

# E-Waste



**Consumer Education and Research Centre**  
**ENVIS Resource Partner**  
**Ahmedabad, India**

## E-Waste

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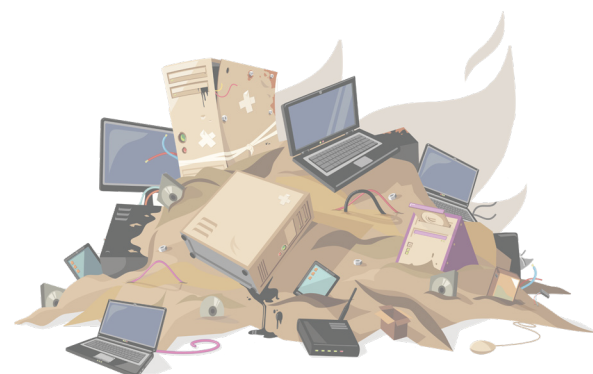


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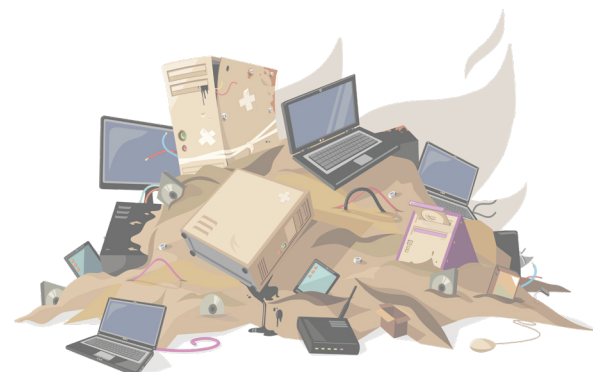
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## Preface

E-waste is becoming a major threat to the globe. Our modern life can be attributed to the advanced technologies the world has offered us. The life around us has become much easier due to the inventions of computers, mobiles and the internet.

One can order anything from anywhere around the world by the tip of their finger. This ease of life that the advanced technology has given us has come with a cost. The life cycle analysis of any electrical appliance has a detrimental impact on the environment right from the extraction of raw materials, manufacturing, processing, packaging, distribution, usage to its disposal. Due to the digitization of the modern day world, the discarded e-waste is being piled up.

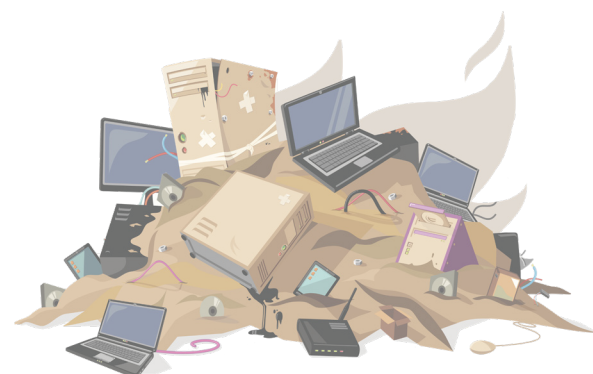
The toxic emissions that include release of heavy metals, carcinogenic chemicals, acids etc. from the e-waste is causing harmful effects to the biome. Improper handling of e-waste is an immediate and long term concern which can lead to drastic environmental problems and human health hazards.

According to the Basel Convention, wastes are substances or objects, which are disposed of or are intended to be disposed of, or are required to be disposed of by the provisions of national laws. (Text of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, UNEP, Geneva, Switzerland, p.6, <http://www.basel.int/text/>)

The major sources of e-waste includes all electrical and electronic appliances from commercial, households etc. The quantum of e-waste generated during the financial year 2019-2020, the estimated generation of e-waste was 1014961.2 tonne for 21 types of electrical and electronic equipment (CPCB).

To deal with the waste, the government and many private organizations are involved in collections, dismantling, proper disposal, recycling, refurbishing and exporting of e-materials. Improper processing of e-waste could cause more harm after the end of life than it ever did during its use.

The book details the e-waste sources and its detrimental impacts on the environment. It covers the International Policies on E-Waste. These policies encompass provisions for the production of electrical and electronic equipment (EEE), as well as the collection, treatment and export of discarded EEE. The other topics share the information on the e-waste management and recycling practices in India.



# E-WASTE SOURCES AND ITS ENVIRONMENTAL IMPACTS

We have embraced digital revolution in all its glory. This has resulted into an ever growing heap of e-waste, which has become hard to manage. The substantial production of electronic products and its disposal has become a grave concern.

E-waste stands for electronic waste. The electronic products that are unwanted or has neared its useful life come under the category of e-waste. It can be defined as any electrical or electronic equipment that's been discarded. This includes working and broken items that are thrown in the garbage. Used electronics which are destined for reuse, resale, salvage, recycling or disposal are also considered as e-waste. The causes of e-waste generation are: Upgrade and innovation in technology, Lifestyle changes or end of the intended usage of the electronic equipment.

## E-waste includes:

- Non-ferrous and precious metals,
- Alloys,
- Glass,
- Ceramics,
- Organic polymers with toxic content,
- Other substances like stabilizers, fillers and pigments.

## The following are the different categories of E-waste:

Type 1: Major appliances (refrigerators, washing machines, dryers etc.)

Type 2: Small appliances (vacuum cleaners, irons, blenders, fryers etc.)

Type 3: Computer and telecommunication appliances (laptops, PCs, telephones, mobile phones etc.)

Type 4: Consumer electronics (video and audio equipment, musical instruments)

Type 5: Lighting devices (incandescent light bulbs, fluorescent tubes, gas-discharge lamps etc.)

Type 6: Electrical and electronic tools (drills, saws, gardening devices etc.)

Type 7: Toys, leisure (electronic toys, models, sports equipment)

Type 8: Medical devices (all medical equipment with the exception of implants)

Type 9: Monitoring devices (detectors, thermostats, laboratory equipment etc.)

Type 10: Vending machines/Autonomic dispensers

E-waste can be toxic as it cannot be biodegradable as it accumulates in soil. Electronic goods also have a drastic impact on climate change. Every device ever produced has a carbon footprint and is contributing to human-made global warming. For the manufacturing of 1 tonne of laptops, potentially 10 tonnes of CO<sub>2</sub> is emitted. E-waste is often overlooked as its long term impact is still unknown.



**Effects of e-waste on Air:** Dismantling, shredding or melting of the informally discarded e-waste materials releases dust particles, hydrocarbons and toxic fumes into the atmosphere thus, contributing to greenhouse gas emissions and polluting the surrounding air. In order to extract valuable metals such as copper it is often incinerated. These burning of e-waste often pose great health risk to humans and animals. Higher value materials, such as gold and silver, are often removed from highly integrated electronics by using acids, desoldering, and other chemicals, which also release fumes in areas where recycling is not regulated properly.



**Effects of e-waste on Soil:** Improper and illegal disposal of e-waste into the landfills can cause the heavy metals and flame retardants to directly seep into the soil. The nearby crops and farms become vulnerable by absorbing these toxins which results in less productive yields. Large particles of e-waste due to their size and weight redeposit onto the grounds. These contaminants remain in the soil for longer periods which are harmful to the microorganisms of the soil. The amount of soil contaminated depends on a range of factors including temperature, soil type, pH levels and soil composition. When electronics aren't recycled properly, electronic waste can leach out into the surrounding area and contaminate crops, livestock, and wildlife.



**Effects of e-waste on Water:** Improper disposal of e-waste can also cause water pollution. It breaks down into heavy metals such as lead, arsenic, cadmium etc which leaches down leading to soil pollution. These heavy metals further leaches down contaminating the groundwater that underlies these landfill sites. Toxins like lead, barium, lithium and mercury which dissolves these water resources are carcinogenic to humans.



Leachates of Mercury and Polychlorinated biphenyls (PCBs) are formed when circuit breakers and condensers are destroyed. When brominated flame retardant plastic or cadmium containing plastics are land filled, both polybrominateddiphenyl ethers (PBDE) and cadmium may leach into the soil and groundwater. It has been found that significant amounts of lead ion are dissolved from broken lead containing glass, such as the cone glass of cathode ray tubes. The toxic fall-out from open air burning affects both the local environment and broader global air currents, depositing highly toxic byproducts in many places throughout the world.

When consumed, these toxins are retained in the cells of organisms and passed up the food chain in even higher concentrations. These processes are called bioaccumulation and biomagnification. E-waste is often exported to developing countries where workers use primitive recycling techniques, such as acid leaching and cable burning, to recover gold, silver, copper, and other valuable metals. Workers in so-called informal recycling centers are directly exposed to contaminants as they dismantle the discarded devices. Furthermore, primitive recycling practices release polyaromatic hydrocarbons, dioxins, and other hazardous byproducts into the environment. This environmental contamination exposes neighboring communities to the pollutants who are exposed to thyroid dysfunction, adverse birth outcomes, behavioral changes, decreased lung function, and adverse changes that can be seen at the cellular level.



## Effects of e-waste on Health

Source of e-wastes	Constituent	Health effects
Solder in printed circuit boards, glass panels and gas-kets in computer monitors	Lead (Pb)	<ul style="list-style-type: none"> <li>• Damage to central and peripheral nervous systems, blood systems and kidney damage.</li> <li>• Affects brain development of children.</li> </ul>
Chip resistors and semiconductors	Cadmium (Cd)	<ul style="list-style-type: none"> <li>• Toxic irreversible effects on human health.</li> <li>• Accumulates in kidney and liver.</li> <li>• Causes neural damage.</li> <li>• Teratogenic.</li> </ul>
Relays and switches, printed circuit boards	Mercury (Hg)	<ul style="list-style-type: none"> <li>• Chronic damage to the brain.</li> <li>• Respiratory and skin disorders due to bioaccumulation in fishes.</li> </ul>
Corrosion protection of untreated and galvanized steel plates, decorator or hardner for steel housings	Hexavalent chromium (Cr) VI	<ul style="list-style-type: none"> <li>• Asthmatic bronchitis.</li> <li>• DNA damage.</li> </ul>
Cabling and computer housing	Plastics including PVC	<p>Burning produces dioxin. It causes</p> <ul style="list-style-type: none"> <li>• Reproductive and developmental problems;</li> <li>• Immune system damage;</li> <li>• Interfere with regulatory hormones</li> </ul>
Plastic housing of electronic equipments and circuit boards	Brominated flame retardants (BFR)	<ul style="list-style-type: none"> <li>• Disrupts endocrine system functions</li> </ul>
Front panel of CRTs	Barium (Ba)	<p>Short term exposure causes:</p> <ul style="list-style-type: none"> <li>• Muscle weakness</li> <li>• Damage to heart, liver and spleen.</li> </ul>
Motherboard	Beryllium (Be)	<ul style="list-style-type: none"> <li>• Carcinogenic (lung cancer)</li> <li>• Inhalation of fumes and dust. Causes chronic beryllium disease or beryllicosis.</li> <li>• Skin diseases such as warts.</li> </ul>



# INTERNATIONAL POLICIES ON E-WASTE

In response to the tremendous growth in the amount of e-waste generated worldwide and international controversy over its export, recent decades have seen an upsurge of used and end-of-life electronics regulations at the local, national, regional and international levels. These policies encompass provisions for the production of electrical and electronic equipment (EEE), as well as the collection, treatment and export of discarded EEE.

## Key International Processes and Agreements

### Connect 2020 Agenda for Global Telecommunication/ICT Development

This global agenda sets out the shared vision, goals and targets that Member States of the International Telecommunication Union (ITU) have committed to achieve by 2020. These targets will be achieved in collaboration with stakeholders within the ICT ecosystem. With the adoption of the Connect 2020 Agenda, ITU Member States have committed to transitioning to an information society, empowered by the interconnected world, where telecommunication/ICT enables and accelerates socially, economically and environmentally sustainable growth and development for everyone. One of the key goals of the Connect 2020 Agenda is sustainability. Within this specific Goal, it addresses the issue of e-waste through reducing the volume of redundant e-waste by 50% by 2020.

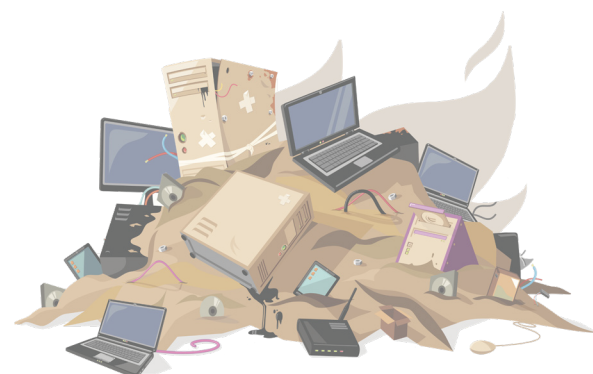
### Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)

The Basel Convention aims to protect human health and the environment against the adverse effects resulting from the generation, management, transboundary movements and disposal of hazardous and other wastes. Among key provisions of the Basel Convention are the environmentally sound management, transboundary movement, waste minimization and waste disposal practices aimed at mitigating adverse effects on human health and the environment. E-waste is added to the convention in 1998 by the fourth meeting of the conference of the parties.

The Nairobi Declaration was adopted by the 9th meeting of the conference of the parties to the Basel Convention in 2006, and gave a mandate to the secretariat of the Basel Convention to implement a work plan for the environmentally sound management of e-waste. The e-waste work plan adopted by the ninth conference of the parties included activities in the following work areas: programmes of activities for the environmentally sound management of e-waste in Africa, in Asia Pacific and in South America; the Partnership for Action on Computing Equipment (PACE); and, the preparation of Technical Guidelines on transboundary movement of e-waste, in particular regarding the distinction between waste and non-waste.

### Montreal Protocol on Ozone Depleting Substances (1989)

The Montreal Protocol is an international treaty which aims to protect the ozone layer by phasing out the production and use of ozone depleting substances (ODS). ODS, chlorofluorocarbons (CFCs) and hydrochlorofluorocarbon (HCFCs) as refrigerants are still used in some refrigerators and air conditioners. Waste refrigerators and air conditioners will also likely contain CFCs or HCFCs.





In terms of WEEE management, the Montreal Protocol is an important instrument because it covers ozone-depleting substances present in refrigerators, freezers and other refrigeration equipment and provides for management and disposal, as well as for reducing production.

### **Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998)**

The Rotterdam Convention promotes shared responsibilities in relation to the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm. The convention promotes open exchange of information about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to parties. It also calls on exporters of hazardous chemicals to use proper labelling, to include directions on safe handling, and to inform purchasers of any known restrictions or bans. In context of WEEE, capacitors are estimated to constitute the second largest source of Polychlorinated biphenyls PCBs. PCBs have various industrial uses in refrigeration systems and in the electrical industry (capacitors and transformers).

### **Stockholm Convention on Persistent Organic Pollutants (2001)**

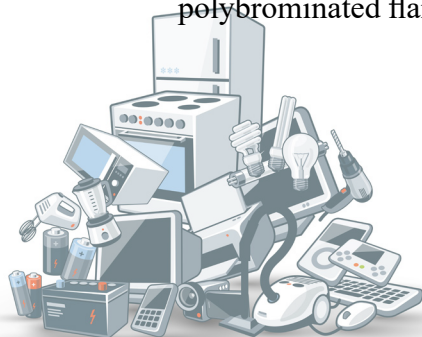
The Stockholm Convention is a global treaty designed to protect human health and the environment from chemicals that remain intact in the environment for long periods of time, that become widely distributed geographically, that accumulate in the fatty tissues of humans and wildlife, and that have harmful impacts on human health or on the environment. There are several persistent organic pollutants present in e-waste, and the listing of e-waste requires parties of the Stockholm Convention to take appropriate measures to eliminate the release of these pollutants from stockpiles and wastes. In relation to the management of WEEE, the Stockholm Convention is particularly important because of the PCBs contained in electrical transformers in electrical equipment and in the capacitors of some devices.

### **International Labour Organization Convention on Chemicals, concerning safety in the use of chemicals at work (1990)**

International Labour Organization (ILO) Convention stresses the right of workers to information about the chemicals they use at work and imposes responsibility on suppliers and employers to provide information and training; whilst Recommendation sets standards for classification, labelling and marking, and chemical safety data sheets, and includes steps for employers to include measures such as monitoring of exposure, operational control, medical surveillance, first aid and emergency preparedness, and close cooperation between workers and employers. International labour Conventions protect and apply to all workers engaged in the management of waste including e-waste.

### **Organisation for Economic Cooperation and Development, Council Decision Waste Agreement (1992)**

This Council Decision is an agreement among developed Member States that aims to control the transboundary movement of hazardous waste – wastes exported only for the purpose of material recovery. The Waste Agreement established a framework for OECD Member States to supervise and control the transboundary movement of wastes within the OECD area. This shall also apply to e waste as they contain hazardous chemicals like mercury, lead, cadmium, polybrominated flame retardants, barium lithium etc.



### **United Nations Framework Convention on Climate Change (UNFCCC) (1994)**

Although not directly involved in e-waste, UNFCCC has been active as part of the e-waste from toxic to green initiative. Through the initiative, waste pickers in India have been trained to collect electronic waste, such as computers and mobile phones, for safe disposal and recycling. The initiative aims to make waste pickers more resilient to poverty by providing green jobs that increase their incomes and protect them from the risks of exposure to toxins and heavy metals.

### **Minamata Convention on Mercury (2013)**

The Minamata Convention is a global treaty to protect human health and the environment from the adverse effects of mercury. The convention draws attention to a global and ubiquitous metal that, while naturally occurring, has broad uses in everyday objects and is released to the atmosphere, soil and water from a variety of sources. Controlling the anthropogenic releases of mercury throughout its lifecycle has been a key factor in shaping the obligations under the convention. The Convention deals with the interim storage of mercury and its disposal once it becomes waste, sites contaminated with mercury, and health problems.

Electronic boards, activated glass (LCD) and batteries may contain extremely contaminating elements that do not degrade completely, such as mercury. Mercury is critical for most everyday electronic devices, such as smartphones, notebooks, batteries and lighting equipment, but it is very polluting, even in small concentrations.

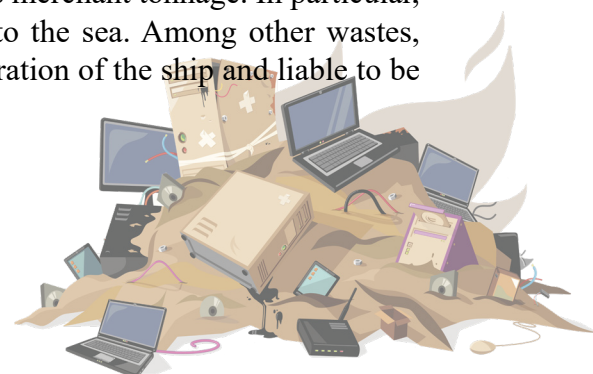
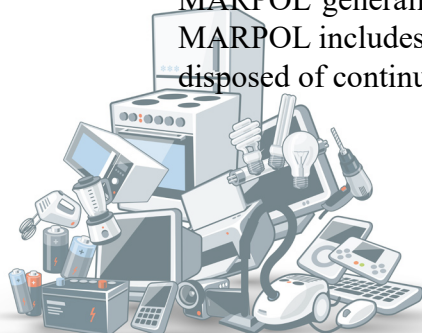
### **Paris Climate Agreement under the United Nations Framework Convention on Climate Change**

The Paris Agreement's central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise below 2 degrees Celsius compared to pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. Additionally, the agreement aims to strengthen the ability of countries to deal with the impacts of climate change. The agreement recognizes that sustainable lifestyles and sustainable patterns of consumption and production, with developed country parties taking the lead, play an important role in addressing climate change.

E-waste disposal contributes to climate change due to the chemicals released when it is burned. Electronics contain materials like copper, aluminium, and iron, and when burned, these metals accumulate in the air. Harmful chemicals like polybrominated diphenyl ethers (PBDE) and polybrominated biphenyls (PBBs) are the principal toxins found in electronics. PBDEs are used as flame retardants in electronics, and during combustion process it releases carbon dioxide. Collectively, these various chemicals when burned for disposal causes harm both to humans and the environment.

### **International Convention for the Prevention of Pollution from Ships (MARPOL)**

MARPOL addresses pollution from ships by oil; by noxious liquid substances carried in bulk; harmful substances carried by sea in packaged form; sewage, garbage; and the prevention of air pollution from ships. MARPOL has greatly contributed to a significant decrease in pollution from international shipping and applies to 99% of the world's merchant tonnage. In particular, MARPOL generally prohibits the discharge of all waste into the sea. Among other wastes, MARPOL includes e-waste generated during the normal operation of the ship and liable to be disposed of continuously or periodically.



## Case Study

With an estimated 20–50 million tons of e-waste produced annually worldwide, it is the fastest-growing stream of municipal solid waste. Management of e-waste is a significant environmental health concern. In developing countries, where most informal and primitive e-waste recycling occurs, workers and others who live near these recycling facilities are exposed to dangerous chemicals with potentially long-term adverse health effects. Other locations where such recycling is prevalent include India and Ghana, Liberia, and Nigeria in Africa.

### Guiyu, China

Guiyu, China, is the last stop for tens of millions of tons of discarded TVs, cell phones, batteries, computer monitors, and other types of electronic waste each year. In this area of Guangdong province in southeast China, the industry is characterized by thousands of small, family-run workshops interspersed with residences, schools, and stores. The workshops employ hundreds of thousands of local and migrant workers to extract copper, silver, gold, platinum, and other materials for resale, often burning or using acid baths to separate out the elements of interest. According to United Nations data, about 70% of electronic waste globally generated ended up in China. Much of [the e-waste] comes through illegal channels because under United Nations conventions, there is a specific ban on electronic waste being transferred from developed countries like the United States to countries like China and Vietnam.



When recycling is done properly, it's a good thing for the environment. But when recycling is done in primitive ways like we have seen in China with the electronic waste, it is hugely devastating for the local environment.

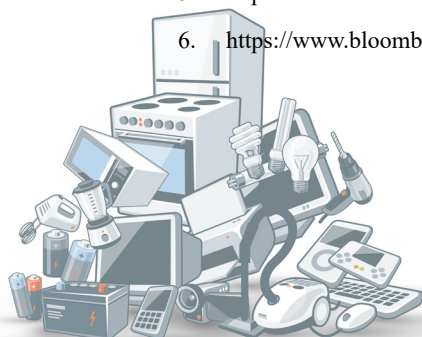
### The Tokyo Medal Project:

The Tokyo Medal Project is an official “Tokyo 2020 nationwide national programme”. The Tokyo organizing committee of Olympics and Paralympics 2021 conducted the “Tokyo Medal 2020” project to collect electronic devices to produce Olympic medals from the recycled e waste collected. Approx. 78985 tons of e waste were collected in the time span of April 2017 to March 2019. Approximately 32kg of gold, 3500kg silver and 2200kg bronze were collected. Every single medal awarded to the athletes of Tokyo Olympics 2021 were from recycled e-waste. 1621 municipalities participated in the e waste collection drive of the e-waste.



## Sources

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## E-WASTE MANAGEMENT IN INDIA

The E-waste (Management & Handling) Rules, 2011 have been notified with primary objective to channelize the E-waste generated in the country for environmentally sound recycling which is largely controlled by the un-organized sector who are adopting crude practices that results into higher pollution and less recovery, thereby causing wastages of precious resources and damage to environment.

The e-waste rules apply to all electrical and electronic equipment (EEE) listed in Table 1 and put on market in India, including their components and consumables which are part of the product at the time of discarding.

The rules also call for the reduction in the use of hazardous substances in electrical and electronic equipment. Every producer of equipment listed in Table 1 shall ensure that the covered products do not contain lead, mercury, cadmium, hexavalent chromium, poly-brominated biphenyls or poly-brominated di-phenyl ethers above a specified threshold. The threshold for cadmium is 0.01% by weight in homogeneous material, for all other substances, the threshold is 0.1% by weight in homogeneous material. In case of any doubt regarding applicability of these rules the matter would be referred to an inter-ministerial committee comprising of technical experts and industry representatives.

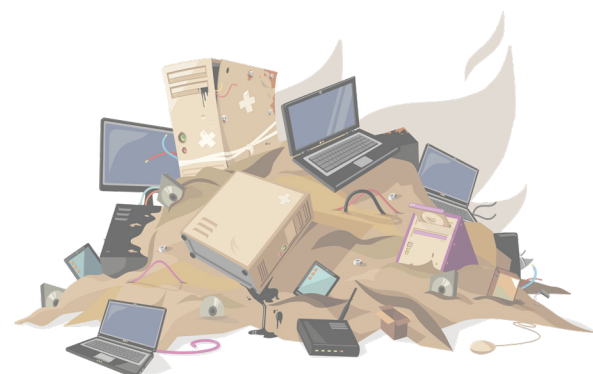
The E-waste (Management & Handling) Rules, 2016 shall apply to every manufacturer, producer, consumer, bulk consumer, collection centres, dealers, e-retailer, refurbisher, dismantler and recycler involved in manufacture, sale, transfer, purchase, collection, storage and processing of e-waste or electrical and electronic equipment listed in Schedule I, including their components, consumables, parts and spares which make the product operational but shall not apply to –

- (a) used lead acid batteries as covered under the Batteries (Management and Handling) Rules, 2001 made under the Act;
- (b) micro enterprises as defined in the Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006); and
- (c) radio-active wastes as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and rules made there under.

### Major Stakeholders

**1. Producer** is any person who, irrespective of the selling technique used, “manufactures and offers to sell electrical and electronic equipment under his own brand; or offers to sell under his own brand, assembled electrical and electronic equipment produced by other manufacturers or suppliers; or offers to sell imported electrical and electronic equipment” and has to take authorization under these Rules for implementation of EPR.

**2. Bulk Consumers** are bulk users of electrical and electronic equipment such as central government or state government departments, public sector undertakings, banks, educational institutions, multinational organizations, international agencies and private companies that are registered under the Factories Act, 1948 and Companies Act, 1956; they have to maintain records on E-waste generated and channelized to registered/authorized collection centres/recycler/dismantler.



**3. Extended Producer Responsibility** is a responsibility of any producer of electrical or electronic equipment, for their products beyond manufacturing until environmentally sound management of their end of life products.

**4. Collection Centre** is a centre established individually or jointly or a registered society or a designated agency or a company or an association to collect e-waste which has to obtain authorization under E-Waste Rules, 2011.

**5. Dismantler** is any person or registered society or a designated agency or a company or an association engaged in dismantling of used electrical and electronic equipment into their components who has to obtain authorization and registration E-Waste Rules, 2011. The association may include a consortium as well.

**6. Recycler** is any person who is engaged in recycling or reprocessing of used electrical and electronic equipment or assemblies or their component. Recycling facility may be set up by an individual or a company or a joint venture or a consortium.

**7. State Pollution Control Boards/ Pollution Control Committees** have been given the responsibility as regulatory agencies for ensuring implementation of the E-waste Rules in their respective States

**8. Central Pollution Control Board** is responsible for evolving the guidelines for implementation, overseeing the progress made in implementing the Rules and ensuring RoHS compliance.



**Table 1: Categories of Electrical and Electronic Equipments Covered under the Rules**

Sr. No.	Categories of Electrical and Electronic Equipments
<b>1.</b>	<b>Information Technology and Telecommunication Equipment</b>
	Centralized data processing
	Mainframes
	Minicomputers
	Personal computing
	Personal computers (Central processing unit with input and output devices)
	Laptop computers (Central processing unit with input and output devices)
	Notebook computers
	Notepad computers
	Printers including cartridges
	Copying equipment
	Electrical and electronic typewriters
	User terminals and systems
	Facsimile
	Telex
	Telephones
	Pay telephones
	Cordless telephones
	Cellular telephones
	Answering systems
<b>2.</b>	<b>Consumer electrical and electronics</b>
	Television sets (including sets based on (Liquid Crystal Display and Light Emitting Diode technology),
	Refrigerator
	Washing Machine
	Air Conditioners excluding centralized air conditioning plants

Source: <https://cpcb.nic.in/displaypdf.php?id=aHdtZC9JbXBsaW1lbnRhdGlvbkUtV2FzdGUucGRm>



# E-WASTE RECYCLING PRACTICES IN INDIA

## A. Non-formal Sector

Ninety-five percentage of the ewaste in India is being recycled in nonformal sector and five percentage of the ewaste volume are handled in formal unit. In and around of metropolitan cities in India, there are over 3000 units engaged in non-formal sector for e-waste recycling. Non-formal units of e-waste recyclers are distributed all over India. A large cluster of industries are in Delhi, Tamil Nadu, U.P., Karnataka, Maharashtra, Gujarat, Kerala, Andhra Pradesh, West Bengal, Rajasthan, etc. Non-formal units generally follow the steps such as collection of the e-waste from the rag pickers, disassembly of the products for their useable parts, components, modules, which are having resell value. The rest of the material is chemically treated to recover precious metals. Due to inadequate means, it may cause leaching of hazardous substances to the air, soil, and water. This recycling method has low efficiency and recovery is carried out only for valuable metals like gold, silver, aluminum, copper, etc. Other materials such as tantalum, cadmium, zinc, palladium etc. could not be recovered.

## B. Formal Sector

Ninety-five percentage of the ewaste in India is being recycled in nonformal sector and five percentage of the ewaste volume are handled in formal unit. In and around of metropolitan cities in India, there are over 3000 units engaged in non-formal sector for e-waste recycling. Non-formal units of e-waste recyclers are distributed all over India. A large cluster of industries are in Delhi, Tamil Nadu, U.P., Karnataka, Maharashtra, Gujarat, Kerala, Andhra Pradesh, West Bengal, Rajasthan, etc. Non-formal units generally follow the steps such as collection of the e-waste from the rag pickers, disassembly of the products for their useable parts, components, modules, which are having resell value. The rest of the material is chemically treated to recover precious metals. Due to inadequate means, it may cause leaching of hazardous substances to the air, soil, and water. This recycling method has low efficiency and recovery is carried out only for valuable metals like gold, silver, aluminum, copper, etc. Other materials such as tantalum, cadmium, zinc, palladium etc. could not be recovered.

## Indian Enforcement Agencies involved in E-waste

1. Ministry of Environment and Forests, Government of India is responsible in identification of hazardous wastes and provides permission to exporters and importers under the Environment (protection) Act, 1986.
2. Central Pollution Control Board (CPCB) was constituted under the Water (Prevention and Control of Pollution) Act, 1974. CPCB coordinates activities with the State Pollution Control Boards and ensures implementations of the conditions of imports. It also monitors the compliance of the conditions of authorization, import and export and conduct training courses for authorities dealing with management of hazardous wastes and to recommend standards for treatment, disposal of waste, leachate and specifications of materials and recommend procedures for characterization of hazardous wastes.



3. State Pollution Control Boards (SPCB) constituted under the Water (Prevention and Control of Pollution) Act, 1974 to grant and renew authorization, to monitor the compliance of the various provisions and conditions of authorization, to forward the application for imports by importers and to review matters pertaining to identification and notification of disposal sites.
4. Directorate General of Foreign Trade constituted under the Foreign Trade (Development & regulation) Act 1992 to grant/ refuse license for hazardous wastes prohibited for imports under the Environment (protection) Act, 1986.
5. Port Authorities and Customs Authorities under the customs Act, 1962 verify the documents and inform the Ministry of Environment and Forests of any illegal traffic and analyze wastes permitted for imports and exports and also train officials on the provisions of the Hazardous Wastes Rules and in analysis of hazardous wastes.
6. The Directorate General of Foreign Trade (DGFT) is the certifying authority for permitting imports of second-hand goods.

Source: [https://www.meity.gov.in/writereaddata/files/EWaste\\_Sep11\\_892011.pdf](https://www.meity.gov.in/writereaddata/files/EWaste_Sep11_892011.pdf)

## **Guidelines for Producer Responsibility Organization (PRO) Under E-waste (Management) Amendment Rules, 2018**

### **1. Background:**

In the E-Waste (M) Rules, 2016, Producers of Electrical and Electronic Equipment (EEE) have been given options to manage their extended producer responsibility (EPR) either individually or collectively through a producer responsibility organisation (PRO) recognised by the producer or producers in their EPR — Authorisation. As per Rule 13 (1) (xvii) of E- Waste (Management) Amendment Rules, 2018, a PRO shall apply to the Central Pollution Control Board for registration to undertake the activities prescribed for Producer Responsibility Organisations under these Rules. The said rules prescribed the activities to be carried out by the PRO in the definition of the PRO. However, in the said rules procedure of registration and criteria for registration has not been detailed out.

### **2. Definition of PRO:**

As per rule 3(dd), 'Producer Responsibility Organisation' (PRO) means a professional organisation authorised or financed collectively or individually by producers, which can take the responsibility for collection and channelisation of e-waste generated from the 'end-of- life' of their products to ensure environmentally sound management of such e-waste.

### **3. Role of PRO:**

A PRO can assist a producer or producers in meeting their legal obligations (achieving collection targets, setting up of collection centres/points/implementing take back, carrying awareness programmes etc.), only if producer (s) engage that PRO.

PRO shall have an agreement with producer(s) or a consortium of producers. Such agreement shall outline the role and responsibility of PRO for managing EPR.

### **4. Activities of PRO:**

1. Collection and Channelisation of e-waste on behalf of authorised producers for environmentally sound management of such waste. Producers may engage PROs for specific or multiple tasks relating to management of their EPR.





2. The activities of PRO may include one or more of the following tasks.
  - i. Establishment of collection mechanism (door to door collection/collection campaign/e—waste exchange platform/procurement from individuals)
  - ii. Implementation of buy back/take back/DRS/e-waste exchange
  - iii. Establishment of collection centres/points this may include setting up of collection godowns or operating through warehouses as per the guidelines of CPCB
  - iv. Implementation of take back
  - v. Logistics arrangements
  - vi. Ensuring traceability of the e-waste collected and channelised
  - vii. Ensuring Environmentally sound dismantling and recycling of e-waste
  - viii. Conducting awareness programme among consumer's/bulk consumers/producers for collection and channelisation of e-waste
  - ix. Helping producers in filing of quarterly/annual returns as per the rules

### **5. Capacity and Capability of PRO:**

A PRO should be capable to channelise e-waste for meeting the collection targets of its producers. A PRO should specify its organisational structure in terms of human resource, collection facilities, infrastructures for collection, storage and transportation of e-waste. A PRO should also specify its capacity for handling e-waste, which include capacity for collection, storage, transportation and capacity of its dismantler and recycler with whom it has agreement for dismantling and recycling of e-waste. PRO should provide details of its collection mechanism [collection points/ centres, take back arrangements/ buy back arrangement, details of reverse logistics arrangement (toll free numbers, contact details for the purpose of giving back EEE by consumers)]. PRO should be capable to carry out awareness programme for making consumers aware about its channelisation schemes, collection mechanism through print/visual/display mode.

### **6. Registration of PRO:**

A PRO shall apply for registration to Central Pollution Control Board in the form given at Annexure - I. On receipt of the application complete in all respect, CPCB will carry out evaluation for its capability and capacity to handle e-waste collection, storage, transportation, dismantling recycling and its capacity for carrying out awareness programme for channelisation of e-waste. On being satisfied of its capability and capacity, CPCB shall grant registration to the PRO within 60 days of receipt of completed application.

### **7. Target time and Response:**

CPCB may verify the applications and respond with check-list within 25 days of receipt of the application in CPCB in case of in-complete applications. A letter will be issued along with check-list of short-comings by the concerned officer in CPCB.

### **8. Approval of Registration:**

Member Secretary, CPCB shall be the competent authority to approve grant of registration to PRO.

### **9. Duration of Registration:**

The registration shall be valid for five years.



## 10. Renewal of Registration:

An application for renewal of registration shall be made before 60 days of its expiry.

## 11. Cancellation / suspension of Registration:

CPCB may cancel or suspend registration of the PRO, in case a PRO fails to comply with any of the conditions of registration or with any provisions of the E (P) Act, 1986 or E- waste (Management) Rules, 2016 or amendments thereof during the period of registration. If any PRO is found to be violating the provision of registration, during random checking by CPCB/SPCB, notice may be issued by the CPCB/SPCBs within 25 days of such verification/checking.

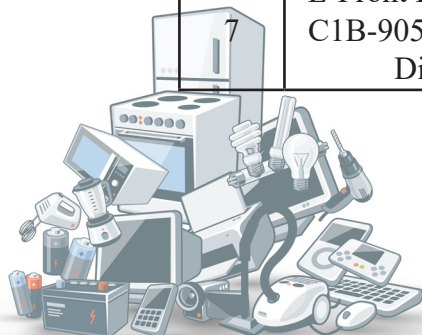
Before cancellation or suspension of registration of a PRO an opportunity will be given to that PRO for hearing before the Member Secretary, CPCB who shall approve cancellation or suspension of registration of PRO. The decision on cancellation or suspension of registration will be intimated within 10 days after hearing.

## 12. Appeal:

Any PRO aggrieved by an order of cancellation or suspension of registration passed by the Member Secretary, CPCB may, within a period of thirty days from the date on which the order is communicated to it, make an appeal to the Chairman CPCB whose order shall be final.

### List of recyclers/Dismantler in the state of Gujarat as on 06.12.2021

Sl. No	Name & Address	Installed Capacity Metric Ton per Annum (MTA)	State Wise Capacity
1	M/s. E-coli Waste Management P. Ltd, Plot No.-90 TO 92 Sabar Industrial Park Pvt. Ltd Vill-Asal Ta-Bhiloda Dist. Sabar kantha	6012	
2	M/s. ECS Environment Ltd, ECS House, 11-12 Garden View, Opp. Auda Garden, Sindhu Bhawan road, Off SG Highway Pakwan Circle, Bodakdev, Ahmedabad-380054	4999.92	
3	M/s. Pruthavi E-Recycle Pvt. Ltd., Plot No.-31/32 Golden Industries Area Near Rolex Industries Vill- Kothariya Rajkot -360002	6588	
4	M/s. E-Process House, Plot No. 136/F-1. 2nd Phase, GIDC, Dist Valsad VAPI 396195	350	
5	M/s. Earth E-Waste Management Pvt. Ltd., Block No. 63, Sagun Ind. Estate, Type-A Paiky 11-A, Plot No. 1 to 5 & 10-D, Plot No. 1 to 5, Vill-Altodara, Tal. Opad, Dist. Surat – 394130	6000	
6	M/s. Recotech E-Waste Management, Plot No. 36-37, Aashirwad Industrial Estate, Udhana-Sachin Road, GIDC Naka, Sachine, Surat	4500	
7	E-Front Line Recyclling Pvt. Ltd., Shed No. C1B-9059, GIDC, Panoli, Tal: Ankleshwar, Distt: Bharuch, Gujarat 394116	3600	

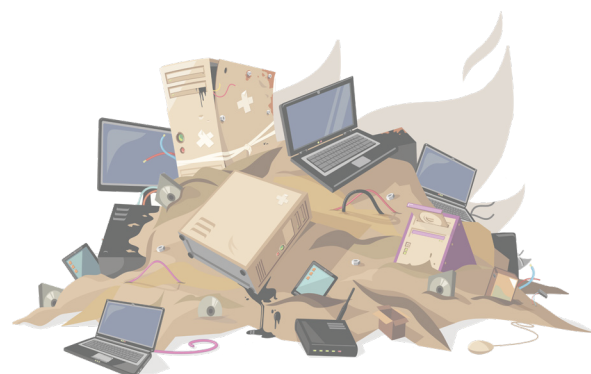


8	M/s. Dron E-Waste Solution, Plot No. 56, G.I.D.C., Gozariya, Tal & Distt; Mehsana, Gujarat- 382825	2400
9	M/s. Eximo Recycling Pvt. Ltd., Plot No. 5/3, Raj Industrial Estate, Tal: Savli, Vadodara	1200
10	M/s. Galaxy Recycling, Sr. No. 36/P1, P2, 37/P2, 38/P2, Plot No. 52 &53, Near Tirth Agro. Pvt. Ltd., At: Bharudi, Tal: Gondal, Rajkot	521
11	M/s. Basant Clean Enviro Ltd., Plot No. 67, G.I.D.C., Kadi, Distt: Mehsana, Gujarat- 382715	7200
12	M/s. Eco Green Recycling, Plot No. 4, Near-Dynamic Textile, Ozar Road, Mota Ponda, Kapaada, Distt: Valsad, Gujarat	1620
13	M/s. Unicare E-Waste Recycler, Plot No. 9/1, Raj Industrial Park-III, Jarod-Savali Road, Karachiya, Tal: Savli, Distt: Vadodara- 391520	1500
14	M/s. Surbine Recycling (P) Ltd., Plot No. 765, GIDC PhaseII, Dared- 361004, Distt: Jamnagar	1500
15	M/s. Greentech Recycling, Plot No. 5&6, Maharaja Estate, B/H: Ananad hotel, Sarkhej-sanand Road, Ahmedabad	702
16	M/s. Dinesh Appliances, Plot No: 10, R. K. Ind Estate, Rakhiyal, Ahmedabad	360
17	M/s. Mahammad Salim & Brothers Near Umiya Weigh Bridge, GIDC- Sachin, Tal: Chorasi, Dist: Sachin-394230	600
18	Electro Waste Solutions Plot no: 631, GIDC-Halol, Dist: Panchmahal	480
19	Felix Industries Pvt Ltd, Plot No:123, Devraj Industrial Park, 200 ft Ring Road, Piplaj-Pirana Road, Piplaj- 382405, Dist: Ahmedabad	375
20	Ecotime Industries, Plot No: 98 & 99, Sparkle Industrial Estate, Tal: Jalalpor, Dist: Navsari-396436	144
21	Sharda Copper, Plot No: SME-06, Bardoli-2, (Miyawadi) Industrial Estate, Bardoli, Surat-394601	300



22	Bharuch Enviro Infrastructure Ltd (Beil), Plot no: 9701-16, 9801-28, 9901-28, 9601-04, 10001-10008, G-7 & 8, 7924- 27, 9401-9412, 9501-9506, 7905 E to H, GIDC, Ankleshwar-393002, Ta: Ankleshwar, Dist: Bharuch	700	
23	Star Recycling, Survey no: 44 P1P1 44P1P2 & 46, Plot no: 45, R K Industrial Zone-09, Kuwadva- Wankaner Road, Ranpur360023, Tal & Dist: Rajkot	400	
24	R Planet Integrated Solution Pvt. Ltd Plot no: 201, 202 (old block no. 264,265 paiki 1), Village : Zak-382330, Tal : Dahegam, Dist : Gandhinagar	11450	
25	Payas Recyclers, Survey No.2139, Plot No.28, Parshwa Industrial Park, B/H. Sandvik Asia, Ahmedabad-Mehsana Highway, Rajpur-382740, Tal: Kadi, Dist: Mehsana	1158	
26	ID Technocom, Plot No.C1-414/P, GIDC Estate Mansa, Visnagar Road, Vill-Mansa, Mansa382845, Dist : Gandhinagar	240	
27	M/s. Unity E-Recycling Co, Sr. No: 310/p, Plot No: 4, Danilimda, Ahmedabad-380028	383	
28	M/s. Mahaarana Industries Pvt. Ltd., Survey No. 466 & 475, Village: Timba, Ta: Daskroi, Dist; Ahmedabad	16585	
29	10. M/s GL Recycling LLP, Survey No. 108, Village: Soliya, Ta.:Kotda Sangani, Dist.: Rajkot-360030	6026	
30	M/s. Electro Alloys Recycling And Transformation HUB, Plot No. 301/13 , GIDC Palej-392220, Bharuch	750	
31	M/s. Reart Recycling Private Limited., Plot No.365, Survey No.111p1, Golden Green Industrial Park (phase-D), Khambha-360311, Tal: Lodhika, Dist: Rajkot	300	
32	M/s. Tvarita Phones Pvt. Ltd., Plot No.171, Survey No. 846, N. H. 8, Vapi, Valsad-396191	600	
33	M/s. Kalpana E-Recyclers, Plot No. 2486, Madhuban Industrial Park, Village: Kuha, Ta: Daskroi, Dist: Ahmedabad	876	

The details of recycler/dismantler for other states is available on: <https://cpcb.nic.in/-e-waste-recyclers-dismantler/>



## Consumer Education and Research Centre

Consumer Education and Research Centre (CERC), set up in 1978, is a non-political, non-profit and nongovernment organisation dedicated to the education and empowerment of consumers as well as promotion and protection of consumer interests through effective uses of education, research, the media and law. CERC has three major roles-to make consumers aware of their rights, to help them protect themselves and to make providers of goods and services accountable. Its activities include complaints handling, legal advice and litigation, consumer education and awareness programmes, library and information service, publication, comparative testing of products, advocacy, investor and environment protection.

## CERC-ENVIS Resource Partner

Ministry of Environment, Forest and Climate Change, Government of India has recognized Consumer Education and Research Centre (CERC) as ENVIS (Environment Information System) Centre in 2005. The focus of ENVIS is to provide environmental information to decision makers, policy planners, scientists and engineers, research workers, etc. across the country. ENVIS was conceived as a distributed information network with the subject-specific centers to carry out the mandates and to provide the relevant and timely information to all concerned.

Subject assigned to the CERC- ENVIS Centre is “Environmental Literacy - Eco-labelling and Eco-friendly Products.” The Centre launched the website <http://cercenvi.nic.in/> on NIC (National Informatics Centre) platform with the theme ‘Ecolabelling and Eco-Friendly Products’. The website furnishes the information on national and international scenario on this subject.

It publishes theme based quarterly newsletter named “Green Insights”. It also circulates bi-monthly e-bulletin “Green Alert”. Since Social Media is very popular among youth and to attract them and sensitise them towards sustainable consumption and lifestyle, We are active social medias such as on Facebook, Instagram, Twitter and Youtube Channel.



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