8. E-Waste Recycling

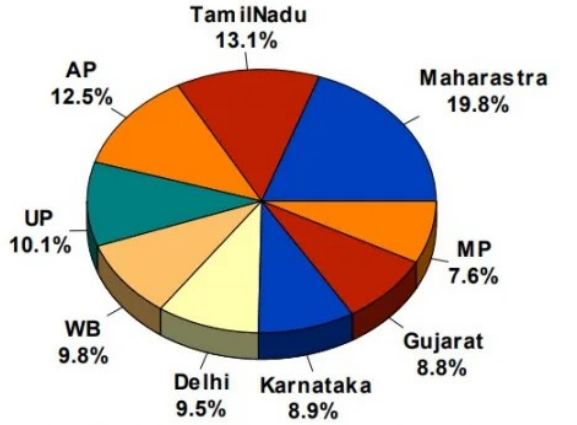
As India pushes itself forward for local electronics manufacturing, from semiconductor fabs to the Electronics Component Manufacturing Scheme (ECMS), e-waste recycling threatens to undercut the progress.

Introduction - Understanding E-Waste

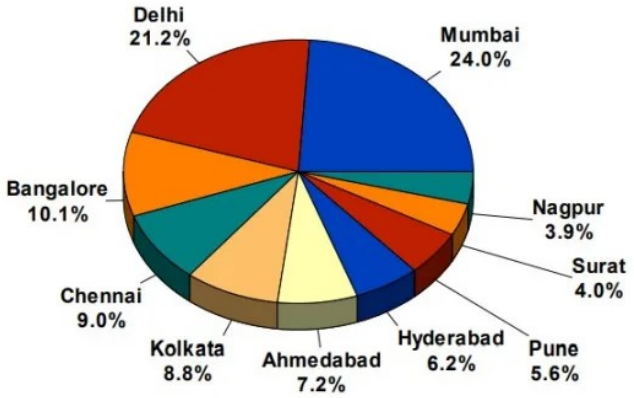
Definition - E-waste refers to discarded electrical and electronic equipment (EEE), such as computers, mobile phones, televisions, and refrigerators, that have reached the end of their life cycle.

Composition - Contains valuable materials (like copper, aluminium, gold, lithium, cobalt, and rare earth elements) and hazardous substances (such as lead, mercury, cadmium, and brominated flame retardants).

Significance - Represents both a resource recovery opportunity and an environmental challenge due to toxic handling and poor waste management systems.



State wise E-waste Generation in India (Tonnes/year)



City wise E-waste Generation in India(Tonnes/year)

Current Status of e-Waste in India

Volume - India generated 4.17 million metric tonnes (MMT) of e-waste in 2022, becoming the third-largest producer globally, after China and the USA.

Recycling Gap - Only about one-third of this waste is processed through formal channels, while the informal sector handles 90–95%, often using crude and unsafe methods.

Drivers of Growth -

1. Rising middle-class consumption of electronics
2. Rapid technological obsolescence
3. Short product life cycles
4. Frequent consumer upgrades

Key Statistics

Digital Expansion - According to TRAI (2023), India has over 93.9 crore mobile broadband connections — highlighting the massive scale of potential e-waste generation.

Consumption Share - Despite high connectivity, India accounts for only 4% of global electronics consumption, reflecting a smaller but fast-growing market.

The Informal Sector Dominance

Extent - As per the Indian Cellular and Electronics Association (2023), informal recyclers handle up to 95% of e-waste in India.

Methods Used

1. Open burning of wires to extract copper
2. Acid leaching to recover precious metals
3. Unscientific dismantling in unregulated workshops

Consequences

1. Severe health hazards due to exposure to toxic fumes and chemicals

2. Soil and water contamination
3. Air pollution in densely populated urban clusters like Seelampur (Delhi) and Moradabad (U.P.)

Challenges in e-Waste Management

Low Collection Efficiency - Less than 10% of e-waste is collected through official channels due to fragmented systems.

Traceability Issues - Difficulty tracking materials recovered from informal recyclers leads to data inaccuracies.

EPR System Weaknesses - The Extended Producer Responsibility (EPR) system faces issues such as -

1. "Paper trading" of recycling credits (false reporting of recycling without actual work done).
2. Poor third-party audit and verification.

Limited Formal Infrastructure - Small number of registered recyclers and refurbishers compared to total e-waste generated.

Public Unawareness - Many consumers are unaware of safe disposal channels or the harmful impacts of improper disposal.

Policy Framework

E-Waste (Management) Rules, 2022

Administered by - Central Pollution Control Board (CPCB) under the Ministry of Environment, Forest and Climate Change (MoEFCC).

Key Features

Extended Producer Responsibility (EPR) - Mandates producers, manufacturers, and importers to ensure collection and recycling of their products after end-of-life.

Mandatory Registration - All stakeholders (manufacturers, recyclers, refurbishers) must register on the CPCB portal.

Environmental Compensation - Penalties for non-compliance under "Polluter Pays" principle.

Circular Economy Promotion - Encourages recycling, reuse, and repair to reduce material waste.

Verification and Auditing - Provisions for third-party verification to prevent fake recycling claims.

Formal Recycling and Refurbishing Infrastructure (as of Feb 2025)

Registered Recyclers - 322 units with a combined processing capacity of 22 lakh metric tonnes per year.

Registered Refurbishers - 72 units with a capacity of 92,000 metric tonnes per year.

Observation - Despite growing capacity, the utilization remains low due to poor collection and segregation at source.

Public Awareness and Collaboration Efforts

Government Campaigns - The Ministry of Electronics and Information Technology (MeitY), with partners like MAIT (Manufacturers' Association for Information Technology) and NASSCOM, launched awareness drives across 31 states and UTs.

Innovative Models - Pilot 'mandi-style aggregation systems' aim to connect informal waste pickers with formal recyclers — ensuring safety and traceability.

Educational Initiatives - School and college campaigns on responsible e-waste disposal are being scaled up under the "Digital Clean-up India" movement.

Road Ahead

Strengthen EPR Implementation - Introduce real-time tracking of e-waste flows. Conduct regular third-party audits of recyclers.

Curb Malpractices - Strict action against fake recycling certificate trading.

Enhance Product Life Cycles - Promote "Right to Repair" and eco-design to extend product usability.

Incentivize Formalization - Encourage informal recyclers to register under formal systems through training and certification.

Improve Data Systems - Establish a national e-waste inventory using digital tagging for traceability.

Promote Research - Support innovation in urban mining, material recovery, and low-cost recycling technologies.

Global Context

India's Standing - Among the top 5 e-waste generating nations globally.

UN E-Waste Monitor (2024) - Global e-waste reached 62 million tonnes, expected to rise by 30% by 2030.

Circular Economy Target - India aims to align its recycling and recovery goals with Sustainable Development Goal 12 (Responsible Consumption and Production).

Significance

Environmental Benefits - Reduces toxic emissions and prevents groundwater contamination.

Economic Gains - Unlocks valuable metals and promotes circular economy growth.

Social Inclusion - Creates livelihood opportunities for informal workers in safer environments.

Strategic Resource Recovery - Reduces dependency on imported rare earth elements critical for electronics manufacturing.

Source - https - //www.thehindu.com/incoming/e-waste-collection-faces-gaps-as-government-sets-sights-on-recycling-for-precious-metals/article70108477.ece