E-WASTE MANAGEMENT IN INDIA

CHALLENGES AND AGENDA

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Abbreviations

ASSOCHAM	Associated Chambers of Commerce
CEEW	Consumer electrical and electronics
CPCB	Central Pollution Control Board
DGFT	Directorate General of Foreign Trade
EEE	Electrical and electronic equipment
EPR	Extended Producer Responsibility
EPRA	Extended Producer Responsibility Authorization
ESM	Environmentally sound management
EST	Environmentally sound technologies
FY	Financial year
HS	Harmonized system
HWM	Hazardous waste management
IBEF	India brand equity foundation
IoT	Internet of things
IT	Information technology
ITEW	Information technology and communication
LCD	Liquid crystal display
LED	Light emitting display
MeitY	Ministry of Electronics and Information Technology
MNC	Multinatonal company
MoEF&CC	Ministry of Environment, Forest and Climate Change
MT	Metric tonnes
NGO	Non-governmental organization
NGT	National Green Tribunal
OEM	Original equipment manufacturer
PCC	Pollution Control Committee
PLI	Production-linked incentive
POM	Placed on market
PRO	Producer Responsibility Organization
PSU	Public sector undertaking
RWA	Resident Welfare Association
SCGJ	Skill Council for Green Jobs
SPCB	State Pollution Control Board
TSDF	Transportation, storage and disposal facility
TV	Television
US(A)	United States of America
WEEE	Waste electrical and electronic equipment

Introduction

The definition of e-waste varies from legislative authority to legislative authority. For instance, the European Union (EU) has defined e-waste or Waste Electrical and Electronic Equipment (WEEE) as electrical or electronic equipment that is waste, including all components, sub-assemblies and consumables that are part of the product at the time of discarding.[1]

In India, e-waste, as defined under the E-waste (Management) Rules of 2016—issued by the Central Pollution Control Board (CPCB)—is electrical and electronic equipment (EEE), whole or in part, discarded as waste by consumers (individual or bulk) as well as rejects from manufacturing, refurbishment and repair processes.

The primary identification of e-waste is that used EEE is no longer fit for its originally intended use and is ready to be discarded. All the end-of-life equipment which we intend to discard for the purposes of dismantling and recycling will fall under the category of e-waste. If any equipment is not discarded and is kept as it is in a household, repository or warehouse, it will not be referred to as e-waste.

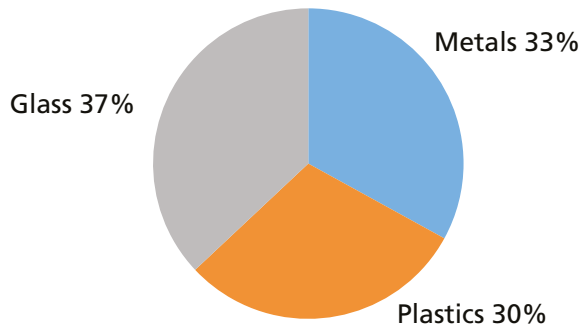
E-waste can be generated from multiple sources, including but not limited to households, bulk consumers like government offices and commercial establishments, manufacturers and retailers. Most of the e-waste that we see being collected or going for recycling has reached the end of its life and would have likely been manufactured a decade back; the rest, if scientifically taken care of, can be reused or refurbished. Common household products that constitute e-waste are washing machines, refrigerators, air conditioners, vacuum cleaners, televisions, personal computers, laptops and mobile phones. In terms of components of e-waste, it is estimated that glass waste accounts for 37 per cent, which is the highest, metallic waste accounts for 33 per cent, and plastic waste for 30 per cent[2] (see *Graph 1: Components of e-waste* and *Graph 2: Metallic constituents of e-waste*).

The primary identification of e-waste is that used EEE is no longer fit for its originally intended use and is ready to be discarded

In India, Schedule I of the E-waste (Management) Rules, 2016 has divided the various electrical and electronic equipment (EEE) into two broad categories. The categories are:

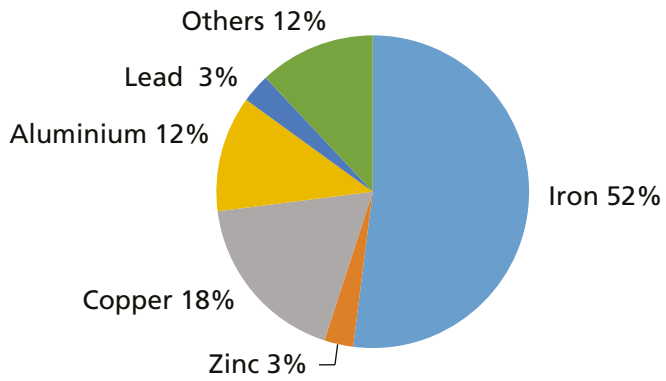
1) Information, technology and communication (ITEW)
2) Consumer electrical and electronics (CEEW)

Graph 1: Components of e-waste



Source: Electricals and Electronics manufacturing in India, ASSOCHAM, NEC technologies, 2018

Graph 2: Metallic constituents of e-waste



Source: Electricals and Electronics manufacturing in India, ASSOCHAM, NEC technologies, 2018

Different kinds of equipment have been assigned codes and divided into a total of 21 sub-categories (see *Table 1: Categories of e-waste and average life of electrical and electronic equipment)*. Sixteen types of electrical and electronic equipment (EEE) fall under ITEW category and five types of EEE under CEEW category.

As some forms of e-waste continue to grow exponentially, e-waste has been declared the world's fastest growing waste stream.[3] United Nations (UN) has termed this fast-paced growth of e-waste 'a tsunami'. However, according to a report by the World Economic Forum, while e-waste is a part of the problem, it can as well play a major role in offering a solution and fueling a circular economy.

It is easy to frame e-waste as a post-consumer problem by retailers, manufacturers and producers. However, such an assumption will not lead us to a fruitful solution. Designers, manufacturers, producers, investors, traders, miners, raw material producers, consumers, policy-makers and other stakeholders like refurbishers, dismantlers, collection centers and recyclers all have key roles to play in waste reduction, value retention, increasing life expectancy of a product and its ability to be repaired, reused and recycled, thus ensuring a closed loop.

In India, the E-waste management Rules, 2016 make producers of these equipment responsible for their end-of-life management and disposal (including of their components, consumables and spare parts).

Sources of e-waste

E-waste is generated from domestic production of electrical and electronic equipment (EEE) as well as import of electrical and electronic equipment into the country. 'Products placed on the market' (POM) in a particular financial year is a very important dataset for calculation of e-waste generation.

To be able to estimate the amount of e-waste that India generates as a country, we need to be aware of the number of units or weight of appliances that have been put out in the market for sale by producers of every equipment. Another useful data for calculation would be the average life span after which a product reaches its end of life.

Currently, how much e-waste an individual producer generates is determined on the basis of the quantity of electrical and electronic equipment placed on the market in the preceding years and taking into consideration the average life of the equipment.

Methodology for estimation of e-waste generation

The generation of e-waste from end-of-life products may be calculated as given below:

E-waste generation (weight or quantity) in a year (x) = Sales in (x - z) years x weight or quantity, where z stands for the average life span of the EEE.

The number and weight of appliances put out for sale, as well as the average life of equipment are crucial parameters in determining the quantity of e-waste generated

For example, if we want to calculate the e-waste generated by a certain producer in the personal computing (personal laptop: ITEW 3) segment in the year 2019–20, and the average lifespan of a laptop (set by CPCB) is five years, then we will have to refer to the data of laptops placed on the market (POM) in 2015–16 by the particular producer to arrive at the actual e-waste generation of the producer specifically due to laptops. The average life of all 21 categories of e-waste has been specified by CPCB and has been published in its E-waste (Management) Rules Implementation Guidelines, 2016.

Table 1: Categories of e-waste and average life of EEE

Information technology and communication			Consumer electrical and electronics		
EEE code	ITEW	Average life span (z) in years	EEE code	CEEW	Average life span (z) in years
ITEW 1	Centralized data processing: Mainframes and minicomputers	Ten years for mainframes and five years for mini-computers	CEEW 1	Television sets (including sets based on Liquid Crystal Display and Light Emitting Diode technology)	Nine years
ITEW 2	Personal computing: Personal computers (central processing unit with input and output devices)	Six years	CEEW 2	Refrigerators	Ten years
ITEW 3	Personal computing: Laptop computers (central processing unit with input and output devices)	Five years	CEEW 3	Washing machines	Nine years
ITEW 4	Personal computing: Notebook computers	Five years	CEEW 4	Air-conditioners excluding centralized air conditioning plants	11 years
ITEW 5	Personal computing: Notepad computers	Five years	CEEW 5	Fluorescent and other mercury containing lamps	–
ITEW 6	Printers including cartridges	Ten years			
ITEW 7	Copying equipment	Eight years			
ITEW 8	Electrical and electronic typewriters	Five years			
ITEW 9	User terminals and systems	Six years			
ITEW 10	Facsimile (fax)	12 years			
ITEW 11	Telex	Five years			
ITEW 12	Telephones	Nine years			
ITEW 13	Pay telephones	Nine years			
ITEW 14	Cordless telephones	Nine years			
ITEW 15	Cellular telephones	Ten years for feature phones and seven years for smart phones			
ITEW 16	Answering systems	Five years			

Source: Schedule I, E-waste (Management) Rules, 2016 and implementation guidelines for e-waste management rules 2016

3 per cent

India's share in global hardware electronics production

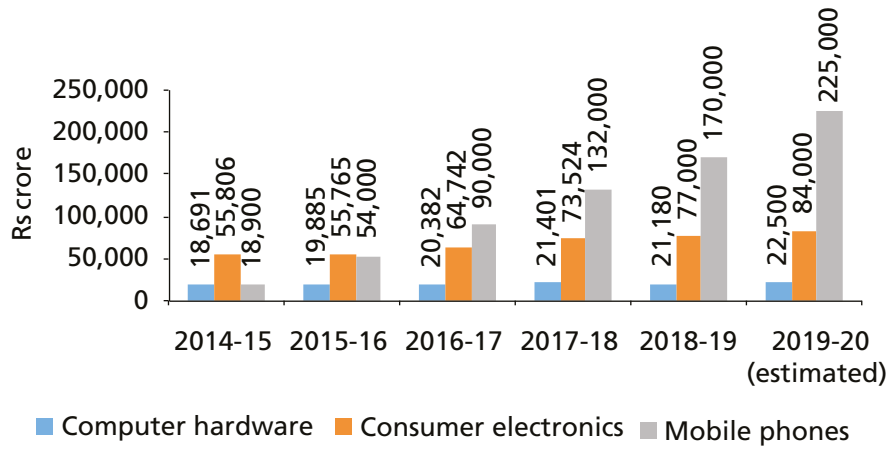
2.3 per cent

Share of domestic electronics production in India's GDP

Domestic production of EEE in India

India's share in global hardware electronics production is about 3 per cent. The share of domestic electronics production in India's GDP is 2.3 per cent.[4] The production of mobile handsets, and Liquid Crystal Display (LCD) and Light Emitting Diode (LED) products like TVs in the country has gone up significantly, and over the last few years, the demand of these electronic products is increasingly being met by domestic production. The production of LCD and LED TVs has gone up from 0.87 crore units in 2014–15 to 1.6 crore units in 2017–18. Production of cellular mobile handsets in terms of volume reached 225 million (22.5 crore) units in 2017–18, as compared to production of 60 million (6 crore) units in 2014–15.[5] As many as 268 manufacturing units for cellular mobile handsets and their parts and components have been set up in the country during the last three–four years. Ministry of Electronics and Information Technology (MeitY), in its 2019–20 annual report, has provided data regarding production of electronics only in terms of revenue (see *Graph 3: Production profile for electronics in India*). The graph, however, covers just a few electronic commodities like computer hardware, consumer electronics and mobile phones. The graph clearly depicts the exponential rise, especially in domestic production, of shorter lifespan equipment like mobile phones.

Graph 3: Production profile for electronics in India



Source: Annual Report MeitY, 2019–20

Imports into India

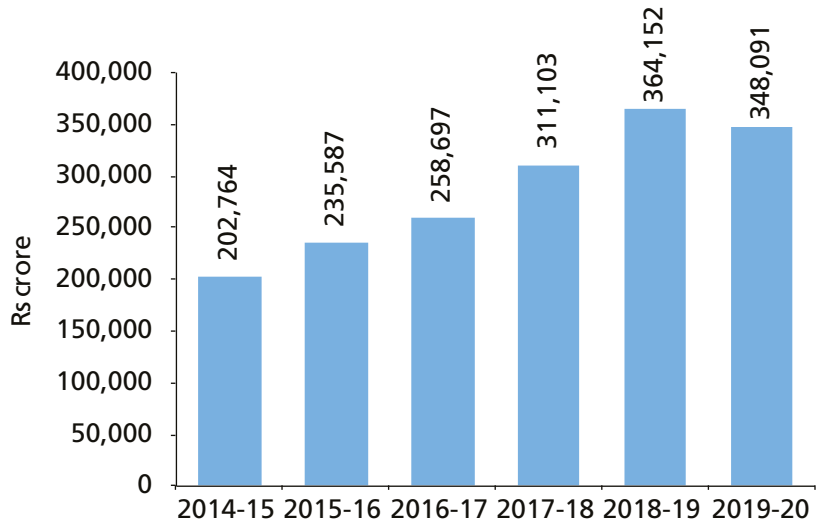
Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 have banned the import of e-waste, except for refurbishment and re-exportation of second-hand goods. However, the nodal body of excise and customs lacks the protocol, resources and expertise to differentiate between e-waste and second-hand goods.

Lack of differentiation of e-waste from second-hand goods is an outgrowth of the Harmonized System (HS) codes in importing products. HS codes for waste and second-hand equipment are the same, which makes it practically impossible to stop the flow of e-waste into the country.

According to the latest Rajya Sabha report on the issue, titled *E-waste in India*, published in 2011, most ports are handicapped by lack of manpower and machinery in their efforts to stop import of e-waste into the country. The report also suggests that the Mumbai Port Trust and Jawaharlal Nehru Port Trust, both in Maharashtra, are major inlets of e-waste.

Data from the Ministry of Commerce and Industry website indicates that the average share of electrical equipment in total imports is 9.62 per cent. Import of EEE has been increasing at 12.3 per cent annually in the last six years, with 2019–20 witnessing a negative growth (see *Graph 4: Import profile of EEE in India*).

Graph 4: Import profile of EEE in India



Source: CSE 2020, compiled from Department of Commerce, Ministry of Commerce, and Industry website

15 per 1,000
Personal computers in India

784 per 1,000
Personal computers in the US

41 per 1,000
Personal computers in China

Global and Indian scenarios

The generation of e-waste is a function of the amount of EEE used and discarded by citizens in a particular year. As the social strata changes, the consumption patterns, amount of consumption and rate of generation changes as well. *Table 2: Statistics of top five e-waste generating countries in 2019* summarizes the per capita generation and total e-waste generated by top countries globally.

Table 2: Statistics of top five e-waste generating countries in 2019

Rank	Country and rank in e-waste generation	EEE placed on the market (kg/capita)	E-waste generation (kg/capita)	E-waste collection rate (per cent)
1	China	13.3	7.2	16
2	USA	25.3	21	15
3	India	5.8	2.4	1
4	Japan	21.3	20.4	22
5	Germany	18.2	19.4	52

Source: CSE 2020

Summary of EEE put on the market and per capita e-waste generation in India

Source: The Global E-waste Statistics Partnership with data inputs from ASSOCHAM India in 2016

How much e-waste does India generate?

Very few sources give relevant data with respect to e-waste generation in India. Moreover, data from different sources presents a high degree of variance. So data provided by global and national government agencies has to be supplemented with a fair bit of conjecture.

According to the *Global E-waste Monitor, 2020*, India generated 3.2 million metric tonnes (mMT) of e-waste in 2019. *Table 3: Year-wise e-waste generation in India*, provides an overview of e-waste generation in the country from the time the E-waste (Management) Rules were notified in 2016. Year-on-year growth in e-waste generation is approximately 13 per cent.

Table 3: Year-wise e-waste generation in India

Year	E-waste generation (million metric tonnes)
2015	1.97
2016	2.22
2017	2.53
2018	2.86
2019	3.23

Source: CSE, 2020 compiled from The Global E-waste Statistics Partnership

On the other hand, CPCB provides another estimate which is substantially lower than the estimate provided by the *Global E-waste Monitor, 2020*.

The *Review and Action Taken Report on Status of Implementation of Action Plan for E-waste (Management) Rules, 2016 and Amendments Thereof* submitted by CPCB to the National Green Tribunal (NGT) in February 2020 includes the following points with respect to e-waste generation in India:

- MeitY conveyed to the Ministry of Environment, Forest and Climate Change (MoEF&CC) that only a national-level inventory of e-waste generation can be prepared. State-wise data could not be produced due to lack of reported data by State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs).
- MoEF&CC stated that the method prepared and suggested by CPCB may be used for the estimation of e-waste generated annually.

Official and autonomous estimates on waste generation vary greatly, and require a fair bit of conjecture to arrive at a viable number

- CPCB has estimated that a quantity of 708,445 tonnes (0.7 mMT) of e-waste was generated in 2017–18, but these figures are only based on the sales data of 244 producers registered with it. They do not include imported e-waste figures.
- CPCB has estimated that a quantity of 771,215 tonnes (0.77 mMT) of e-waste was generated in 2018–19, based on sales data of 1,168 producers registered with it. This again does not include imported e-waste figures.

Why the difference in estimates?

The difference in estimates of e-waste generation is rather intriguing. Three major factors explain the difference in the estimates that are being provided by various organizations.

- The estimations done by CPCB are on the basis of the 21 categories listed in Schedule I of the E-waste (Management) Rules, 2016, whereas, the *Global E-waste Monitor* considers 54 different categories of e-waste that UN agencies follow.
- Imports are conveniently left out from the estimates done by CPCB, so actual figures of e-waste generation are likely to be far higher than the current estimates.
- Furthermore, CPCB has furnished its estimations on the basis of the producers who have sought extended producer responsibility authorization (EPRA) from CPCB. The actual number of producers who put their products on the market every year is not available, and only 1,606 producers have obtained EPRA. This further widens the gap between reported and actual generation.

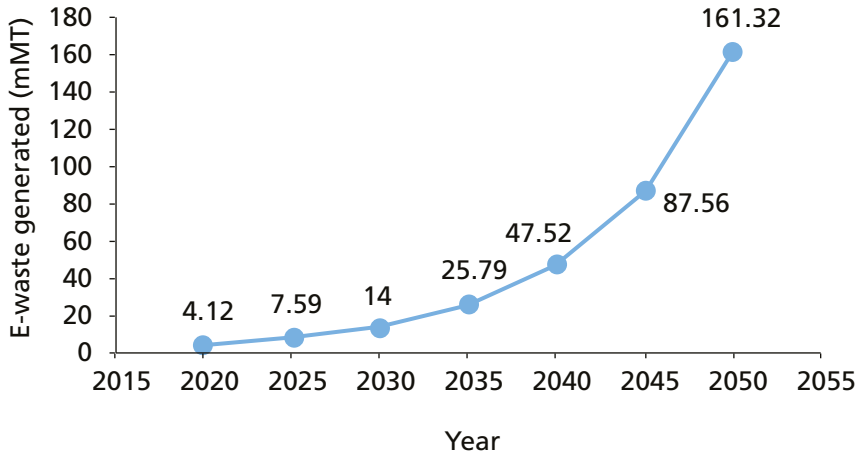
The *Review and Action Taken Report on Status of Implementation of Action Plan for E-waste (Management) Rules, 2016 and Amendments Thereof* submitted by CPCB to NGT in February 2020 also mention that most SPCBs and PCCs have started reaching out to the GST council for estimating the producers of EEE operating within their jurisdiction.

771,225 tonnes

CPCB estimate of e-waste generate in India in 2018–19

The estimated year-on-year growth in e-waste generation (13 per cent) only takes into account domestic production and consumption patterns and leaves out import data (as it is difficult to find, especially in terms of units and weight of e-waste and second-hand goods). If import data were included as well, estimated year-on-year growth in e-waste generation would obviously go up. However, even if we extrapolate based on a best-case scenario of 13 per cent growth, by 2025, India will be producing 7 mMT of e-waste annually, which will increase to over 160 mMT by 2050 (see *Graph 5: Projected e-waste generation in India*).

Graph 5: Projected e-waste generation in India



Source: CSE, 2020

Second-hand electronic market in India

In 2015, the used-goods market was valued at Rs 115,000 crores by ASSOCHAM.[6] As a matter of fact, the pre-owned goods economy runs parallel to the new goods economy. In the last couple of years, major e-retailers like Amazon and Flipkart have also jumped into the business of selling 'refurbished' electronics. This is a positive sign from the resource utilization perspective as it increases the life span of the product, ensures repair, reuse, and displays conscious consumerism.

Right to repair

Two decades ago, the Indian consumer sector had a repair economy that functioned synergistically with the new products market that helped in increasing the life of used goods and diverting them from the waste stream. Somehow the repair economy has fallen apart, with products being designed to be disposed of and not designed for easy repair. 'Right to repair' is a concept which needs to be reintroduced into the Indian market.

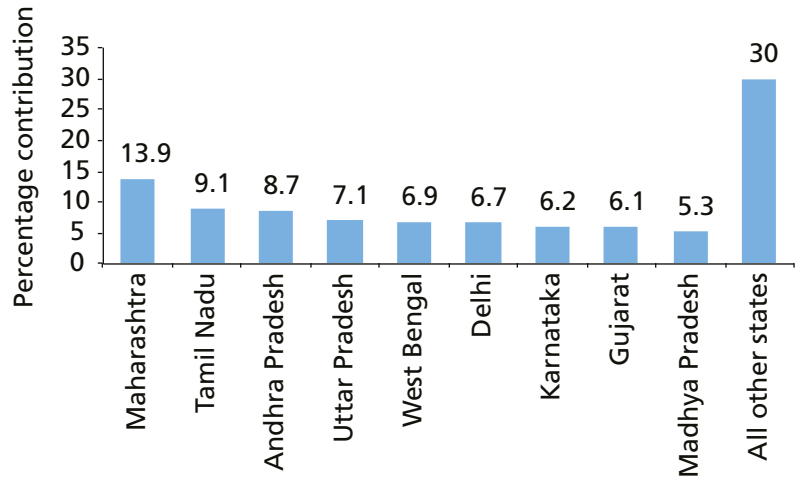
This is where the concept of responsible production and consumption kicks in, to ensure that equipment are given a second chance before being dumped into the environment, where they can detrimentally affect human health and natural resources.

Where is e-waste produced in India?

The *Review and Action Taken Report on Status of Implementation of Action Plan for E-waste (Management) Rules, 2016 and Amendments Thereof* was submitted by CPCB to NGT in February 2020. In the report, MeitY conveyed to MoEF&CC that only a national-level inventory of e-waste generation could be prepared. State-wise data could not be produced due to lack of reported data by SPCBs and PCCs.

However, ASSOCHAM, along with NEC technologies India Pvt Ltd, in their report *Electrical and Electronics Manufacturing in India, 2018*, have listed the top e-waste generator states in India (see *Graph 6: Percentage contribution by states to annual e-waste generation*). These states were also listed as the top e-waste generators in a 2007 study by the Manufacturers' Association of Information Technology and Gesellschaftfür Internationale Zusammenarbeit (GIZ) as well as by MietY.[7] All these states house at least one metro and multiple tier 1 and tier 2 cities, indicating that the penetration of EEE is highest in urban and peri-urban areas. This also means that vast regions and markets are yet to be explored and exploited by the electronic segment as the penetration of electronics has just begun in semi-rural and rural areas.

Graph 6: Percentage contribution by states to annual e-waste generation



Source: Electrical and Electronics manufacturing in India, ASSOCHAM & NEC Technologies, 2018

Estimating domestic sales

As stated earlier, there are only a few sources of information on the domestic production and sales of electronics in India. MeitY annual report 2019–20 provides data with respect to the number of units produced only for two categories of equipment: LCD and LED televisions, and cellular mobile handsets (see *Table 4: Increase in domestic production of LCD and mobile handsets*). The data for the rest of electronics, industrial, strategic and medical electronics, computer hardware and electronic components and LED lights have been published only in terms of revenue.

12 million
Number of LCD and LED TVs produced in India in 2019–20

320 million
Number of cellular mobile handsets produced in India in 2019–20

Table 4: Increase in domestic production of LCD and mobile handsets

Type of electronic equipment	Number of units produced in 2014–15 (in crores)	Number of units produced in 2018–19 (in crores)
LCD and LED TVs	0.87	1.2
Cellular mobile handsets	6	32

Source: MeitY Annual Report 2019–20

We need data that can be analyzed and interpreted to arrive at an estimate of electronic waste produced annually. This will help us strategize to tackle the menace of e-waste. Publishing data in the public domain will also create transparency with respect to generation, flow channels and methods of handling and disposal of potentially hazardous e-waste material. It is a positive sign that we want to position ourselves as a global manufacturing hub and it only increases the need for a robust data management system for handling of e-waste.

Estimating imports

The official stand of the Indian government is that it has banned the import of e-waste meant for disposal into the country as per Hazardous and Other Wastes (Management and Transboundary) Rules, 2016. But these Rules can be flouted in many ways—legally and illegally.

Schedule III, Part A and Part B includes a list of hazardous wastes that can be imported but with prior informed consent (see *Annexure IV*). In other words, import of waste is regulated and requires permission of MoEF&CC. Schedule VI lists hazardous and other wastes prohibited for import. Under Schedule VI, waste with Basel nos. A1180 and A3180 are prohibited for import. Therefore, technically, e-waste is not banned for import. It is regulated. Under this provision, parties seeking permission to import have to apply to MoEF&CC.

Moreover, the Rules explicitly allow import and export of certain wastes without any permission from the MoEF&CC (see *Table 5: List of EEE wastes allowed for import without permission from MoEFCC*). This provision is meant for used goods that will be imported for refurbishment and re-export. But, because of lack of data and monitoring, it could well be used to dump large quantities of e-waste into India.

Table 5: List of EEE wastes allowed for import without permission from MoEF&CC

B1110	Electrical and electronic assemblies (including printed circuit boards, electronic components and wires) destined for direct reuse and not for recycling or final disposal
	Used electrical and electronic assemblies imported for repair and to be re-exported after repair within one year of import
	Used electrical and electronic assemblies imported for rental purpose and re-exported within one year of import
	Used electrical and electronic assemblies exported for repair and to be re-imported after repair
	Used electrical and electronic assemblies imported for testing, research and development, project work purposes and to be re-exported within a period of three years from the date of import
	Spares imported for warranty replacements provided equal number of defective or non-functional parts are exported within one year of the import
	Used electrical and electronic assemblies imported by Ministry of Defence, Department of Space and Department of Atomic Energy
	Used electrical and electronic assemblies (not in bulk; quantity less than or equal to three) imported by individuals for their personal use
	Used individual laptops, personal computers, mobile phones and tablet imported by organizations in a year
	Used electrical and electronic assemblies owned by individuals and imported on transfer of residence
	Used multi-functional print and copying machines (MFDs)
	Used electrical and electronic assemblies imported by airlines for aircraft maintenance and remaining either onboard or under the custodianship of the respective airlines' warehouse located on the airside of the custom bonded areas

Source: Hazardous and other Waste (Management and Transboundary Movement) Rules, 2016

Under this provision, parties do not require prior permission for import. However, the import of these goods requires custom authorities to verify documents specified in Schedule VIII of the Hazardous and other Waste (Management and Transboundary Movement) Rules, 2016. Under Schedule VIII, customs have to check if there is an undertaking for export; and the copy of the annual return filed with the concerned SPCB for import in the previous financial year. Unfortunately, there is no database on custom clearances for import. It is also evident that SPCBs have no information about what they have permitted. Therefore, the current Rules, without adequate monitoring and enforcement, allow sufficient avenues for import of e-waste.

E-waste legislation in India

The dominant role of the informal sector, and the health and environmental challenges that accompany informal e-waste handling were key reasons for the introduction of regulation in the form of E-waste (Management and Handling) Rules in 2011. These Rules came into effect from 1 May 2012. However, the implementation of these Rules was not very effective due to shortcomings on multiple fronts. To address the shortcomings, and to make the legal framework effective and functional, E-waste (Management) Rules 2016 were notified in March 2016. They came into effect from October 2016, superseding the 2011 Rules. In March 2018, these Rules were amended (see *Figure 1: Legislative progress on e-waste management*).

The primary objective of the 2016 Rules is to ensure environmentally sound management of e-waste. The Rules also endeavour to ensure protection against adverse effects of inappropriate handling and management of e-waste.

Specific objectives

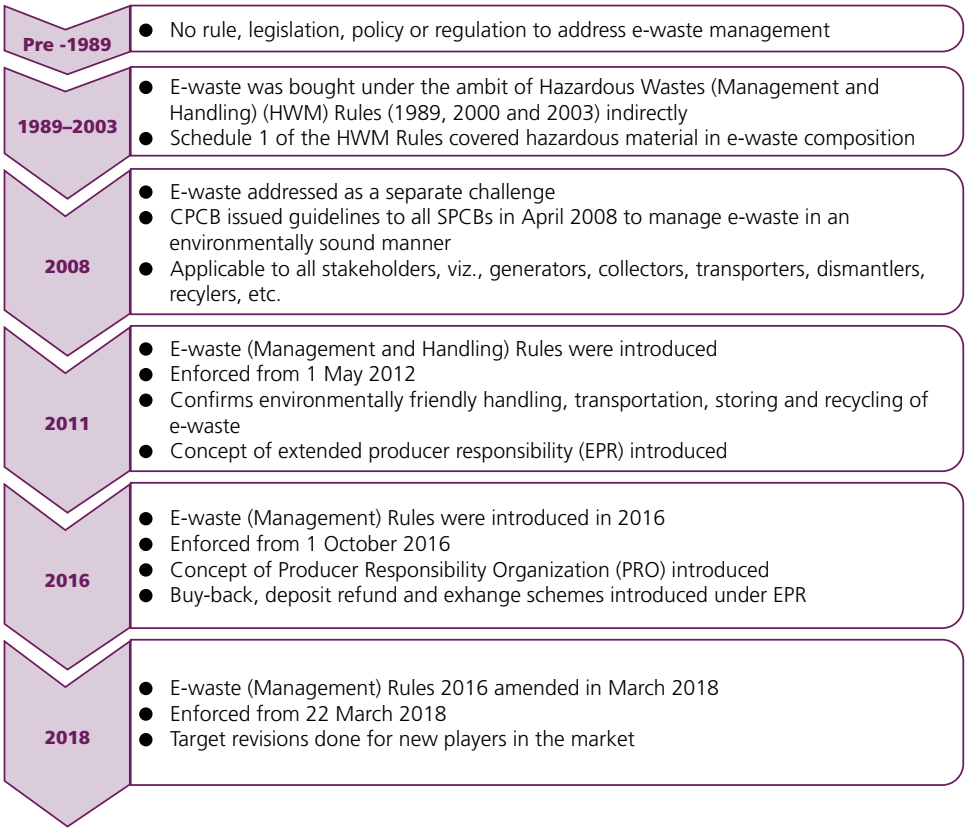
- To implement Extended Producer Responsibility (EPR), as elaborated in the 2016 Rules, laying emphasis on producers' responsibility for environmentally sound management of e-waste, even at the post-consumer stage.
- To promote the establishment of an efficient e-waste collection mechanism, through take-back systems and buy back.
- To promote environmentally sound technologies through authorized dismantlers and recyclers.
- To minimize illegal recycling and recovery operations in the informal sector.
- To reduce the use of hazardous substances in the manufacture of EEE.

If e-waste is not handled and managed properly, it can lead to occupational hazards, environmental toxicity, and economic non-viability

Stakeholders

The Rules have bound a handful of stakeholders—producers, manufacturers, recyclers, dismantlers, refurbishers, dealers and e-retailers—and specified the activities each of them needs to perform, right from seeking authorization to maintaining records and filing annual returns. The responsibilities of authoritative stakeholders are listed in *Annexure III*.

Figure 1: Legislative progress on e-waste management



Source: CSE, 2020

These stakeholders and their primary legal duties are:

Producers

- Obtaining EPRA, which includes submission of the EPR plan to CPCB along with other information required in the Form 1 appended with the 2016 Rules.
- Fulfilling their collection targets as per Schedule III or III-A of the 2016 Rules.
- Maintaining records of e-waste handling in Form 2 and making such records available for scrutiny by CPCB or the concerned SPCB.
- Filing annual returns in Form 3 to the concerned SPCB on or before 30 June every year.

Dismantlers, recyclers, manufacturers and refurbishers

- Obtaining authorization [through Form 1 (a) for manufacturers and refurbishers and Form 4 for recyclers and dismantlers] from the concerned SPCB.

- Maintaining records of e-waste generated, handled and disposed of in Form 2 and making it available for scrutiny if requested by the concerned SPCB.
- Filing annual returns in Form 3 to the concerned SPCB on or before 30 June every year.

Dealers

- Collecting e-waste by providing the consumers a box, bin or a demarcated area to deposit e-waste in and to send it to a collection centre, dismantler or recycler as designated by the producer (if they are part of the reverse logistics of the producer).

Forms appended with E-waste (Management) Rules, 2016 are a mechanism to ensure all stakeholders work in synergy to keep stock of the e-waste handled or generated and sent to other stakeholder for dismantling, recycling and disposal [see *Table 6: Forms appended with the E-waste (Management) Rules, 2016*].

Table 6: Forms appended with E-waste (Management) Rules, 2016

Form	Purpose	Applicable to
Form 1	Seeking EPRA	Producers
Form 1 (a)	Obtaining authorization for storage, treatment or disposal of e-waste	Manufacturers and refurbishers
Form 1 (aa)	Format for issuance of EPRA by CPCB	Producers
Form 1 (bb)	Format for granting authorization for generation, treatment, storage and disposal by SPCB	Manufacturers and refurbishers
Form 2	Maintaining records of e-waste handled or generated	Manufacturers, producers, collection centres, refurbishers, bulk consumers, dismantlers and recyclers
Form 3	Filing annual returns (on or before 30 June following the year to which the returns relate)	Manufacturers, producers, refurbishers, bulk consumers, dismantlers and recyclers

Form	Purpose	Applicable to
Form 4	Authorization of facility for possessing, dismantling and recycling following environmentally sound technology	Recyclers and dismantlers
Form 5	Annual report (to be submitted by SPCB on or before 30 September following the year to which the returns relate)	SPCBs and CPCB
Form 6	E-waste manifest	Manufacturers, producers, collection centres, refurbishers, bulk consumers, dismantlers and recyclers
Form 7	Filing appeal against an order passed by CPCB or an SPCB	Manufacturers, producers, collection centres, refurbishers, bulk consumers, dismantlers and recyclers

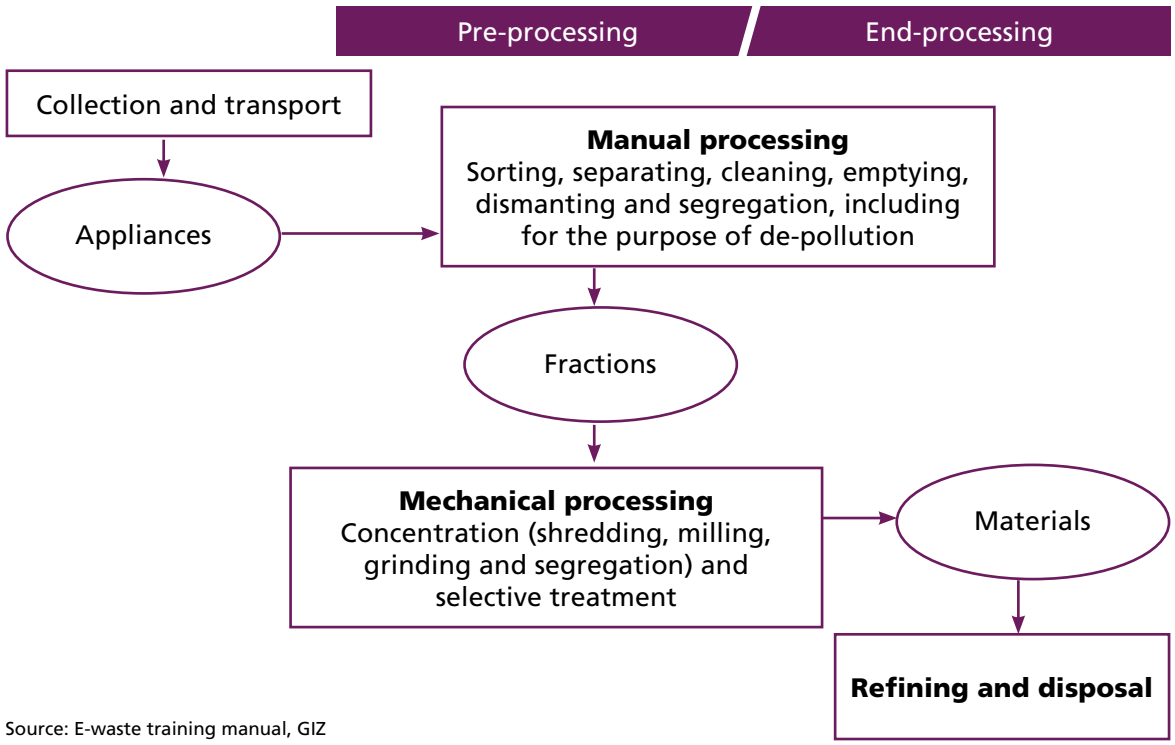
Source: CSE, 2020

What is e-waste recycling?

E-waste recycling primarily involves two stages—manual collection, sorting, separating and dismantling followed by mechanical processing which involves shredding, grinding, etc. Recovered materials are sent to relevant facilities for further treatment and recovery of resources and materials (see *Figure 2: Process flow of e-waste recycling*).

E-waste recycling is a very broad term that is not limited to just one stakeholder. Every stakeholder has a part to play in the value chain for ensuring sustainable e-waste management. Producers have to stop the approach of 'design for obsolescence' and start focusing on 'build for reuse'. Authorities have to spread awareness among stakeholders regarding the potential hazards of e-waste. Consumers have to start channelizing their e-waste to dismantling and recycling facilities that operate using environmentally sound technologies to treat the waste.

Figure 2: Process flow of e-waste recycling



Source: E-waste training manual, GIZ

Extended Producer Responsibility

The E-waste (Management) Rules, 2016 have entrusted the responsibility of collection and channelization of e-waste on producers of EEE as per the principle of Extended Producer Responsibility (EPR). EPR encompasses the responsibility of producers at the post-consumer stage of a product's lifecycle, which includes collection, transportation, storage, dismantling, recycling and disposal.

End-of-life EEE has to be collected from consumers by the producers. Consumers are divided into two categories, individual and bulk. The Rules define bulk consumers as entities that employ 20 or more people or whose annual turnover is greater than Rs 1 crore. Bulk or institutional consumers include offices, departments, ministries, public sector undertakings (PSUs) and multinational companies (MNCs).

Producers are also required to have legal agreements with authorized dismantlers and recyclers either individually, collectively, or through a Producer Responsibility Organization (PRO), which have to be disclosed through their EPR plans. An EPR plan has to be submitted to CPCB while applying for Extended Producer Responsibility Authorization (EPRA) through the Form 1 appended with the Rules. The plan includes details of collection points, transportation partners, dismantling and recycling partners, website toll free numbers, details of awareness campaigns to be conducted and contact details of producers. CPCB approves the EPR plan before granting EPRA to a producer.

Producers authorized by CPCB have to meet their collection targets as per Schedules III and III-A of the Rules (see *Table 7: Collection targets as per Schedule III* and *Table 8: Collection targets as per Schedule III-A*). Producers are only liable to collect back equipment that they sell in accordance with the codes mentioned in Schedule I of the Rules.

The 2016 Rules define a bulk consumer as an entity where 20 or more people are employed or whose annual turnover is greater than Rs 1 crore

Schedule III is applicable to producers whose market presence (in years) is either equal to or more than the average life of the equipment they have manufactured, whereas Schedule III-A is applicable to producers whose market presence is less than the average life of the equipment they have manufactured. The average life for different kinds of EEE is decided by CPCB and is published in their implementation guidelines for the Rules.

The average life of the equipment is decided considering the use, second-hand use and storage period of the EEE.

Table 7: Collection targets as per Schedule III

Financial year	Collection target (per cent of e-waste generation)
2017–18	10
2018–19	20
2019–20	30
2020–21	40
2021–22	50
2022–23	60
April 2023 onwards	70

Source: E-waste (Management) Rules, 2016

Table 8: Collection targets as per Schedule III-A

Financial year	Collection target (per cent of sales figure in the preceding year)
2018–19	5
2019–20	5
2020–21	10
2021–22	10
2022–23	15
2023–24	15
2024–25	20
2025 onwards	20

Source: E-waste (Management) Rules, 2016, 2018 Amendment

CPCB's website has a list of 1,606 producers that have registered themselves with the Board. CPCB issues EPRAs as per Form 1 (aa), wherein year-wise collection targets are provided to producers of EEE, depending on the type of equipment that they are placing on the market.

Collection targets for popular brands

Collection targets for all producers are available on the CPCB website (which can be accessed at https://cpcb.nic.in/epr-authorization-status/). We have tried to pull out data of well-known brands and lay out their year-wise collection targets (see *Table 9: Year-wise collection targets of popular brands*). We have only selected 13 most familiar names out of over 1,600 producers that have obtained EPRA. Xiaomi has the lowest collection

target and Samsung has the highest collection target in this sample. Samsung, Sony and Videocon are the only producers that have been assigned targets for both ITEW and CEEW as they pump items in both these broad categories for sale into the market. The rest of the producers have been assigned targets for either ITEW or CEEW, depending on the equipment category that they sell.

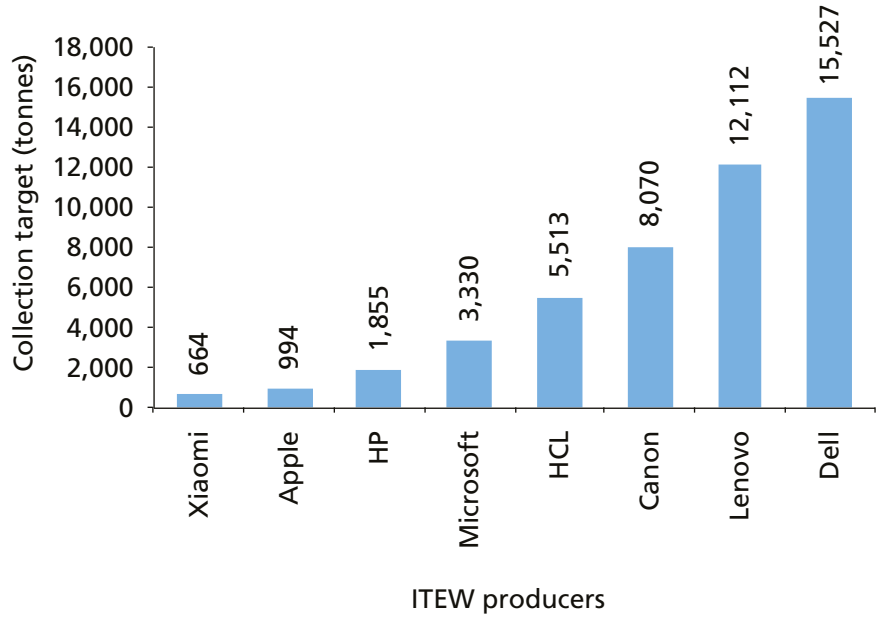
Table 9: Year-wise collection targets of popular brands

Popular brands	Collection targets (in tonnes)					Total brand-wise collection target
	2017–18	2018–19	2019-20	2020–21	2021–22	
Xiaomi	0	0	123	197	344	664
Apple	148	184	294	368	0	994
HP	245	296	367	449	499	1,855
Microsoft	171	232	561	1,314	1,051	3,330
HCL	1,157	1,463	956	1178	759	5,513
Canon	500	766	1,554	2,170	3,079	8,070
Lenovo	1,787	1,829	2,649	3,564	2,283	12,112
Dell	2,939	2,879	4,363	5,096	250	15,527
Sony	3,757	2,090	3,904	3,900	4,506	18,158
Haier	3,159	4,734	6,422	130,581	9,570	36,943
Godrej & Boyce	9,508	11,775	19,528	20,806	24,771	86,388
Videocon	20,912	26,821	36,880	31,928	36,698	153,239
Samsung	36,708	44,121	66,829	64,696	70,078	282,433
Total year-wise collection target	80,991	97,191	144,431	148,725	153,889	625,226

Source: CSE, 2020

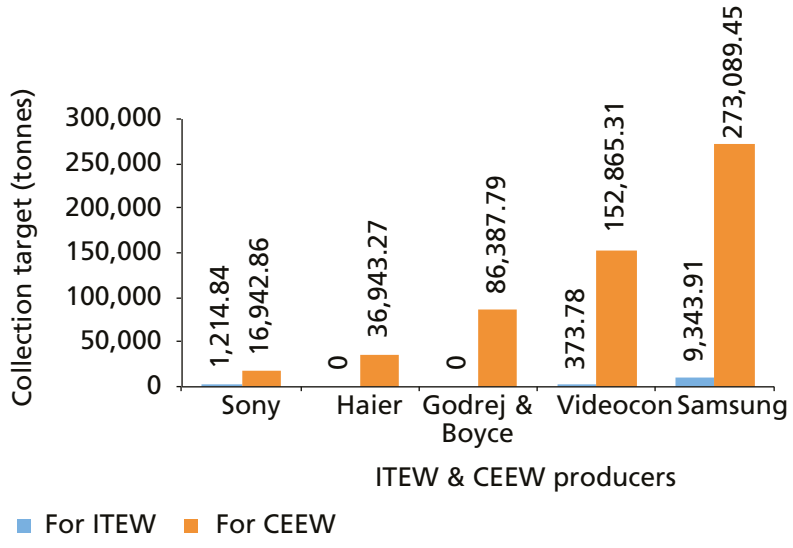
The overall collection targets for a period of five years for these brands are given in *Graph 7: Collection targets for popular ITEW producers* and *Graph 8: Collection targets for popular ITEW and CEEW producers*.

Graph 7: Collection targets of popular ITEW producers*



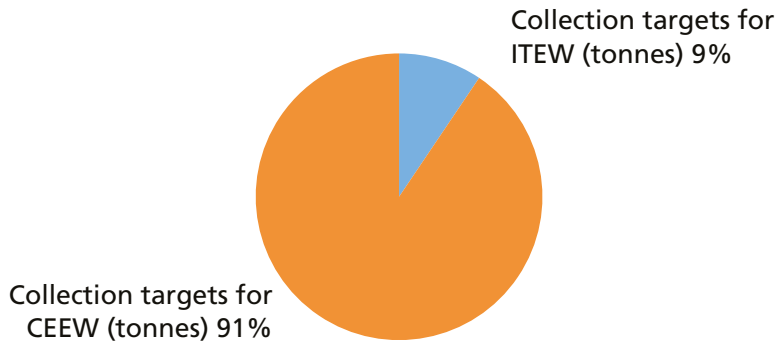
*From 2017 to 2022
Source: CSE, 2020

Graph 8: Collection targets of popular ITEW and CEEW producers*



*From 2017 to 2022
Source: CSE, 2020

Graph 9: Distribution of collection targets



Source: CSE, 2020

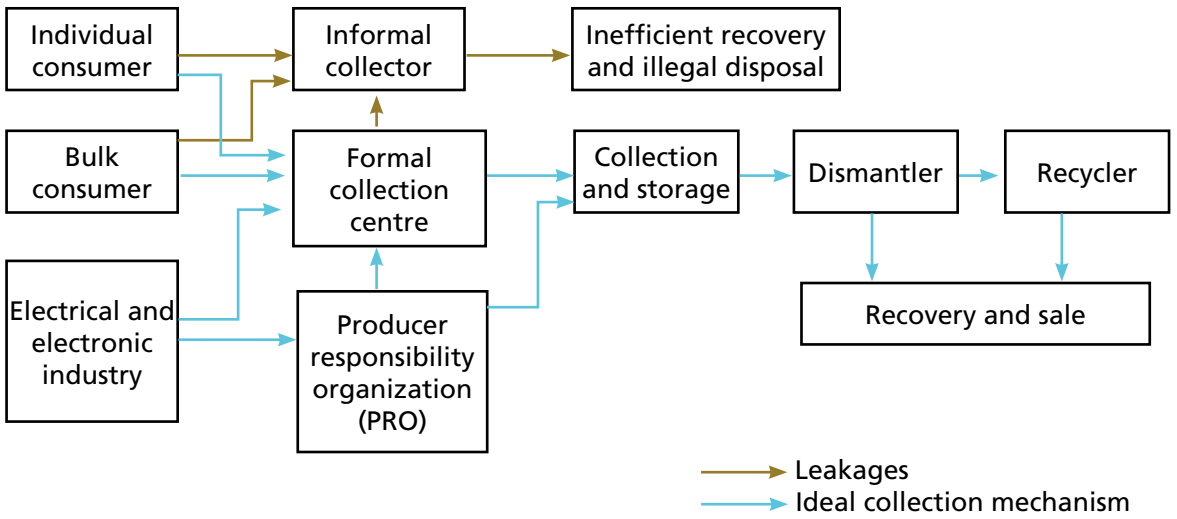
The relative distribution of collection targets of ITEW and CEEW is given in *Graph 9: Distribution of collection targets*. It is evident that consumer electronics dominate the collection targets. This can be attributed to the fact that consumer electronic equipment are heavier than information technology equipment. The latter's sheer number will be higher but their weight much less than their consumer equipment counterparts.

Collection of e-waste

In India, the main generators of electrical and electronic waste happen to be government institutions, and public and private sector bodies, collectively referred to as bulk consumers. Bulk consumers account for almost 70 per cent of the e-waste generated in the country. The contribution from households and domestic establishments, which are referred to as individual consumers, is relatively small, but the rate of leakage from individual consumer into the informal sector is extremely high. Manufacturers of electrical and electronic components and assemblers are another important source of e-waste generation in India (see *Figure 3: Ideal collection flow of and leakages in e-waste management in India*).

The major challenges with respect to formal collection of e-waste is the poor reach of formal collectors and the unwillingness of consumers to take ownership of the waste produced by them. It is always an easier option to call a *kabadiwallah,* who will take away your electronic waste and also pay you a decent amount for it, rather than carrying your waste to a formal collection center and not receiving any incentive for your effort and time.

Figure 3: Ideal collection flow of and leakages in e-waste management in India



Source: CSE, 2020

Recyclers

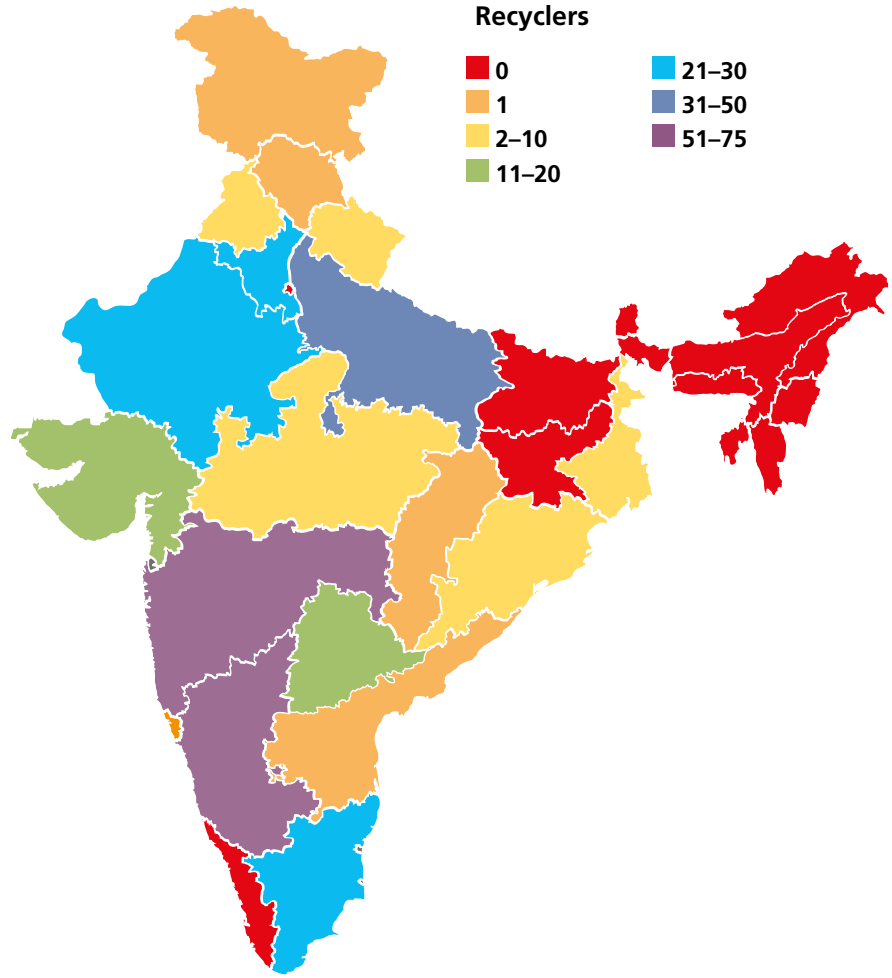
Recyclers and dismantlers are supposed to acquire permissions like consent to establish (CTE) and consent to operate (CTO) from relevant authorities and apply for authorization to their concerned SPCB with the help of the Form 4 appended with the E-waste (Management) Rules, 2016. SPCBs submit this data to CPCB, which maintains a state-wise list of recycling and dismantling facilities, together with their processing capacity, on its website (which is updated from time to time). Currently, India has a total of 312 authorized recycling facilities with a combined processing capacity of 7,82,080 metric tonnes per annum (mTA) (see *Table 10: Authorized recyclers in India and their processing capacities*).

Table 10: Authorized recyclers in India and their processing capacities

State	Number of authorized dismantlers and recyclers	State-wise capacity (mTA)
Goa	1	103
Jammu and Kashmir	1	165
Andhra Pradesh	1	480
Chhattisgarh	1	600
Himachal Pradesh	1	1,000
West Bengal	3	1,860
Odisha	3	3,680
Punjab	3	4,850
Madhya Pradesh	2	9,600
Uttarakhand	4	19,250
Telangana	11	41,493
Gujarat	16	49,053
Karnataka	71	52,722
Maharashtra	75	78,179
Haryana	28	87,378
Rajasthan	26	90,769
Tamil Nadu	24	97,271
Uttar Pradesh	41	243,627
Total	312	782,080

Source: CSE, 2020

Figure 4: Spatial arrangement of recycling and dismantling facilities in India



Source: CSE, 2020

Only 18 states in the country have at least one recycling or dismantling facility, with close to half of the recycling facilities clustered in the western and southwestern part of the country (see *Figure 4: Spatial arrangement of recycling and dismantling facilities in India*). This implies that more than half of the states and Union territories have to rely on interstate transport to ensure environmentally sound processing and management of the e-waste they are generating.

If the latest CPCB estimate of 771,215 tonnes of e-waste generation in India (in 2018–19) is taken into consideration (which was estimated on the basis of 1,168 producers who had obtained EPRA), then we can easily conclude that India is self-sufficient in handling the e-waste it produces and ensuring its environmentally sound processing.

However, 438 new producers have obtained EPRA recently. Will the country be able to handle the additional e-waste they generate? What about the producers that have not obtained EPRA and whose e-waste has been conveniently left out of the estimation provided by CPCB to the honorable NGT in February 2020?

Moreover, if we take into consideration the figures reported by the *Global E-waste Monitor*, a very grim picture emerges of e-waste management capacity of the country. The report claims that the annual e-waste generation in India (in 2019) was 3.2 mMT. This implies that the country only has the capacity to recycle one-fourth of the waste it generates.

The other side of the story is that most recyclers are not working at the capacity that they have disclosed, leading to ambiguity regarding the authorized e-waste recycling business. Centre for Science and Environment visited e-waste recyclers to gauge the situation on the ground. We found that recycling was not happening at the scale at which the recyclers were authorized to work. According to the 2018–19 annual report published by CPCB on 10 August 2020, after compiling information till March 2019 from SPCBs and PCCs, there were a total 280 authorized recyclers and dismantlers in the country, with a combined processing capacity of 510,950 MT. The report also claims that a total of 69,414 MT of e-waste has been recycled in the year. This indicates that India's recycling facilities are majorly underutilized, with only 13.5 per cent of the capacity being used to handle and recycle e-waste.

Clearly, the recycling potential of India is poor. More than 90 per cent of the country's e-waste is handled by the informal sector that resorts to non-scientific and dangerous methods to extract resource from e-waste and dump it irresponsibly. This jeopardizes the health of the informal workers and compromises the safety and well-being of the public and the environment. It is quite evident that we, as a community, have failed miserably to manage our e-waste. The rich are diverting their e-waste to the poor, not only globally, but locally as well. This practice must stop.

312

Number of registered e-waste recyclers and dismantlers in India

0.78 million MT

Total recycling capacity of these units

Informal recyclers

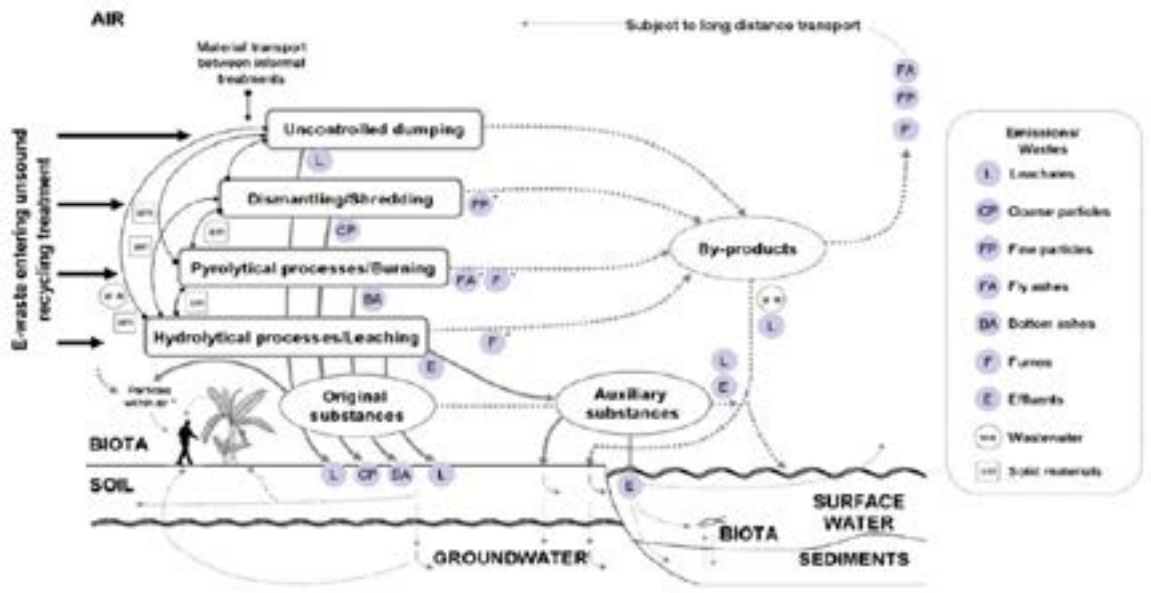
The informal sector has been the backbone of e-waste recycling in India, with various reports claiming that close to 90 per cent of the country's e-waste is being handled by the informal sector. Though this sector has managed to keep high volumes of e-waste from reaching dumping sites, while providing livelihoods to millions of people, the environmental and societal risks arising from non-scientific handling of e-waste have to be addressed (the hazardous components in e-waste and their harmful effects are listed in *Annexure II*). For a very long time now, e-waste from all over the country as well as from some western countries has been finding its way

to informal processing yards. E-waste collection, international, national and regional trading, dismantling, segregation of components, repairing, refurbishing, metal recovery and recycling are operations carried out in these informal set-ups. Many of them have been operating for over three decades now.

A report by Toxics Link (*Informal E-waste Recycling in Delhi*) on the unfolding impact of two years of E-waste (Management) Rules, 2016 estimates that Delhi-NCR alone has 15 hotspots of informal recycling, where approximately 3,400 to 5,000 informal recycling units are operational, employing anywhere between 12,000 to 50,000 workers directly and indirectly. Informal recycling usually takes place in residential colonies, slums, unauthorized settlements or residential-cum-commercial setups.

Operations in the informal sector can range from simple trading to material recovery and encompass everything in between like dismantling, repair, refurbishing and open burning. The different types of emissions and pathways of pollutants released during informal recycling are illustrated in *Figure 5: Types of emissions from and pollutant pathways in informal recycling*. The destination of recovered or recycled materials varies from buyer to buyer (like local scrap markets, small shopkeepers, consumers, industrial areas and Chinese product manufacturers).

Figure 5: Types of emissions from and pollutant pathways in informal recycling



Source: E-waste: The hidden harm of technological revolution, 2004

The sources and points of leakages through which e-waste reaches informal recyclers are multi-pronged and so are the destinations of the resources recovered from e-waste treated in these informal setups. Obviously, informal processing also generates waste that cannot be processed further and informal recyclers resort to multiple channels to get rid of rejects generated by the system (see *Graph 10: Informal recycling—sources, destinations and disposal methods*).

The challenge with the informal sector has always been its unscientific method of treatment and disposal. But due to the great outreach of the informal sector, its role cannot be disregarded. Collection and segregation are the keys tasks to which the informal sector in India contributes positively with regard to electrical and electronic equipment. The need of the hour is to re-evaluate and introduce policies for inclusion of this sector into the mainstream business of e-waste management.

Formal vs informal sector

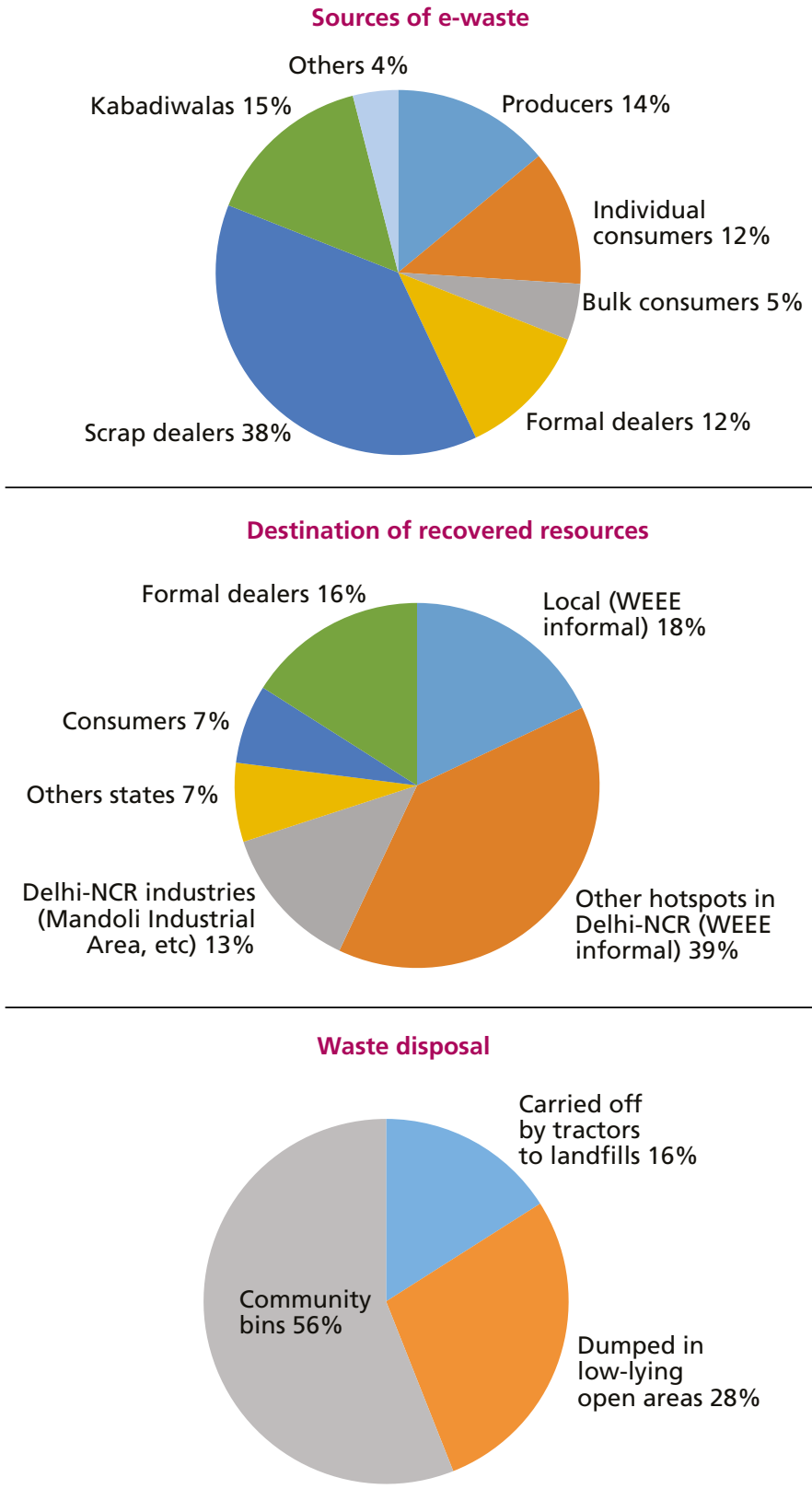
E-waste is a unique category of waste. Along with hazardous materials, it also contains precious substances like silver, gold, platinum, palladium, nickel and copper. For this reason, we do not see e-waste lying around on the streets or in the common bins of our cities and villages. E-waste handling is lucrative business, attracting the informal as well as the formal sector. *Table 11: India's formal and informal e-waste management sectors*

Table 11: India's formal and informal e-waste management sectors

Parameter	Informal sector	Formal sector
Percentage of e-waste processed	90	10
General practices of e-waste processing	Rudimentary methods: Incineration, breaking, dismantling, dumping, etc.	Industrial recycling and dismantling using technically advanced methods
Current stakeholders	Dealers or retailers, unorganized recycling sector (local pawn shops, recyclers, dismantlers, etc.) contractual labour, localized vendors (kabadis)	Government, consumers, retailers, industries or organizations, registered processing units, NGOs and manufacturers
Binding laws	Not bound by any laws or regulations	Environmental laws, E-waste (Management) Rules, labour laws, etc.
Major functions	Collection, disassembly, extraction and dumping	Disassembly, extraction, recycling, treatment and segregation

Source: ASSOCHAM and NEC Technologies report, Electrical and Electronics manufacturing in India 2018

Graph 10: Informal recycling—sources, destinations and disposal methods



Source: Informal e-waste recycling in Delhi, Toxics link, 2018

provides an overview of the share of e-waste handled, general practices, stakeholders, binding laws and major functions of the informal and formal sector of the country.

Moreover, the formal sector also has some financial constraints when it comes to procurement of e-waste from bulk consumers. Formal sector operators are supposed to pay 5 per cent GST for procuring any EEE that has reached end of life.[8] On the other hand, when they sell recovered resources and materials that are referred to as scrap, they are charged 18 per cent GST.[9]The 13 per cent GST differential in the incoming and outgoing revenue is a source of worry for a lot of formal recyclers. The informal sector has also blamed GST and demonetization for the decrease in the amount of e-waste that they currently receive. They also claim that they still have to offer bribes to local officers for interstate transport of e-waste in India.

Recommendations

The ever-growing problem of e-waste needs to be dealt with adeptly. To do so, we need better data on the quantity of e-waste India generates every year. It is also not clear whether we are importing e-waste, as regulated waste and 'used' material for refurbishment and re-export. If we are indeed importing, then the challenge of safe recycling and reprocessing becomes an even bigger one.

India has rules in place for proper collection and authorized recycling. However, the implementation of these rules needs significant improvement. Only a miniscule portion of the massive quantities of e-waste the country generates is recycled in authorized centres. The role of the informal sector in the recycling business needs to be re-positioned so that it can provide cost-effective opportunities without discounting environmental safety and amenable labour conditions.

The agenda is as follows:

1. **Inventorize e-waste so that the challenge of management is better understood**

For this, the starting point must be the annual reports filed by SPCBs, which will provide an overview of the amount of e-waste generated and received by authorized recyclers. Gaps in data persist regarding 'imported' e-waste and e-waste that does not make it to authorized recyclers. These gaps need to be closed.

CPCB has created an e-waste review portal (after NGT ordered it to submit an action plan for enforcement of the E-waste {Management} Rules in September 2019. Under the NGT direction, all SPCBs and PCCs have been issued credentials for the review portal and instructed to file quarterly returns. This is a step ahead.

The overall mechanism of reporting has been split into four different timelines and the portal has made it easy for SPCBs and PCCs to submit timely reports to CPCB. However, as observed in the last update provided by CPCB in February 2020, only 29 SPCBs and PCCs have begun implementation of the action plan. Furthermore, none of these reports have been released into the public domain either by the SPCBs and PCCs or by CPCB.

Data on e-waste generation and recycling is vital, and must be collated and made public. To do this, state boards should be directed by CPCB to link

the 'consent to establish' and 'consent to operate'—granted for setting up such units—to the database. MoEF&CC should work with the GST Council and other such bodies to improve and ensure compliance.

2. **Ensure that import of e-waste is better regulated and there is data on permissions given and status of recycling of imported waste**

It is important that 'used' material, which is imported without restriction, is regulated and that information is provided through HS codes so that there is monitoring of this material—quantities and points of use and disposal.

3. **Ensure that there is stringent monitoring and enforcement of the provisions of the E-Waste (Management) Rules 2016 so that EPR targets are met and there is independent information on where this collected waste is 'recycled'**

There must be verification of e-waste flow systems that are proposed by producers in their EPR plans. As of now, the verification is document-based and ground verification is left for later stages. Ground verification should be conducted before an EPRA is issued to ensure policy adherence and limit the possibility of discrepancies.

The flow channel of e-waste is not fully understood. Due to lack of ground monitoring, there is always a possibility of e-waste being diverted to the informal sector for dismantling and recycling to cut down on cost. Informal workers continue to put themselves at risk due to the fact that e-waste is one of the most valuable waste resource. The formal sector does not have cost advantage over the well-established network that the informal sector has managed to secure for years. Integration of formal and informal sectors has to be the way forward for the e-waste industry to thrive. There are multiple challenges in this, which will need to be addressed with proper mapping of stakeholders. A national-level strategy needs to be worked on to create a win–win situation for all stakeholders involved in e-waste management.

CPCB should develop an online or app-based tracking system for movement of e-waste, from generation to the recycling, recovery or disposal stage—similar to what has been done for biomedical waste.

4. **Ensure monitoring of health and environmental conditions of informal e-waste hubs in the country so that people who are employed within them get compensated for any adverse effects on their health. There is also a need to ensure that producers of electronic material are held liable for environmental toxicity due to improper handling or leakages**

The fact is that unsafe recycling of hazardous e-waste could end up adding

massive toxicity to the environment. E-waste is also potentially extremely unsafe for people who work in the informal sector and is adding to their health burden.

5. Improve and incentivize recycling schemes floated by companies

Recyclers are supposed to participate in a bidding process to procure e-waste from various stakeholders like producers, manufacturers and bulk consumers by paying 5 per cent GST and are also responsible for transporting e-waste. This makes formal recycling economically unproductive and is a major reason why formalization is being perceived as a threat by the unorganized sector. MoEF&CC should address this at the policy level and come up with schemes to support and enhance formalization of the e-waste recycling sector.

6. Improve awareness among consumers about e-waste

Citizens do not view e-waste as a health hazard and are not aware of its adverse environmental implications. The responsibility to raise awareness has to be entrusted on practically everyone from RWAs and NGOs to ULBs that have local presence. Producers should be compelled to issue statutory warnings in their product advertisements, which clearly underline disposal techniques of EEE.

Annexures

I. Comparison of salient features of E-waste (Management) Rules, 2016 and E-waste (Management and Handling) Rules, 2011

Provisions	E-waste (Management and Handling) Rules, 2011	E-waste (Management) Rules, 2016
Applicability	• Extending to producers, consumers or bulk consumers, collection centres, dismantlers and recyclers • Extending only to electrical and electronic equipment (EEE) as listed in Schedule I	• Expanded to manufacturers, dealers, refurbishers and Producer Responsibility Organizations (PRO) • Extended to components, consumables, spares and parts to EEE in addition to equipment as listed in Schedule I • CFL and other mercury containing lamps brought under the purview of the Rules
Exemption	• Micro and small industry sector, as defined in Micro, Small and Medium Development Act, 2006	• Micro enterprises as defined in the Micro, Small and Medium Enterprises Development Act, 2006
Collection	• Collection centers can be set up by a producer or by any person or agency or association • Separate authorization from SPCBs for setting up of such collection centre swas necessary	• Collection is now exclusively the producers' responsibility, who can set up collection centres or points or even can arrange a buy-back mechanism for such collection • No separate authorization is required, which will be indicated in the EPR
Extended Producer Responsibility (EPR)	• Producers are required to obtain authorization from SPCBs and PCCs for implementing their EPR for effective channelization of e-waste to registered dismantlers or recyclers	• Single EPRA for producers is now being made CPCB's responsibility to ensure pan-India implementation • Procedure for seeking authorization and effective implementation has now been elaborated with various kind of flexibilities and provisions
Flexibility for ease of implementation of EPR	-	• Option has been provided for setting up of PRO, e-waste exchange, e-retailer, deposit refund scheme as additional channel for implementation of EPR by producers to ensure efficient channelization of e-waste

Provisions	E-waste (Management and Handling) Rules, 2011	E-waste (Management) Rules, 2016
Target-based approach for collection under EPR	-	• Collection and channelization of e-waste in EPRA shall be in line with the targets prescribed in Schedule III of the Rules. • Phase-wise collection targets for e-waste, which can be either in number or weight, shall be 30 per cent of the quantity of waste generation as indicated in the EPR plan during the first two years of implementation of the Rules followed by 40 per cent during the third and fourth years, 50 per cent during the fifth and sixth years and 70 per cent during the seventh year onwards
Simplification of permissions	• Authorization for collection centres, dismantler and recyclers to obtain authorization and registration separately • Separate EPR authorization by all states	• No separate authorization for collection centres, which shall be part of EPR now. Registration or authorization for dismantling and recycling through one system, i.e., authorization instead of both registration and authorization • Pan-India EPR authorization by CPCB
Deposit Refund Scheme	-	• Deposit Refund Scheme has been introduced as an additional economic instrument wherein the producer charges an additional amount as a deposit at the time of sale of the electrical and electronic equipment and returns it to the consumer along with interest when the end-of-life electrical and electronic equipment is returned
Responsibilities of manufacturers	-	• To collect e-waste generated during the manufacture of any electrical and electronic equipment and channelize it for recycling or disposal and seek authorization from SPCBs

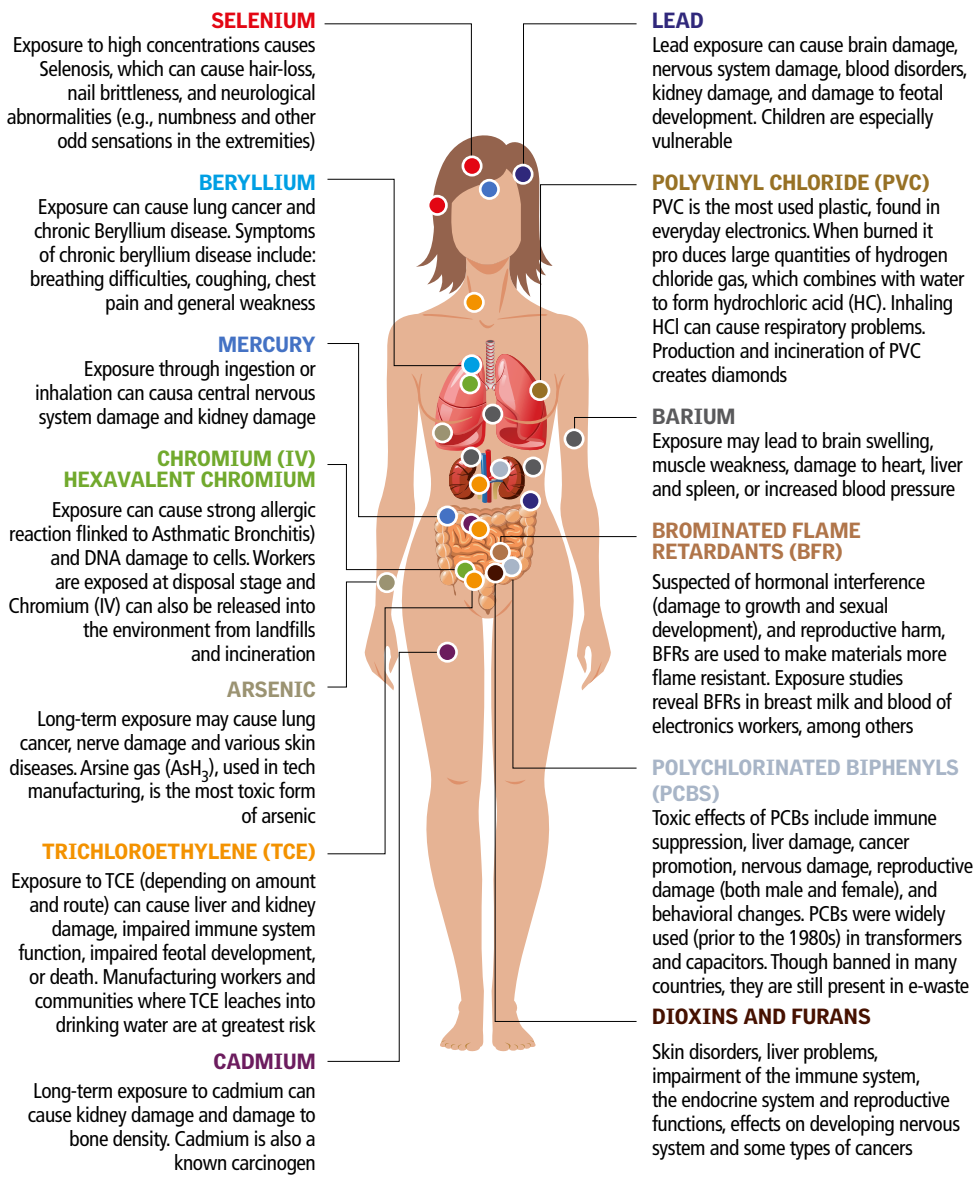
Provisions	E-waste (Management and Handling) Rules, 2011	E-waste (Management) Rules, 2016
Responsibilities of dealers	-	• In case the dealer has been given the responsibility of collection on behalf of the producer, the dealer shall collect e-waste by providing the consumer abox • Dealer or retailer or e-retailer shall refund the amount as per take-back system or Deposit Refund Scheme of the producer to the depositor of e-waste
Responsibilities of refurbishers		• To collect e-waste generated during the process of refurbishing and channelize the waste to authorized dismantlers or recyclers through its collection centre and seek one-time authorization from SPCB
Obligations for bulk consumers	• Bulk consumer means 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, partnership and public or private companies that are registered under the Factories Act, 1948 (63 of 1948) and the Companies Act, 2013 (18 of 2013) • No provision on annual return	• Bulk consumer redefined by adding healthcare facilities which have turnover of more than Rs 1 crore or have more than twenty employees • Need to file annual returns
Responsibility of state governments		Role of the state governments has been also introduced in the Rules in order to ensure safety, health and skill development of the workers involved in the dismantling and recycling operations. These responsibilities are given as follows:

Provisions	E-waste (Management and Handling) Rules, 2011	E-waste (Management) Rules, 2016
		(i) Department of Industry in a state or any other government agency authorized in this regard by the state government has to ensure earmarking or allocation of industrial space or sheds for e-waste dismantling and recycling in existing and upcoming industrial parks, estates and industrial clusters (ii) Department of Labour in a state or any other government agency authorized in this regard by the state government needs to ensure recognition and registrationof workers involved in dismantlingand recycling; assist formation of groups of such workers to facilitate setting up dismantling facilities; undertake industrial skill development activities for the workers involved in dismantling and recycling; and undertake annual monitoring and to ensure safety and health of workers involved in dismantling and recycling (iii) State governments to prepare an integrated plan for effective implementation of these provisions, and to submit annual reports to MoEF&CC

Provisions	E-waste (Management and Handling) Rules, 2011	E-waste (Management) Rules, 2016
Reduction of hazardous substances (ROHS) during the manufacturing stage	• Every producer of electrical and electronic equipment and their components or consumables or parts or spares listed in Schedule I shall ensure that new EEE and their components or consumables or parts or spares do not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers beyond a maximum concentration value of 0.1 per cent by weight in homogenous materials for lead, mercury, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers and of 0.01 per cent by weight in homogenous materials for cadmium	• The procedure for implementation of RoHS has been elaborated and made explicit. Provision on reduction of hazardous substances and related Schedule II has been revised in line with existing EU regulatory framework which forms the basis of the provision • In case the products do not comply with the RoHS provisions, products can be withdrawn or recalled from market and corrective measures taken to ensure compliance
Transportation of e-waste	-	• Transportation of e-waste shall be carried out as per the manifest system, whereby the transporter shall be required to carry a document (three copies) prepared by the sender, giving details as per Form 6
Liability provision	-	• Liability for damages caused to the environmentor third party due to improper management of e-waste including provision for levying financial penalty for violation of provisions of the Rules has also been introduced

Provisions	E-waste (Management and Handling) Rules, 2011	E-waste (Management) Rules, 2016
Responsibility of ULBs	-	• ULBs have been assigned the duty to collect and channelize the orphan products to authorized dismantlers or recyclers

II. Hazardous components in e-waste and their harmful effects



III. Roles and responsibilities of various stakeholders in e-waste management

Authority	Roles and responsibilities
Central Pollution Control Board	1. Grant and renewal of EPRA and monitoring of its compliance 2. Maintaining information on EPRA on its website 3. Setting and revising targets for collection of e-waste from time to time 4. Coordination with SPCBs 5. Preparation of guidelines on environmentally sound management of e-waste 6. Conducting random checks for ascertaining compliance of e-waste rules and identification of such importers or producers who have not applied for EPRA or are not complying with the RoHS provision. Wherever necessary, the Board will seek help of customs department or any other agency of the government of India 7. Conducting random inspections of dismantlers or recyclers or refurbisher 8. Documentation, compilation of data on e-waste and uploading on websites of CPCB 9. Actions against violation of the Rules 10. Conducting training programmes 11. Submission of annual report to the MoEF&CC 12. Enforcement of provisions regarding reduction in use of hazardous substances in the manufacture of EEE 13. Interaction with IT industry for reducing hazardous substances 14. Setting and revising targets for compliance to the reduction in use of hazardous substance in manufacture of EEE from time to time. 15. Any other function delegated by MoEF&CC under the Rules from time to time
State Pollution Control Boards or Committees of Union territories	1. Inventorization of e-waste 2. Grant and renewal of authorization to manufacturers, dismantlers, recyclers and refurbishers 3. Monitoring and compliance of EPRA as directed by CPCB and that of dismantlers, recyclers and refurbishers authorization 4. Conducting random inspection of dismantlers or recyclers or refurbishers 5. Maintaining online information regarding authorization granted to manufacturers, dismantlers, recyclers and refurbishers 6. Implementation of programmes to encourage environmentally sound recycling 7. Action against violations of these Rules 8. Any other function delegated by MoEF&CC under the Rules

Authority	Roles and responsibilities
Urban Local Bodies (Municipal Committees or Councils or Corporations)	1. If e-waste is found mixed with municipal solid waste, to ensure its proper segregation, collection and channelization to authorized dismantlers or recyclers 2. To ensure that e-waste pertaining to orphaned products is collected and channelized to authorized dismantlers or recyclers
Port Authority under Indian Ports Act, 1908 (15 of 1908) and Customs Authority under the Customs Act, 1962 (52 of 1962)	1. Verification of EPRA 2. Informing CPCB of any illegal traffic for necessary action 3. Taking action against importers for violations under the Indian Ports Act, 1908 and Customs Act, 1962

IV. Schedule III: List of hazardous wastes applicable for import and export with prior informed consent

Part	Basel no.	Description
Part A	A1090	Ashes from the incineration of insulated copper wire
Part A	A1150	Precious metal ash from incineration of printed circuit boards not included in Part B
Part A	A2010	Glass waste from cathode ray tubes and other activated glasses
Part B	B1110	Used electrical and electronic assemblies other than those listed in Part D of Schedule III
		Electronic assemblies consisting only of metals or alloys. Waste electrical and electronic assemblies or scrap (including Printed Circuit Boards not containing components such as accumulators and other batteries included in Part A of Schedule III, mercury glass switches, glass from cathode ray tubes and other activated glass and PCB-capacitors, or not contaminated with Schedule II constituents such as cadmium, mercury, lead, polychlorinated biphenyl or from which these have been removed, to an extent that they do not possess any of the characteristics contained in Part C of Schedule III

Schedule VI: Hazardous and other waste prohibited for import

Part	Basel No.	Description
A1	A1180	Waste electrical and electronic assemblies or scrap (does not include scrap assemblies from electric power generation) containing components such as accumulators and other batteries included in Part A of Schedule III, mercury switches, glass from cathode ray tubes and other activated glass and PCB capacitors, or contaminated with Schedule II constituents (e.g., cadmium, mercury, lead and polychlorinated biphenyl) to an extent that they exhibit hazardous characteristics indicated in Part C of Schedule III (note the related entry in Part-B B1110)
A3	A3180	Wastes, substances and articles containing, consisting of or contaminated with polychlorinated biphenyl (PCB) polychlorinated terphenyl (PCT), polychlorinated naphthalene (PCN) or polybrominated biphenyl (PBB) or any other polybrominated analogues of these compounds

V. Global best practices

In Europe, the bulk of e-waste is regulated by the WEEE Directive (2012/19EU). The WEEE directive sets collection, recycling, reuse and recovery targets for six categories of e-waste. From 2018 onwards, Article 7 of the Directive states that the minimum collection rates to be achieved annually shall be either 65 per cent of the average weight of the EEE POM in the three preceding years or 85 per cent of the e-waste generated on the territory of a member state in 2018.

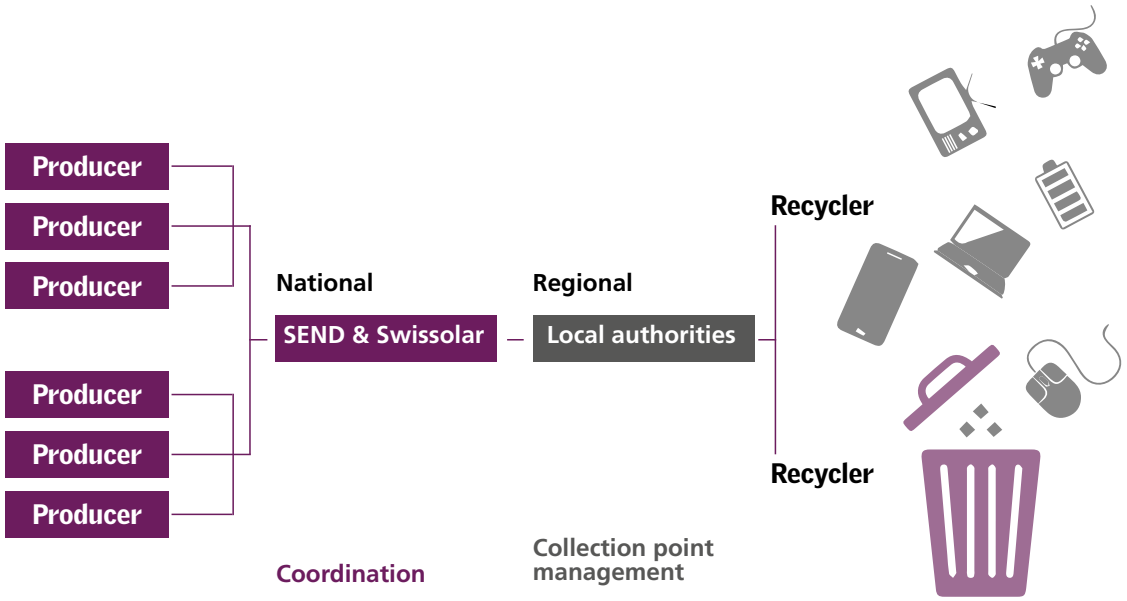
Switzerland

Switzerland has a population of just 8.4million, but there are an estimated 8–10 million smartphones lying unused in homes in the country. Per capita generation of e-waste is 23.4 kg. Despite being one of the biggest global producers of e-waste, the country has been collecting and recycling 75 per cent of discarded electronic material. This has been made possible through a strong, convenient and voluntary take-back system which channelizes waste to dedicated recycling and collection points.

SENS eRecycling has been entrusted with the responsibility of channelizing and recycling e-waste, it organizes the recycling of household appliances

in Switzerland. It does so reliably, efficiently and to the highest quality standards. Producers who are a part of SENS are provided with a unique identification. Consumers have to pay an Advance Recycling Fee (ARF), this promotes the producers to take away EEE free of cost. SENS takes care of collection and disposal for member producers.

E-waste management in Switzerland



Source: CSE 2020

Italy

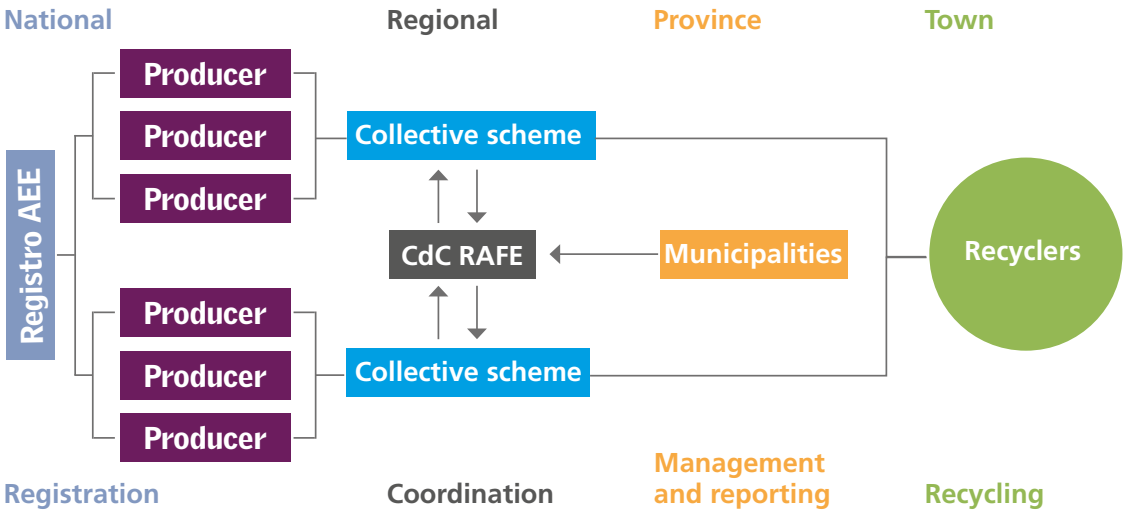
Italy has a population of over 60 million and the per capita generation of e-waste is 17.5 kg. The WEEE Coordination Center is the central body that takes care of optimizing the collection, recycling and management of WEEE. All EEE producers and WEEE treatment plants must register with it.

In Italy, there are two different types of collection points: retailers collection points and municipal collection points. The WEEE Coordination Center contacts the collection scheme that is in charge of that specific collection point. PROs offer a service to pass them from the collection points to the recycler points.

Producers are required to register, before placing EEE on the market. Registration must be made by electronic means through the official website www.registroaee.it. The WEEE Coordination Center is the point of reference for all subjects involved in the WEEE supply chain, working with them according to rules defined by the shareholders meeting and through procedures and regulations deriving from specific agreements

and conventions.The WEEE RAEE is managed and governed by collective systems under the supervision of the Ministry of the Environment.

E-waste management in Italy



Source: CSE 2020

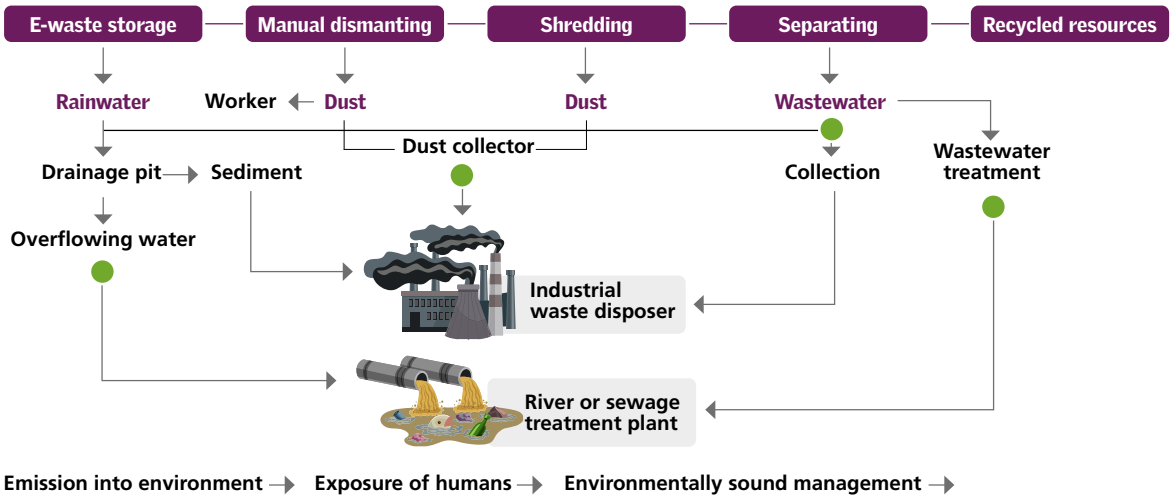
Japan

Japan has a population of 126 million and per capita e-waste generation is 20.4 kg. It has one of the most advanced e-waste legislation in Asia. Most e-waste is collected and recycled under the Act on Recycling of specified kinds of home appliances (2001) and the Act of Promotion of Recycling of Small EEE(2013). Japan was one of the first countries globally to implement the EPR-based system for e-waste.

The laws for specified kinds of home appliances legally promotes ESM of e-waste and efficient use of recyclable sources. It covers air conditioners, refrigerators and freezers, all kinds of televisions, washing machines and clothes dryers. Responsibilities of all stakeholders have been fixed—consumers have to pay a recycling fee, retailers are responsible for collection of used home appliances and manufacturers are responsible for recycling of collected appliances.

The Act on Promotion of Recycling of Small EEE extends the coverage of home appliances recycling law to other electronics as well. Consumers are responsible for delivering end-of-life products to the nearest collection point, retailers are responsible for proper channelization and manufacturers are encouraged to use recycled materials in their products. This Act covers all EEE except the fourth covered in the Law for Specified Kinds Home of Appliances.

E-waste management in Japan



Source: 2019, UNEP IETC, Daniel Ternald

The Tokyo 2020 Medal Project, Japan

In the two years between April 2017 and March 2019, 100 percent of the metals required to manufacture approximately 5,000 gold, silver and bronze medals (for the Tokyo Olympics) were extracted from small electronic devices contributed by people from all over Japan. Unfortunately, the Olympics have been postponed due to the ongoing pandemic.

Project in numbers

Collection period:

- 1 April 2017 to 31 March 2019

Number of devices collected:

- Approximately 78,985 tonnes collected by municipal authorities across Japan (used small electronic devices including mobile phones)
- Approximately 6.21 million used mobile phones collected by NTT Docomo shops across Japan

Final quantity of metals collected:

- Gold: Approximately 32kg
- Silver: Approximately 3,500kg
- Bronze: Approximately 2,200kg

Participating municipalities:

- 1,621 municipalities
- 90 per cent of the 1,741 wards, cities, towns and villages nationwide participated

References

1 Anon 2013. *Making the most of waste electrical and electronic equipment*, Publications Office, Directorate-General for Environment, Europe. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32012L0019, as accessed on 2 September 2020

2 Anon 2018. *Electrical & Electronics Manufacturing in India*, NEC Technologies India Private Limited and Associated Chambers of Commerce of India (ASSOCHAM), New Delhi/Noida. Available at https://in.nec.com/en_IN/pdf/ElectricalsandElectronicsManufacturinginIndia2018.pdf, as accessed on 18 August 2020

3 CP Baldé, V Forti, V Gray, R Kuehr and P Stegmann 017. *The Global E-waste Monitor, 2017*, United Nations University (UNU), International Telecommunication Union (ITU) & International Solid Waste Association (ISWA), Bonn/Geneva/Vienna. Available at https://collections.unu.edu/eserv/UNU:6341/Global-E-waste_Monitor_2017__electronic_single_pages_.pdf, as accessed on 26 August 2020

4 Anon 2019. 'National policy on electronics 2019', *The Gazette of India*, Ministry of Electronics and Information Technology 2019. Available at https://www.meity.gov.in/writereaddata/files/eGazette_Notification_NPE%202019_dated%2025022019.pdf as accessed on 17th November 2020

5 Ibid

6 Anon 2014. ASSOCHAM India. Available at https://www.assocham.org/newsdetail.php?id=4351, as accessed on 17 November 2020

7 Dr S Chatterjee 20111. *Electronic Waste in India*, Department of Information Technology. Available at https://www.meity.gov.in/writereaddata/files/EWaste_Sep11_892011.pdf, as accessed on 20 November 2020

8 Satish Sinha and Priti Mahesh 2020. *Into the Future, Managing e-waste for protecting lives and livelihoods*, Toxics Link. Available on http://toxicslink.org/?q=content/future-managing-e-waste-protecting-lives-and-livelihoods as accessed on 24 November 2020

9 Anon 2017. *Changes in GST rate for certain goods and change in IGST rate on import of certain goods*, GST Council. Available at http://gstcouncil.gov.in/sites/default/files/gst%20rates/GST%20RATE%20APPROVED%20BY%20GST%20Council-%206.10.2017.pdf, as accessed on 25 November 2020

10 Anon 2017. *GST rate schedule for goods*, GST Council. Available on http://gstcouncil.gov.in/sites/default/files/gst%20rates/chapter-wise-rate-wise-gst-schedule-18.05.2017.pdf as accessed on 25th November 2020

The use of electrical and electronic equipment is witnessing an explosive growth. So is e-waste. The UN has even termed this phenomenon a 'tsunami' of e-waste. The developed world turns the tide in its favour by redirecting the tsunami towards the developing world.

While e-waste is a problem, it can easily be moulded into a solution. It is the most valuable of wastes, as it contains many rare and precious metals and materials.

How can better regulation and practices, clearer and more comprehensive data, and intelligent synergy between the formal and informal sectors, promote better management and recycling of e-waste, prevent its dumping in developing countries (like India), protect e-waste handlers from the harmful effects of the dangerous chemicals it contains, and fuel a circular economy? This report contemplates these questions.

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