamline waste management and improve efficiency, a transition from single-city to regional MSW-based WTE plants is recommended under the National Policy. This approach will facilitate the processing of waste from both urban and rural areas.

## 1.5. Inconsistent Application of the ‘Polluter Pays Principle’ in the Waste-to-Worth Sector

**Issue:** While the Polluter Pays Principle is a fundamental environmental policy, its application in the waste-to-worth sector in India remains inconsistent. Currently, bulk waste generators are not held fully accountable for the environmental impact of their waste, creating an imbalance in responsibility and hindering the development of sustainable waste management practices. The EPR mechanism is a welcome step towards this principle, but needs to be strengthened and expanded to a wide variety of waste streams.

**Concerned Authorities:** Ministry of Environment, Forest and Climate Change, Central Pollution Control Board, State Pollution Control Bodies, and Third-parties (for surveillance)

## Recommendations:

### A. Enforce Polluter Pays Principle:

Enforce Polluter Pays Principle in line with the Air and Water Act to include all waste generators, especially bulk waste generators, in the waste-to-worth sector. This ensures that those responsible for generating waste bear the financial and environmental costs associated with its management and disposal.

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### B. Mandatory Authorization:

Introduce mandatory authorization for all bulk waste generators. This includes obtaining permits and complying with waste and wastewater management regulations.

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### C. Compulsory Returns Filing and Digital Traceability:

Make it compulsory for both waste generators and authorized waste receivers to file regular returns detailing waste generation, handling, and disposal practices. This ensures transparency and accountability in waste management operations. Employ digital traceability tools including GST tracking and e-way reconciliation.

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### D. Strengthen Enforcement:

Strengthen enforcement mechanisms to ensure compliance with the Polluter Pays Principle and related regulations. This includes regular inspections, penalties for non-compliance, and promoting public awareness of waste management responsibilities.

## 1.6. Regular/Real-Time Inventorisation and Data Update

**Issue:** Currently, India faces challenges with outdated and incomplete data on waste generation and characterization. This lack of real-time information hinders effective planning, monitoring, and evaluation of waste management processes, ultimately impeding the growth of the Waste-to-worth sector.

**Concerned Authorities:** Ministry of Environment, Forest and Climate Change, Central Pollution Control Board, State Pollution Control Boards, and Urban Local Bodies.

## Recommendations:

- A. To enhance waste management efficiency, implement a mandatory real-time data reporting system for all waste generators and handlers, incorporating key parameters like generation volumes and waste characterization. This system should leverage technology and AI for monitoring, evaluation, and identification of challenges. To improve compliance rates for regulated waste treatment, incentivize proper waste management through market-based instruments like EPR, Green Credits etc.

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- B. Develop a comprehensive framework for pricing all environmental and sustainability factors, including carbon emissions, water usage, and virgin material consumption. Expand existing initiatives like the BEE's Carbon Trading scheme and the Green Credits program to encompass a broader range of sustainability performance tokens. This will facilitate the trading and monetization of these tokens, promoting sustainable practices in the waste sector.

## 2. Economic and Financial Challenges

Key issues related to the financial viability of waste-to-worth projects, including the need for reasonable concession periods to attract investment, buy back mechanisms etc. are outlined below, accompanied by recommendations for resolution.

### 2.1. Reasonable Concession Periods to Encourage Investment in Capital-Intensive Waste-to-Worth Projects

**Issue:** Establishing robust waste-to-worth infrastructure requires significant capital investment. Short concession periods for such projects discourage private sector participation and hinder the development of advanced waste management facilities. This limitation restricts the flow of much-needed capital and expertise into the sector, ultimately impeding India's progress towards sustainable waste management and a circular economy.

**Concerned Authorities:** Ministry of Finance, States and Urban Local Bodies.

#### Recommendations:

##### A. Extend Concession Periods:

Increase the concession period for Design, Build, Finance, Operate, and Transfer (DBFOOT) waste-to-worth projects to a minimum of 30 years. This longer timeframe allows investors to recoup their investment and generate reasonable returns, making these projects more financially attractive.

##### B. Promote Public-Private Partnerships:

Encourage Public-Private Partnerships (PPPs) to leverage the expertise and financial resources of the private sector while ensuring public oversight and accountability.

##### C. Develop a Robust Risk-Sharing Framework:

Establish a clear risk-sharing mechanism between the government and private investors to mitigate project risks.

##### D. Dynamic Tariff :

A dynamic tariff linked to an inflation index may be considered.

### 2.2. Lack of a Robust Market and Buyback Mechanisms

**Issue:** Despite efforts to promote recycling and resource recovery in India, the lack of a well-defined market and buyback mechanisms for recycled or recovered materials and energy poses a significant challenge. Without assured demand and price stability, the economic viability of waste-to-worth initiatives remains uncertain, discouraging both waste processors and consumers from actively participating in the circular economy.

**Concerned Authorities:** Ministry of Commerce and Industry, Ministry of New and Renewable Energy, Ministry of Housing and Urban Affairs, Bureau of Indian Standards, and Urban Local Bodies.

## Recommendations:

### A. Mandatory Buy back Mechanisms:

Implement mandatory buyback mechanisms for recycled and recovered resources, with government agencies, Urban Local Bodies (ULBs), DISCOMs, Oil Marketing Companies (OMCs), and manufacturing agencies playing a key role in procuring these materials.

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### B. Standardized Quality:

Define and enforce quality standards for recycled materials to ensure their suitability for various applications. Establish an agency responsible for quality monitoring, certification, and compliance.

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### C. Government Procurement:

Mandate the use of recycled materials in government procurement and infrastructure projects. Set targets for increasing the percentage of recycled materials used in public projects over time (minimum 5% and up to 30% over the next 5 years).

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### D. Promote Circularity in Industry:

Encourage industries to incorporate recycled materials in their manufacturing processes. Provide incentives and support for companies that adopt circular economy practices.

Policies should also incentivize the adoption of eco-friendly materials, including recycled construction materials, recycled plastics, and compostable alternatives. These materials have a lower carbon footprint than conventional options, promoting a more sustainable and responsible supply chain. To stimulate market demand and ensure value realization for specific waste-derived products, the following may be looked into:

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### E. Compressed Biogas (CBG):

Develop Gas Distribution System (GDS) infrastructure near CBG production units to facilitate efficient distribution and utilization. Establish a dedicated body to define quality standards and determine CBG pricing, ensuring transparency and market competitiveness.

Implement a mandatory buyback mechanism, with take or pay, for CBG with a minimum purchase price linked to market rates, providing at least a 10% premium over existing rates. Mandate a minimum 10% blending of CBG with natural gas in city gas distribution networks. Ensure 100% availability of GDS infrastructure through Oil Marketing Companies (OMCs) to support CBG uptake.

Address the low offtake of CBG digestate by mandating government agencies to use a minimum quantity as fertilizer for non-food plantation applications (e.g., road medians, public gardens, government offices, airports, railways). Offtake of CBG digestate will help

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### F. Refuse Derived Fuel (RDF):

Develop and notify comprehensive guidelines for RDF production and utilization, incorporating them into waste management rules to standardize quality and promote its use as a fuel source in cement kilns, power plants, and other industries.

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### G. Recovered Materials from C&D Waste:

Promote the recovery and reuse of materials from Construction & Demolition (C&D) waste, such as aggregates, metals, and wood, in construction and infrastructure projects.

## 2.3. Waste-to-Energy (WTE) Power Procurement

**Issue:** The Waste-to-Energy (WTE) sector in India, while promising for sustainable waste management and renewable energy generation, faces significant challenges that impede its progress. These challenges primarily revolve around financial viability, policy inconsistencies, and stakeholder concerns. The issues are summarized in detail below:

### High Tariff and DISCOM Reluctance:

WTE plants often require higher tariffs for the electricity they generate compared to other renewable sources like solar and wind. This disparity stems from the higher capital and operational costs associated with WTE technologies. While the Tariff Policy of 2016 mandates DISCOMs to procure 100% WTE power, the significant price difference between WTE tariffs (INR 7-8 per unit) and the average power purchase cost (APPC) of around INR 3.61 per unit creates financial strain on DISCOMs. This leads to resistance in power purchase agreements and hinders the growth of the WTE sector.

### Credibility and Bankability Concerns:

The financial health and credibility of state-owned DISCOMs often pose a challenge for WTE project developers. Lenders, including nationalized banks and financial institutions, express concerns regarding the creditworthiness of DISCOMs, impacting the bankability of WTE projects. This lack of confidence translates into difficulties in securing financing and achieving financial closure, further hindering sector growth.

### Lack of Policy Uniformity:

The absence of a unified national framework for WTE tariff determination and project implementation creates inconsistencies across states. Varying approaches and regulations contribute to uncertainty and impact the financial viability and bankability of WTE projects. This lack of uniformity discourages private investment and creates an unpredictable environment for project developers.

**Financial Barriers:** WTE projects are capital-intensive with relatively low profit margins. This financial structure poses challenges in attracting investment from traditional financing sources. Nationalized and private banks are often hesitant to fund WTE projects due to the perceived risks and complexities associated with waste management and power generation. The lack of access to capital and the extended time required to secure funding significantly impedes the growth of the WTE sector.

**The primary objective of the WTE plants is to solve the waste crisis. Addressing high tariffs for WTE power procurement is crucial as WTE plants play a dual role:**

- **Waste Management:** WTE plants help manage municipal solid waste (MSW) efficiently, aligning with the goals of the Swachh Bharat Mission by addressing waste disposal challenges.
- **Renewable Energy:** Though costly, WTE contributes to renewable energy goals, which support India's commitments to climate action and sustainable urbanization.

Without intervention, DISCOMs are likely to resist purchasing WTE power, limiting the viability of WTE projects and hindering waste management efforts. Addressing cost challenges could make WTE projects financially sustainable and more attractive to lenders, ultimately encouraging sectoral growth.

**Concerned Authorities:** Ministry of Environment, Forest and Climate Change, Ministry of New and Renewable Energy, and Ministry of Power

## Recommendations:

- A. Implement policies that mandate a certain percentage of electricity procured by DISCOMs to come from WTE sources.  
.....
- B. Establish a streamlined mechanism for WTE power procurement, potentially involving a central buying agency like Solar Energy Corporation of India Limited (SECI) to bundle WTE power with other renewables, thus reducing the average tariff and enhancing affordability for DISCOMs. If SECI procures WTE power and sells it to DISCOMs at a uniform tariff by bundling WTE power with solar, wind, or a hybrid of solar and wind power, the overall average price of the power will be reduced. This arrangement creates a beneficial scenario for both parties: DISCOMs would acquire WTE power at a standardized tariff from SECI, and WTE generators would sell power to SECI at a sustainable and viable tariff.

The practice of selling power at a Uniform Renewable Energy Tariff (URET), as established under the Electricity Amendment Rules, 2022, has already been implemented by the Ministry of Power. This is facilitated through central procuring agencies like SECI, NTPC Limited, NHPC Limited, and SJVN Limited, which create a centralized pool of power for various renewable energy generators, including solar and hybrid solar-wind sources. The relevant extract from the Ministry of Power's order dated 14.02.2024<sup>2</sup> states: "3. Furthermore, the following Renewable Energy Implementing Agencies (REIAs) of the Ministry of New & Renewable Energy shall act as intermediary procurers for the purpose of implementation of URET Procedure: i. NTPC Limited, ii. NHPC Limited, iii. SJVN Limited, iv. Solar Energy Corporation of India Limited"

By leveraging the credibility and expertise of these central buying agencies, WTE projects across India stand to gain increased investor confidence, which would lead to better access to fundraising opportunities and reduced financing costs.

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2. Ministry of Power, Government of India, Office Memorandum No. 13/05/2023-RCM/NRE dated February 14, 2024

### 3. Infrastructure and Technology Limitations

Key issues related to the lack of adequate infrastructure and technology for waste processing and resource recovery are outlined below, accompanied by recommendations for resolution.

#### 3.1. Land Availability for Waste Processing and Resource Recovery

**Issue:** India's rapid urbanization is projected to accelerate, with the urban population expected to reach 40% by 2030, a significant increase from the 31% recorded in 2011<sup>3</sup>. This urban shift is anticipated to substantially contribute to the nation's economy, driving 75% of India's GDP by 2030<sup>3</sup>. This reflects a growing trend towards urban-centric economic development.

The increasing urbanization in India necessitates allocating adequate land for waste processing and resource recovery to support sustainable urban growth. Land availability is a significant challenge for establishing waste processing and resource recovery facilities, particularly in urban areas with high population density. Competing land uses and the 'Not In My Backyard' (NIMBY) syndrome often hinder the allocation of land for such facilities.

**Concerned Authorities:** Ministry of Environment, Forest and Climate Change, Ministry of Housing and Urban Affairs, Ministry of Commerce and Industry (Department for Promotion of Industry and Internal Trade).

#### Recommendations:

- A. Adequate land allocation is essential for sustainable urban growth, particularly for integrated waste processing and disposal facilities. Long-term, zero-cost leases for such facilities should be considered, and these lands should be included in the Master Plan with appropriate buffer zones.  
.....
- B. State and Urban Local Bodies (ULBs) should designate land for Eco Resource Recovery Parks (ERRPs) at various levels, including ward, zone, city, and regional levels.  
.....
- C. Industrial Estates should earmark land for ERRPs to manage industrial waste.  
.....
- D. Legislation should be enacted to protect the land allocated for ERRPs, preventing any future changes in land use. Additionally, ERRPs should be shielded from socio-political issues by implementing legal measures (such as notification) to provide a buffer zone around these parks.  
.....
- E. Earmark sufficient land for ERRPs appropriate to meet the waste management needs of the respective areas, and equip parks with the necessary infrastructure and technologies to efficiently recover resources from waste.  
.....
- F. Plan for long-term (50 years), with legal protection for land use.

3. Ministry of Urban Development's Smart Cities Mission Statement and Guidelines, June 2015 (<https://smartcities.gov.in/sites/default/files/SmartCityGuidelines.pdf>)



## 3.2. Lack of Strategic Planning for Centralized and Decentralized Waste Processing in Growing Urban Areas

**Issue:** India's rapid urbanization necessitates a strategic approach to waste management that considers both centralized and decentralized processing solutions. While large-scale centralized facilities are essential for efficient waste treatment, decentralized options offer advantages in handling specific waste streams and serving localized communities. However, the lack of comprehensive planning and infrastructure development for both types of processing hinders effective waste management in growing urban areas.

**Concerned Authorities:** Ministry of Housing and Urban Affairs, States and Urban Local Bodies

### Recommendations:

#### A. Population-Based Planning:

Implement a population-based planning approach for waste processing infrastructure. Cities with a population of 1 million or more should have at least one centralized processing and treatment plant with a current capacity of 2000 TPD and a projected capacity of 5000 TPD within the next 30 years.

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#### B. Decentralized Solutions:

Incorporate decentralized plants for treating wet waste, with a capacity of 50-100 TPD, to manage organic waste effectively at the local level. This reduces transportation costs and allows for localized composting or biogas generation.

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#### C. Scalable Infrastructure:

Design waste processing infrastructure with scalability in mind to accommodate future population growth and waste generation increases.

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#### D. Integrated Approach:

Develop an integrated waste management strategy that combines centralized and decentralized processing to optimize resource recovery and minimize environmental impact.

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#### E. Technology Adoption:

Explore and adopt appropriate technologies for both centralized and decentralized processing, considering factors such as waste composition, energy efficiency, and environmental sustainability.

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#### F. Financial Sustainability:

Develop sustainable financial models for both centralized and decentralized facilities, including public-private partnerships and revenue generation through waste-to-worth initiatives.



### 3.3. Underperforming and Non-Compliant Wastewater Infrastructure

**Issue:** A significant portion of India's water infrastructure, including Common Effluent Treatment Plants (CETPs) and Sewage Treatment Plants (STPs), operates below par or in violation of regulatory compliance requirements. This is due to various challenges, such as outdated technology, funding shortages, and operator inadequacies. The resulting inadequate wastewater treatment negatively impacts the environment, public health, and the potential for water reuse.

**Concerned Authorities:** Ministry of Environment, Forest and Climate Change, Ministry of Jal Shakti, Central Pollution Control Board, State Pollution Control Boards, Ministry of Housing and Urban Affairs, and Urban Local Bodies.

#### Recommendations:

To address the issue of underperforming water infrastructure and ensure its contribution to environmental sustainability and resource recovery, the following recommendations are proposed:

##### A. Comprehensive Performance Audits:

Conduct a comprehensive audit of the infrastructure, including CETPs and STPs, to assess their performance and compliance with environmental regulations. Facilities found to be non-compliant may be revamped or even shut down in case of serious non-compliances.

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##### B. Minimum Standards:

Define and enforce minimum environmental infrastructure norms for all water treatment facilities.

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##### C. Prevent Haphazard Proliferation:

State Pollution Control Boards (SPCBs) must strictly prohibit the unnecessary proliferation of CETPs and STPs where existing capacity is adequate.

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##### D. Periodic Inspections:

Ensure regular and thorough inspections of all water infrastructure to monitor compliance and identify potential issues.

### 3.4. Lack of Integrated Backward and Forward Linkages in the Waste-to-Worth Value Chain

**Issue:** India's waste-to-worth sector suffers from a disconnect between different stages of the value chain. While waste generation, segregation, processing, and material recovery occur, there is a lack of integration and coordination across these stages. This absence of backward and forward linkages limits the overall efficiency and effectiveness of the sector, hindering the transition to a circular economy.

**Concerned Authorities:** Ministry of Environment, Forest and Climate Change, States, Central Pollution Control Board, and Ministry of Commerce and Industry (Department for Promotion of Industry and Internal Trade)

## Recommendations:

**A. Establish Regional Waste Hubs and Networks:** Set up centralized waste management hubs where different stages—segregation, processing, and recovery—can occur in proximity, reducing logistical challenges. These hubs can serve as “recycling zones” and streamline material flow. Circular Economy Parks may be promoted.

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### **B. Digital Platforms for Waste Chain Integration:**

Develop digital platforms or marketplaces to connect waste generators with recyclers, material processors, and end-users in real-time. Such platforms could provide visibility into waste availability, track material flow, and facilitate transactions, ensuring smoother transitions between stages.

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**C. Promote Circular Economy Parks:** Develop specialized Circular Economy Parks that host a cluster of industries and businesses focused on resource recovery, recycling, and remanufacturing.

## 4. Capacity Building and Skill Development

Key issues in the waste-to-worth sector related to the shortage of skilled personnel and the need for capacity building are outlined below. These include the necessity for targeted skill development programs, upskilling and reskilling initiatives, and promoting research and technology adoption. Recommendations for addressing these challenges are also provided.

### 4.1. Lack of Capacity Building and Skilling in the Waste-to-Worth Sector

**Issue:** India’s waste-to-worth sector faces a significant skills gap. There is a lack of trained personnel with the necessary expertise to handle and manage various types of waste, including Municipal Solid Waste (MSW), Construction & Demolition (C&D) waste, e-waste, End-of-Life Vehicles (ELVs), and scrap waste. This skills shortage hinders the efficient operation of waste management facilities and limits the potential for resource recovery and recycling.

**Concerned Authorities:** Ministry of Environment, Forest and Climate Change, States and Urban Local Bodies.

## Recommendations:

### **A. Targeted Skill Development Programs:**

Develop and implement targeted skill development programs focused on waste management, specifically addressing the handling and processing of different waste streams like MSW, C&D waste, e-waste, ELVs, and scrap waste.

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### **B. Mandate Training in Educational Institutions:**

To ensure a steady supply of skilled professionals for the sector, integrate waste management modules into the curricula of educational and training institutions, including vocational schools, technical institutes, and universities.

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### **C. Mandatory Qualifications:**

Establish minimum qualifications and certifications for employment in waste management roles within Urban Local Bodies (ULBs), waste handling companies, and NGOs. This ensures that personnel possess the necessary knowledge and skills for safe and efficient waste management.

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**D. Upskilling and Reskilling Initiatives:** Provide opportunities for upskilling and reskilling existing workers in the waste management sector to enhance their capabilities and adapt to evolving technologies and best practices.

## **4.2. Lack of Research, Technology Adoption and Integration**

**Issue:** India's waste-to-worth sector faces critical gaps in research and development, technology adoption, and skilled workforce availability. Limited investment in research hinders innovation in resource recovery technologies and the development of sustainable solutions. Furthermore, the lack of skilled professionals with expertise in resource recovery poses a significant challenge to the sector's growth and efficiency.

**Concerned Authorities:** Department of Science and Technology, Ministry of New and Renewable Energy, States and Urban Local Bodies.

### **Recommendations:**

#### **A. Invest in R&D:**

Increase investment in R&D focused on resource recovery, with a particular emphasis on: developing innovative technologies for efficient waste processing and material recovery; creating low-carbon materials and sustainable alternatives from waste; and scaling up resource recovery solutions to meet the growing needs of the country.

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#### **B. Technology Upgradation Fund:**

Central and State Governments may explore policies that promote technology adoption and innovation in resource efficiency. They may also establish a dedicated fund to provide financial support for technology upgradation in the resource recovery sector.

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#### **C. Specialized Training Programs:**

Introduce mandatory skilling programs and diploma courses in resource recovery at relevant educational institutions. Highlight the career opportunities in the waste-to-worth sector and provide guidance and mentorship to students and young professionals interested in pursuing careers in resource recovery.

## 5. Public Awareness and Social Barriers

Key issues related to public awareness, social perceptions, public resistance to waste processing facilities, and behavioural changes needed to promote waste management and resource recovery are outlined below, accompanied by recommendations for resolution.

### 5.1. Inadequate Waste Segregation at Source

**Issue:** Despite growing awareness, waste segregation at the source remains a challenge in India. This hampers efficient waste processing and recycling, leading to valuable resources ending up in landfills. A cultural shift towards prioritizing waste segregation is crucial for the success of the Waste-to-worth sector.

**Concerned Authorities:** Ministry of Environment, Forest and Climate Change, Urban Local Bodies, and Non-Governmental Organizations.

#### Recommendations:

##### A. Behavioural Change Campaigns:

Launch targeted campaigns promoting the “Reduce, Reuse, Recycle” (RRR) concept and emphasizing the importance of waste segregation into dry and wet streams. These campaigns should utilize various channels like social media, workshops, and community engagement programs to reach diverse audiences.

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##### B. LIFE Integration:

Align behavioral change initiatives with the “Lifestyle for Environment (LIFE)” movement, promoting sustainable practices and responsible waste management as a way of life.

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##### C. Shared Responsibility:

Clearly define roles and responsibilities for waste segregation across stakeholders, including households, institutions, and businesses. Implement mechanisms for monitoring and evaluating individual and collective progress in waste segregation.

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##### D. Technology-enabled Monitoring:

Develop and deploy technology-driven solutions for monitoring and evaluating waste segregation practices. This could include smart bins, mobile applications, and data analytics platforms to track segregation efficiency and identify areas for improvement.

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##### E. Strengthening Markets:

Develop robust markets for segregated waste, ensuring fair pricing and transparent transactions. This will incentivize proper segregation at the source and support the growth of the recycling industry.

## 5.2. Unsustainable Waste Management Practices and Public Resistance to Waste Processing Facilities

**Issue:** India faces significant challenges in managing its municipal solid waste. Open dumping and burning of waste remain prevalent, causing severe environmental pollution and public health risks. This has led to a strong “Not in My Backyard” (NIMBY) sentiment, making it difficult to establish essential waste processing and disposal facilities. The lack of integrated waste management infrastructure and public resistance pose major obstacles to achieving a circular economy in India.

**Concerned Authorities:** Ministry of Environment, Forest and Climate Change, Central Pollution Control Board, States, Urban Local Bodies, and Non-Governmental Organizations.

### Recommendations:

#### A. Develop Integrated Waste Management Facilities:

Establish facilities that combine waste segregation, processing (recycling, composting, anaerobic digestion etc.), and proper disposal methods, including waste-to-energy technologies. This approach reduces indiscriminate dumpsites, minimizes environmental impact, and promotes resource recovery.

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#### B. Transform Public Perception:

Shift the narrative from “Not in My Backyard” (NIMBY) to “Circularity in My Backyard” (CIMBY) by emphasizing the benefits of proper waste management. This can be achieved through:

- **Buffer Zones:** Create green buffer zones around facilities with walking paths, community gardens, and educational centers to mitigate concerns and enhance community acceptance.
- **Community Engagement:** Conduct public consultations, awareness campaigns, and site visits to address concerns and build trust.
- **Transparency:** Ensure transparent operations and environmental monitoring to demonstrate the safety and positive impact of the facilities.
- **Remediate Existing Dumpsites:** Integrate dumpsite rehabilitation with the scientific processing of fresh waste. Implement bio-mining projects to reclaim valuable resources from dumpsites, ensuring these projects are monitored by Pollution Control Boards to prevent further environmental damage caused by haphazard relocation of waste.
- **Strengthen Regulatory Framework:** Develop clear guidelines and protocols for waste management, including waste relocation during bio-mining, and enforce regulations with penalties for non-compliance to ensure environmental protection.

## C. Long Term and Short Term Recommendations to be Considered by:

- **Bureau of Indian Standards**

- **Short Term**

- Define and enforce quality standards for recycled materials
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- **Ministry of Environment, Forest and Climate Change**

- **Short Term**

- Clearly define roles & responsibilities for waste segregation across stakeholders
- Encourage processing of black mass
- Encourage Market based Instruments like EPR, Green credits
- Detail out specifications and standards for all waste processing facilities including CETPs
- Align behavioural change initiatives with [LiFE] movement

- **Long Term**

- Coordinate with DPIIT / States to promote Circular Economy Parks
  - Align behavioural change initiatives with [LiFE] movement
  - Develop robust markets for segregated waste.
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- **Ministry of Housing and Urban Affairs (in coordination with States and ULBs)**

- **Short Term**

- Incorporate Model Concession Terms into the Agreement outlining comprehensive infrastructural requirements for Integrated Waste Processing
- Remediate existing dumpsites, and integrate dumpsite rehabilitation with the scientific processing of fresh waste
- Promote Regional Waste Hubs and Networks
- Implement “Transparent project allocation and processing fee” base bidding instead of “Tipping Fee” model
- Launch targeted awareness campaigns and site visits to engage communities
- Develop a robust risk sharing framework for PPP projects
- Focus on technology transfer and targeted skill development including Capacity building, upskilling and reskilling initiatives.

- **Long Term**

- Promote Eco City Recycling Parks
  - Mandatory Buyback Mechanisms
  - Extend Concession Periods for DBFOT waste to worth projects to minimum 30 years
  - Promote decentralised processing facilities with scalable infrastructure
  - Implement a population-based planning approach for waste processing infrastructure.
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- **Ministry of Commerce and Industry (Department for Promotion of Industry and Internal Trade)**

- **Short Term**

- Earmark lands for Eco Resource Recovery Parks (ERRPs) at various levels

- **Long Term**

- Industries to incorporate recycled materials in their manufacturing processes.
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- **Ministry of New and Renewable Energy in coordination with Ministry of Finance**

- **Short Term**

- Stimulus to promote Li-ion battery ecosystem within India
- Develop dynamic Tariff linked to inflation index
- Implement a mandatory buyback mechanism for CBG
- Develop and notify comprehensive guidelines on RDF production & utilisation

- **Long Term**

- Comprehensive framework for pricing all environmental and sustainability factors
  - Coordinate with RBI to include Resource Recovery under Priority Sector Lending
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- **Central Pollution Control Board in coordination with State Control Pollution Boards**

- **Short Term**

- Ensure mandatory filling for both waste generators / processors and digital tracking
- Bring more clarity in the guidelines and protocols for waste management including waste relocation during bio-mining
- Strengthen enforcement mechanisms for bulk waste generators
- Digital platform for Waste Chain integration
- Coordinate with MoRTH to establish guidelines for minimum standards / requirements for infrastructure for Recycled Vehicle Scrapping Facilities

- **Long Term**

- Strengthen regulatory oversight and monitoring mechanisms
- Periodic Inspections and Comprehensive Performance Audits



## Confederation of Indian Industry

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering Industry, Government and civil society, through advisory and consultative processes.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, with around 9,000 members from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 365,000 enterprises from 294 national and regional sectoral industry bodies.

For more than 125 years, CII has been engaged in shaping India's development journey and works proactively on transforming Indian Industry's engagement in national development. CII charts change by working closely with Government on policy issues, interfacing with thought leaders, and enhancing efficiency, competitiveness, and business opportunities for industry through a range of specialized services and strategic global linkages. It also provides a platform for consensus-building and networking on key issues.

Through its dedicated Centres of Excellence and Industry competitiveness initiatives, promotion of innovation and technology adoption, and partnerships for sustainability, CII plays a transformative part in shaping the future of the nation. Extending its agenda beyond business, CII assists industry to identify and execute corporate citizenship programmes across diverse domains including affirmative action, livelihoods, diversity management, skill development, empowerment of women, and sustainable development, to name a few.

For 2024-25, CII has identified "Globally Competitive India: Partnerships for Sustainable and Inclusive Growth" as its Theme, prioritizing 5 key pillars. During the year, it would align its initiatives and activities to facilitate strategic actions for driving India's global competitiveness and growth through a robust and resilient Indian industry.

With 70 offices, including 12 Centres of Excellence, in India, and 8 overseas offices in Australia, Egypt, Germany, Indonesia, Singapore, UAE, UK, and USA, as well as institutional partnerships with about 300 counterpart organizations in almost 100 countries, CII serves as a reference point for Indian industry and the international business community.

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