E-Waste Management

Mains Syllabus: GS III - Environmental pollution and degradation.

Why in the News?

South Korean tech giants LG and Samsung have filed legal petitions against the Indian government, challenging a newly introduced e-waste recycling regulation that mandates a minimum payout to recyclers.

What is the status of e-waste in India?

- **E Waste** - Electronic waste is the discarded electrical and electronic equipment and its parts, often containing toxic materials.
- It includes items like computers, mobile phones, and household appliances that have reached the end of their useful life and are discarded.
- **Composition** - E-waste contains a variety of materials, including precious metals like gold and copper, as well as hazardous substances like mercury, lead, and cadmium.
- **Solid Waste** - Electronic waste (e-waste) is one of the fastest growing solid waste streams in the world.
- **E waste Generation Rate** - In 2022, an estimated 62 million tonnes of e-waste were produced globally , up 82% from 2010 but Only 22.3% was documented as formally collected and recycled.
- The world's generation of electronic waste is rising five times faster than documented e-waste recycling, reports the UN's fourth Global E-waste Monitor (GEM).
- **India's E waste Generation** - India's e-waste generation surged by 73% in five years, reaching 1.751 million MT in 2023-24.

India ranks as the world's third-largest generator of electronic waste, after China and the United States.

Financial Year	Generation	Quantity of e-waste collected, dismantled and recycled / disposed	
	(Tonne)	(Tonne)	(%)
2019-20	10,14,961.21	2,24,041.0	22.07
2020-21	13,46,496.31	3,54,291.22	26.31
2021-22	16,01,155.36	5,27,131.57	32.92

What are the impacts of e-waste?

- **Soil and Water Contamination** - E-waste contains toxic substances like lead, mercury, cadmium that can leach into the soil and water when disposed of improperly.
- **Air Pollution** - Burning or improper shredding of e-waste releases harmful pollutants into the air, like dioxins, furans, and particulate matter,contributing to air quality degradation.
- **Health Problem** - Exposure to the harmful chemicals from e-waste creates severe health hazards that can be fatal.
- The toxins enter our bodies through inhalation, ingestion of food or water, and skin absorption.

Metal	Health effects e-waste-related
Lead	Damages brain function, particularly in children
Americium	Can induce cancer
Mercury	Causes memory loss, muscle weakness, reduced fertility, and more
Cadmium	Severe lung damage if breathed in
Sulfur	Damages the liver, heart, kidneys, and eyes
Chromium	A known cause of cancer

- **Climate Change** - The decomposition of e-waste in landfills and incineration of e-waste produces greenhouse gases like methane, a potent greenhouse gas, which contribute to climate change.
- **Biodiversity Loss** - Pollution caused by e-waste impacts some animal species more than others, which may be endangering these species and the biodiversity of certain regions that are chronically polluted.
- **Economic Losses** - The improper disposal of valuable materials in e-waste results in a loss of resources and economic opportunities.

India loses more than $10 billion annually due to water pollution from the disposal of cyanide and sulphuric acid solutions, air pollution caused by lead fumes, open coal burning, and plastic incineration, and soil pollution.

E- Waste regulations in India

- The management of E-Waste in India is presently regulated under E-Waste (Management) Rules, 2022 under the Environment Protection Act, 1986 and notified by Central Pollution Control Board.
- **Extended Producer Responsibility** – The EPR mandates that producers of Electrical and Electronic Equipments are responsible for the entire lifecycle of their products, including post-consumer waste management.
- This responsibility encompasses the collection, recycling, and environmentally sound disposal of e-waste.
- **Rules Applicability** - It apply to every manufacturer, producer, refurbisher, dismantler, and recycler involved in the lifecycle of EEE listed in Schedule I.
- **Environmental Compensation** – It shall be levied for non-compliances of provisions of E-Waste(Management) Rules, 2022 and amendments thereof.
- **Mandatory Registration** - All the manufacturer, producer, refurbisher and recycler are required to register on portal developed by CPCB.
- No entity shall carry out any business without registration and also not deal with any unregistered entity.
- **Floor Price** – The 2022 rule introduced a floor price for EPR certificates to ensure fair returns for registered recyclers, curbing informal, hazardous recycling (practices that dominate 95% of the sector).

What are the challenges in e-waste management?

- **Infrastructure Limitations** - Many regions lack the infrastructure necessary for proper e-waste collection, sorting, and recycling.
- **High Costs of Recycling Infrastructure** - Setting up a proper infrastructure and employing advanced recycling technologies can be expensive, discouraging investment, especially in developing countries.
- **Rapid Technological Change** - The rapid pace of technological innovation leads to shorter product life cycles and more frequent disposal, outpacing the capacity of recycling systems to adapt.
- **Product Complexity** - Modern electronic devices are made from a mix of materials (plastics, metals, glass) and often feature miniaturized, embedded, or non-removable components, making dismantling, sorting, and recycling resource-intensive and technically challenging.
- **Inefficient Collection** - There is often a lack of accessible, visible collection points and clear information about proper disposal methods.
- **Lack of Public Awareness** - Many people are unaware of what qualifies as e-waste or how to dispose of it properly, leading to illegal dumping, hoarding, or mixing e-waste with household trash.
- **Transboundary Movement** - Significant volumes of e-waste are exported, often illegally, from developed to developing countries, where they are processed under unsafe conditions, exacerbating environmental and health problems.

What can be done?

- The number and capacity of certified recycling and refurbishing facilities can be increased , ensuring they are equipped with advanced, eco-friendly technologies to safely process a wide range of electronic wastes.
- A well-structured, nationwide e-waste collection network with accessible drop-off

points for consumers and businesses needs to be created.

- Informal e-waste handlers can be channelized into the formal system through structured partnerships, training, and incentives, ensuring safe and environmentally sound recycling practices.
- A robust reverse supply chain can be built for the collection, transportation, and tracking of discarded electronics.
- Partnerships among government, private sector, and NGOs can be promoted to drive innovation, investment, and best practices in e-waste management.

Reference

[The Hindu | India's rising e-waste](#)