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EDITORIAL ANALYSIS

India-Finland and the Circular Economy — From Linear Waste to Circular Wealth

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India-Finland and the Circular Economy — From Linear Waste to Circular Wealth

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INTERVIEW ANGLE

"India generates 62 million tonnes of solid waste annually. Can the circular economy model transform waste management from a cost centre to a profit centre?"

WHY IN NEWS

India will co-host the **World Circular Economy Forum (WCEF) 2026** in New Delhi in autumn 2026, alongside the Finnish Innovation Fund **Sitra**. This will be the first time the global sustainability forum is held in continental Asia. The Central Pollution Control Board (CPCB) under India's Ministry of Environment, Forest and Climate Change is the Indian co-host.

What Is the Circular Economy?

The circular economy replaces the traditional **"take-make-dispose"** linear model with a closed-loop system where products and materials are designed for reuse, repair, remanufacture, and recycling. Instead of extracting virgin resources, processing them into goods, and discarding them as waste, the circular model keeps materials in productive use for as long as possible.

Linear vs Circular Economy

LINEAR ECONOMY	CIRCULAR ECONOMY
Extract raw materials	Minimise virgin extraction
Manufacture and use	Design for durability, repair, modularity
Dispose as waste	Recover materials through recycling, composting, remanufacturing
Value destroyed at end-of-life	Value retained across multiple life cycles
Waste is a cost	Waste is a resource (secondary raw materials)
Focus: GDP growth	Focus: GDP growth + resource decoupling

India's Waste Crisis — The Numbers

India generates staggering volumes of waste across categories, and the management infrastructure has not kept pace with urbanisation and consumption growth.

Waste Generation Statistics

WASTE CATEGORY	ANNUAL GENERATION	COLLECTION/TREATMENT GAP
Municipal Solid Waste (MSW)	~62 million tonnes	Only 43 MT collected; 12 MT treated; 31 MT dumped in wasteyards
Plastic waste	5.6 million tonnes	EPR covers packaging; informal sector handles bulk recycling
E-waste	1.5 million tonnes	Formal recycling rate: ~20%; 80% handled by informal sector
Hazardous waste	7.9 million tonnes	Managed through TSDF (Treatment, Storage, Disposal Facilities)
Biomedical waste	0.17 million tonnes	Regulated under BMW Rules 2016
Construction & Demolition (C&D) waste	~150 million tonnes	Largely unregulated; dumped in open sites

The **CPCB projects** that annual MSW generation will reach **165 million tonnes by 2030** — nearly triple the current level. Without circular economy interventions, India will face a waste crisis that overwhelms landfill capacity, contaminates groundwater, and accelerates greenhouse gas emissions from decomposing organic waste.

NITI Aayog Circular Economy Action Plan — 11 Sectors

NITI Aayog, in consultation with the Ministry of Environment, identified **11 focus sectors** for circular economy transition in March 2021. Eleven committees headed by Secretaries or Additional Secretaries of relevant ministries were constituted to develop action plans.

The 11 Focus Sectors

SECTOR	LEAD MINISTRY	KEY CHALLENGE
Municipal Solid & Liquid Waste	MoHUA	31 MT dumped untreated annually
Scrap Metal (ferrous & non-ferrous)	Ministry of Steel	Import-dependent; informal recycling dominates
Lithium-Ion Batteries	MoEFCC	EV adoption driving volumes; limited recycling capacity
Tyre & Rubber Recycling	Ministry of Chemicals	~1 billion waste tyres annually; pyrolysis vs retreading debate
Gypsum Waste	Ministry of Fertilizers	Phosphogypsum from fertilizer plants — hazardous if untreated
End-of-Life Vehicles (ELVs)	Ministry of Road Transport	No formal ELV framework until 2024 Vehicle Scrappage Policy
Electronic Waste	MeitY	1.5 MT/year; hazardous metals (lead, mercury, cadmium)
Toxic & Hazardous Industrial Waste	MoEFCC	7.9 MT/year; requires specialised TSDFs
Used Oil Waste	Ministry of Petroleum	Contaminated groundwater risk; informal collection channels
Agricultural Waste	Ministry of Agriculture	Stubble burning: 15-20 MT crop residue burnt annually in Punjab-Haryana
Solar Panel Waste	MNRE	First panels reaching end-of-life by 2030-35; no recycling infrastructure

A **Circular Economy Cell** was constituted in NITI Aayog in September 2022. As of 2025, **10 of 11 sectoral action plans** have been finalised for implementation by stakeholder ministries.

Extended Producer Responsibility (EPR) — India's Key Instrument

EPR makes manufacturers and brand owners legally responsible for the end-of-life management of their products. India has implemented EPR frameworks across three major waste streams:

EPR Implementation Status

EPR FRAMEWORK	RULES	KEY TARGETS
Plastic Packaging	Plastic Waste Management Rules 2016 (amended 2022)	100% EPR coverage for plastic packaging by 2028
E-Waste	E-Waste Management Rules 2022	Producers must collect 60-80% of e-waste generated
Battery Waste	Battery Waste Management Rules 2022	Mandatory collection targets for Li-ion, lead-acid batteries

Progress to date: The CPCB's centralised EPR portal has **60,128 registered producers/importers/brand owners** and **3,012 registered plastic waste processors**. Since EPR guidelines came into force in 2022, approximately **20.7 million tonnes of plastic packaging waste** have been recycled (as told to Parliament on March 23, 2026).

From **April 1, 2026**, the expanded EPR Rules 2024 will extend coverage beyond plastics to include **non-ferrous metal scraps, paper, glass, and metals** — a significant expansion toward a zero-waste economy.

Finland as a Global Circular Economy Leader

Finland was the **first country in the world** to prepare a national circular economy roadmap in 2016, led by Sitra. The Finnish experience offers several lessons for India.

Finland's Circular Economy Achievements

INDICATOR	FINLAND'S PERFORMANCE
National roadmap	World's first (2016); Roadmap 2.0 launched in 2019
Beverage container recycling	Near 100% (deposit-return scheme)
Material waste rate	7.4% of domestic material consumption (Eurostat)
Circular economy patents	Ranked 14th globally (recycling & secondary raw materials)
Public support	82% of Finns believe circular economy creates jobs (Sitra 2021 survey)
WCEF initiative	Founded by Sitra; held in Helsinki, Yokohama, and Sao Paulo

What India Can Learn from Finland

1. **Deposit-return systems** — Finland's near-100% beverage container recycling is driven by a deposit scheme where consumers pay a small refundable deposit. India's Swachh Bharat Mission could integrate similar deposit-return for PET bottles and glass.

2. **Digital material passports** — Finland tracks materials through digital passports that record composition, origin, and recyclability. India's EPR portal could evolve into such a system.
3. **Public procurement** — Finland mandates circular economy criteria in government procurement. India's GeM (Government e-Marketplace) could add recycled content requirements.

SDG 12 — Responsible Consumption and Production

The circular economy is directly aligned with **SDG 12 (Responsible Consumption and Production)**, which targets:

- Halving per capita food waste by 2030 (Target 12.3)
- Environmentally sound management of chemicals and waste (Target 12.4)
- Reducing waste generation through prevention, reduction, recycling, and reuse (Target 12.5)

India's WCEF 2026 co-hosting signals its commitment to SDG 12 while positioning itself as a leader among developing nations on circular economy transition.

Both Sides — Can India Go Circular?

The Optimistic Case

- India's **informal recycling sector** (waste pickers, kabadiwalas) already recovers materials at rates that formal Western systems struggle to match — estimated **15-20% of MSW** is informally recycled
- **EPR expansion** to non-plastic materials (April 2026) will create formal market incentives
- **NITI Aayog's 11-sector framework** provides institutional scaffolding
- India's **demographic dividend** means a young workforce can be trained for circular economy jobs (estimated 1.4 million green jobs potential)
- **PM's LiFE (Lifestyle for Environment)** campaign aligns individual behaviour change with circular economy goals

The Sceptical Case

- **Enforcement gap** — Only 12 MT of 62 MT waste is treated before disposal. CPCB has issued show-cause notices to non-compliant producers but penalties are rarely deterrent
- **Informal sector marginalisation** — EPR formalisation risks displacing millions of waste pickers who currently perform recycling without institutional recognition
- **Technology deficit** — Li-ion battery recycling, solar panel recycling, and advanced plastic recycling (chemical recycling) require technologies India does not yet possess at scale
- **Urban-rural divide** — Circular economy interventions are concentrated in Tier-1 cities; rural India lacks waste management infrastructure entirely

- **Stubble burning persists** — Despite the Pusa Bio-Decomposer and Happy Seeder subsidies, 15-20 MT of crop residue is still burnt annually in Punjab and Haryana

Way Forward

1. **Integrate informal sector** — Any circular economy framework must formalise waste pickers through cooperatives, provide health insurance, and ensure they benefit from EPR credit markets rather than being displaced.
2. **Circular economy law** — Move beyond fragmented waste management rules. Enact a comprehensive **Circular Economy Act** that sets economy-wide material recovery targets, mandates eco-design standards, and creates a National Circular Economy Authority.
3. **Green public procurement** — Mandate that 20-30% of government procurement (through GeM) must meet recycled content standards by 2030.
4. **Technology partnerships** — Use WCEF 2026 to sign technology transfer agreements with Finland, Japan, and the EU on Li-ion recycling, solar panel decommissioning, and chemical plastic recycling.
5. **C&D waste regulation** — Construction and demolition waste (~150 MT/year) is the elephant in the room. Enforce C&D Waste Management Rules 2016 and mandate recycled aggregate use in public construction projects.
6. **Stubble-to-value chains** — Scale up compressed biogas (CBG) plants under the SATAT scheme and bio-ethanol production from crop residue, converting agricultural waste from a pollution problem into an energy asset.

UPSC RELEVANCE

Circular economy definition, NITI Aayog 11 sectors, EPR framework (Plastic/E-waste/Battery), WCEF host (India 2026), SDG 12, Sitra (Finland), CPCB.

MAINS GS-3:

Waste management challenges, circular economy vs linear economy, EPR as a policy tool, role of informal sector in waste management, India-Finland cooperation, industrial pollution and environmental degradation.

📌 FACTS CORNER — KNOWLEDGEPEDIA

WCEF 2026:

Host: India (New Delhi, autumn 2026)

Co-hosts: CPCB (India) + Sitra (Finland)

First time in continental Asia

Previous hosts: Helsinki, Yokohama, Sao Paulo

INDIA WASTE STATISTICS:

Total waste: 62 million tonnes/year

MSW collected: 43 MT; treated: 12 MT; dumped: 31 MT

Plastic waste: 5.6 MT/year

E-waste: 1.5 MT/year

Hazardous waste: 7.9 MT/year

C&D waste: ~150 MT/year

MSW projected 2030: 165 MT (CPCB)

NITI AAYOG CIRCULAR ECONOMY:

11 committees constituted: March 2021

Circular Economy Cell: September 2022

10 of 11 sectoral action plans finalised

Focus areas include: MSW, scrap metal, Li-ion batteries, tyres, ELVs, e-waste, solar panels, agricultural waste

EPR IN INDIA:

Registered producers/importers on EPR portal: 60,128

Registered plastic waste processors: 3,012

Plastic packaging waste recycled since 2022: 20.7 MT

EPR expansion (April 2026): Now covers metals, paper, glass

FINLAND'S CIRCULAR ECONOMY:

First national circular economy roadmap: 2016

Beverage container recycling: near 100%

Sitra: Finnish Innovation Fund (founded 1967, under Finnish Parliament)

82% Finns support circular economy for jobs

OTHER RELEVANT FACTS:

SDG 12: Responsible Consumption and Production

PM LiFE campaign: Lifestyle for Environment (launched June 2022 at Stockholm+50)

SATAT scheme: Sustainable Alternative Towards Affordable Transportation (CBG from waste)

Swachh Bharat Mission 2.0: focus on source segregation, processing, legacy dumpsite remediation

India's annual GHG from MSW: projected 41.09 MT by 2030

Sources: Down to Earth , PIB , NITI Aayog , Sitra

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