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# NITI Aayog Circular Economy Reports — India's End-of-Life Vehicle and E- Waste Challenge Through 2030

5 February 2026

**SUBJECTS COVERED****ENVIRONMENT****ECONOMY****SCIENCE & TECH****CURATED & WRITTEN BY****Bharat Choudhary**

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## WHY IN NEWS

NITI Aayog released three reports on circular economy in mobility — covering End-of-Life Vehicles, Waste Tyres, and Lithium-ion Battery/E-waste — at the International Material Recycling Conference in Jaipur, projecting a dramatic surge in material waste as India's vehicle fleet expands through 2030.

## WHY CIRCULAR ECONOMY IN MOBILITY IS A POLICY EMERGENCY

India is at the intersection of two simultaneously accelerating trends: **rapid motorisation** and **energy transition**. The number of registered vehicles in India has grown from ~72 million (2004) to over 330 million (2024). The government's targets — 30% EV sales share by 2030 under the EV30@30 initiative — will add tens of millions of electric vehicles by the decade's end. Every vehicle eventually becomes waste; every battery pack eventually degrades.

Without a systematic **circular economy framework** — designing waste back into productive use — this motorisation boom will create:

A massive increase in **scrap metal, hazardous materials, and electronic waste**

**Land degradation** from informal dismantling (current practice)

**Critical mineral waste** — lithium, cobalt, nickel from battery packs — that India currently imports at high cost

## REPORT 1: END-OF-LIFE VEHICLES (ELVS)

The first NITI Aayog report addresses vehicles at the end of their service life.

**The scale of the problem:** India will have approximately **23 million End-of-Life Vehicles in 2025**, rising to **50 million by 2030** as older vehicles (bought during the mid-2010s automobile boom) exit the fleet. Each ELV contains approximately 900–1,100 kg of steel, 70–100 kg of aluminium, 10–15 kg of copper, and various plastics and rubber compounds.

**The current ELV management failure:** India lacks a formal **Extended Producer Responsibility (EPR)** system for vehicles. Approximately 85–90% of ELVs are dismantled by the **informal sector** — largely unregulated workshops that recover metals but often dispose of hazardous materials (oil, coolant, brake fluid, airbag propellants, refrigerants) in environmentally damaging ways.

**Policy framework:** The **Vehicle Scrappage Policy (2021)** created mandatory fitness testing at **Automated Testing Stations (ATS)** and **Registered Vehicle Scrapping Facilities (RVSFs)** as the formal dismantling infrastructure. The policy incentivises scrapping old vehicles (vehicles 15 years old for commercial; 20 years for private) with benefits including reduced road tax and manufacturer discounts. By February 2026, approximately 1,500+ RVSFs have been authorised.

The NITI Aayog report recommends extending EPR obligations to vehicle manufacturers — making them financially responsible for the end-of-life costs of their vehicles.

## REPORT 2: WASTE TYRES

India produces approximately **1.6 million tonnes of waste tyres annually**, growing rapidly with vehicle numbers. Tyre rubber is highly resistant to degradation (natural decomposition takes 50–80 years), creating persistent waste management challenges.

**Current disposal:** A large fraction of waste tyres are used as **fuel in cement kilns, brick kilns, and steel furnaces** — a high-emission practice. Some are converted to crumb rubber (for playgrounds, athletic tracks, road surfacing). Very few are recycled to recover carbon black (a key tyre manufacturing input).

**The opportunity:** Tyres contain approximately 20–30% carbon black and 25% synthetic rubber. Modern **pyrolysis** processes can recover both as usable secondary materials — creating economic value while reducing waste disposal. India has limited but growing pyrolysis capacity.

**Policy linkage:** Extended Producer Responsibility for tyres (implemented under Plastic Waste Management Rules amendments) creates financial obligations for tyre manufacturers, incentivising investment in formal recycling infrastructure.

## REPORT 3: E-WASTE AND LITHIUM-ION BATTERIES

This is the most critical report given India's EV transition ambitions.

**E-waste trajectory:** India generates **6.19 million metric tonnes (MMT) of e-waste in 2024**, projected to reach **14 MMT by 2030** — making India one of the world's largest e-waste generators. India generates roughly 2 kg per capita per year — lower than OECD averages (~20 kg) but with a much faster growth rate.

**Li-ion battery wave:** Lithium-ion battery demand will surge from **29 GWh (2025) to 248 GWh (2035)** — a nearly nine-fold increase. Each depleted battery pack contains lithium (0.5–1.2 kg per kWh), cobalt, nickel, manganese, and graphite — all critical minerals. At current import prices, recoverable materials in India's 2030 battery waste stream could be worth billions of dollars.

**Current recovery failure:** India’s formal e-waste recycling capacity is estimated at only 20–25% of generated waste. The remainder is handled by the informal sector using acid leaching and open burning — recovering some metals but contaminating soil and groundwater and exposing workers to hazardous materials.

**E-Waste Management Rules 2022:** Updated the 2016 rules to include Extended Producer Responsibility (EPR) obligations for battery manufacturers, requiring producers to ensure collection and recycling targets. Advanced Chemistry Cell (ACC) battery manufacturers under the PLI-ACC scheme (50 GWh capacity target) must also plan for battery lifecycle management.

## THE 6RS FRAMEWORK AND INDIA’S CIRCULAR ECONOMY TARGETS

The reports use the **6Rs of Circular Economy** as their organising framework:

R	Meaning	Example
<b>Reduce</b>	Minimise material use	Design lighter vehicles; extend battery life through software
<b>Reuse</b>	Extend product life	Refurbished EV batteries for stationary storage (second life)
<b>Recycle</b>	Material recovery	Hydrometallurgical Li recovery from battery black mass
<b>Refurbish</b>	Restore products to functionality	Reconditioned tyres; rebuilt gearboxes
<b>Recover</b>	Energy recovery from non-recyclable	Pyrolysis of tyres for fuel oil
<b>Repair</b>	Extend product lifespan	Right-to-repair policies for electronic devices

**India’s membership in GACERE** (Global Alliance on Circular Economy and Resource Efficiency) — a UNEP and European Commission initiative — signals India’s integration into global circular economy governance.

## UPSC RELEVANCE

*ELVs (23 million 2025 → 50 million 2030); e-waste (6.19 MMT 2024 → 14 MMT 2030); Li-ion battery demand (29 GWh 2025 → 248 GWh 2035); Circular Economy 6Rs (Reduce, Reuse, Recycle, Refurbish, Recover, Repair); EPR (Extended Producer Responsibility); Vehicle Scrappage Policy 2021 (ATS + RVSFs; 15 years commercial; 20 years private); E-Waste Management Rules 2022; PLI-ACC (50 GWh target); GACERE (UNEP + European Commission); MRAI (Material Recycling Association of India).*

*Circular economy framework; India’s waste management crisis; EPR as policy instrument; vehicle scrappage and reverse logistics; EV battery lifecycle and critical mineral recovery; informal vs formal recycling sector; India’s obligations under Basel Convention (hazardous waste).*

**★ FACTS CORNER — KNOWLEDGEPEDIA**
**NITI AAYOG CIRCULAR ECONOMY REPORTS (FEB 2026):**

Released at: International Material Recycling Conference (IMRC), Jaipur

Three reports: ELVs | Waste Tyres | E-waste & Li-ion Batteries

**ELV PROJECTIONS:**

2025: **23 million** ELVs

2030: **50 million** ELVs

Vehicle Scrappage Policy: 2021; RVSFs + ATS framework

**E-WASTE PROJECTIONS:**

India e-waste 2024: **6.19 MMT**

India e-waste 2030: **14 MMT**

Per capita (India): ~2 kg/year (OECD: ~20 kg/year)

**LI-ION BATTERY DEMAND:**

2025: **29 GWh**

2035: **248 GWh** (nearly 9x increase)

PLI-ACC target: **50 GWh** domestic capacity

**CIRCULAR ECONOMY 6RS: REDUCE | REUSE | RECYCLE | REFURBISH | RECOVER | REPAIR**
**INDIA'S E-WASTE POLICY TIMELINE:**

E-Waste Management Rules: **2016** (first comprehensive rules); amended **2022**

EPR (Extended Producer Responsibility): Mandated for electronics + battery producers

Battery Waste Management Rules: **2022** (separate rules for batteries)

**OTHER RELEVANT FACTS:**

Waste tyre generation India: ~**1.6 million tonnes/year**

Daily MSW India: ~**1.68 lakh tonnes**; only **55–60%** processed

2,100+ dumpsites occupy **10,000+ hectares** of land

GHG from MSW: ~**41 million tonnes CO<sub>2</sub>-eq** by 2030

India EV sales: 50,000 (2016) → 2.08 million (2024); target **30% EV share by 2030**

GACERE: Global Alliance on Circular Economy and Resource Efficiency; India member

Basel Convention: International treaty governing hazardous waste transboundary movement; India signatory

Sources: Drishti IAS, IndiaBix

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