India's Growing Battery Waste Problem

India's EV and renewable push

lithium battery demand projected to rise from 4 GWh (2023) to 139 GWh (2035).

Improper disposal of batteries

Soil & water contamination, loss of valuable minerals.

2022, Lithium batteries formed ~700,000 tonnes of India's 1.6 million metric tonnes of e-waste.

1. Battery Waste

Discarded batteries (esp. lithium-ion) containing hazardous chemicals (lead, cadmium, mercury) & valuable minerals (lithium, cobalt, nickel).

Major Sources

1. Electric Vehicles (EVs)
2. Consumer Electronics (mobiles, laptops)
3. Renewable Energy Storage (BESS)
4. Lead-acid batteries (industrial & automotive)

2. Risks of Improper Disposal

1. Environmental, Toxic leachates pollute groundwater, soil degradation, air pollution from burning waste.
2. Economic, Loss of recoverable metals higher mineral import dependence.
3. Health, Exposure to heavy metals eurological damage, respiratory illness, kidney failure.

3. Key Indian Regulations & Initiatives

Early Rules

1. 2003 – Hazardous Waste (Management & Handling) Amendment Rules → First inclusion of hazardous materials in e-waste regulatory coverage.
2. 2011 – E-Waste (Management & Handling) Rules → Introduced Extended Producer Responsibility (EPR).

Strengthened Framework

1. 2016 – E-Waste (Management) Rules → Added Producer Responsibility Organization (PRO) concept.
2. 2022 – E-Waste (Management) Rules →
3. Mandates EPR for producers (fund collection, transport, recycling).
4. Supports resource recovery for India's Net Zero 2070 goal.

4. Amendments

2023 – E-Waste Second Amendment Rules

1. Clearer hazardous substance reduction provisions.
2. Defined EPR certification generation methodology.
3. Mandatory refrigerant management.

2024 – E-Waste Amendment Rules

1. Extended return/report filing timelines (max 9 months).
2. Created EPR certificate exchange platforms.
3. Price regulation for EPR certificates (CPCB).

2025 – Battery Waste Management (Amendment) Rules

1. EPR registration displayed via barcode/QR on product & packaging.
2. CPCB to publish quarterly updated list of registered producers.
3. Exemption for chemical marking if Pb ≤ 0.004% & Cd ≤ 0.002%.

5. EPR Floor Pricing Mechanism

Purpose is to Minimum compensation for recyclers covering collection, processing, material recovery costs. Set by Central Pollution Control Board (CPCB). Aim Make recycling financially viable, prevent informal dumping.

6. International Framework

1. Basel Convention (1989): Controls hazardous waste movement; includes e-waste guidelines.
2. Ban Amendment (2019): Prohibits OECD & EU countries from exporting hazardous waste to other Basel parties.

Regional Agreements

1. Bamako Convention – Africa.
2. Waigani Convention – South Pacific.

7. Challenges in India

1. Inadequate EPR Floor Price, Recycling unprofitable for formal recyclers.
2. Informal Sector Dominance, Unsafe methods, loss of valuable materials.
3. Weak Enforcement, Poor audits, fake EPR certificates, weak digital tracking.
4. Economic Risks, by 2030, poor recycling could cost >$1 billion in foreign exchange.
5. Environmental Risks, Toxic leaching, air & soil contamination.

8. Way Forward

1. Recalibrate EPR Floor Price, Align with global standards (e.g., ₹600/kg in UK).
2. OEM Accountability, Prevent cost pass-through to consumers.
3. Strengthen Enforcement, Digital EPR tracking, 3rd-party audits, strict penalties.
4. Formal-Informal Integration, Train & incentivize informal recyclers to join formal system.
5. Industry Collaboration, Policy-maker, producer, recycler dialogue for resilient recycling ecosystem.