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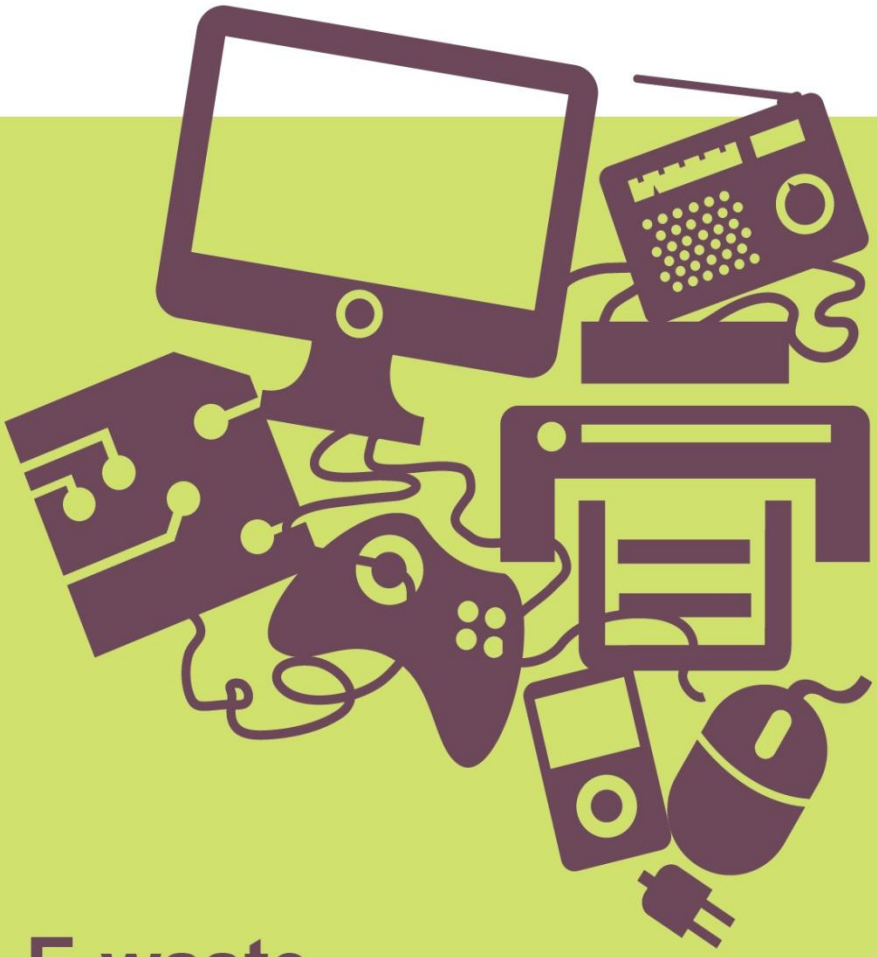

E-waste Awareness for Government Officials

Manual for Training of Trainers / 5 Days

सत्यमेव जयते

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The Project entitled “Capacity Building on E-waste through 1/3/5 day For training program under Digital India” is funded by Ministry of Electronics and Information Technology (MeitY)/Government of India.

Also, the prime purpose and focus of the “Content for Capacity Building on E-waste through 1/3/5 day For training program under Digital India through Digital India Initiative” shall not be referred to use/ quoted/ in matters of legal proceeding as the matter is solely for dissemination of awareness.

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Table of Contents

List of Tables

List of Figures

General Introduction

Project Background

Capacity Building of Government Employees on 'e-Waste' Training Program, under 'Digital India Initiative'

Ministry of Electronics and Information Technology (MeitY) has initiated the project "Awareness Programme on Environmental Hazards of Electronic waste" on March 31, 2015 under the 'Digital India' initiative of the Government of India. The project is expected to have far reaching and significant impact on the growth of the country as it focuses on reuse and recycling of e-waste, which has the potential to conserve natural resources. The project will also help in effective implementation of e-Waste Management Rules, 2016.

The National Institute of Electronics and Information Technology (NIELIT), a body with the Ministry of Electronics and Information Technology (MeitY), is mandated to carry out HR development and related activities in the area of Information, Electronics and Communication Technology (IECT), as the HRD arm of MeitY. NIELIT is actively engaged in the development of qualified human resources in the areas of IT; Electronics; Communication Technologies; Hardware; Cyber Law; Cyber Security; GIS; Cloud Computing; ESDM; e-Governance etc. and has huge potential to create awareness among various Government Departments.

Vide MeitY's letter No.F.No.7(4)/2015 dated April 19, 2016, NIELIT has been awarded a project titled 'Capacity Building of Government Officials on e-waste Awareness' under which Government Officials shall be trained on e-Waste Management.

The major concern of e-Waste Management in India is lack of awareness among various stakeholders about the ill effect of the end-of-life products. It is essential that Government Officials are made aware about e-waste, its hazards and management. This project aims to create awareness on e-waste management and build capacity among officials of Central and State Government Departments, in general, and those of Department of IT, Science & Technology and associated departments, Railways, Defence etc. in particular through customized training programms. The training will help to inculcate better implementation of e-Waste Management Rules, 2016.

Under the project, training of Government officials shall be conducted on grant-in-aid basis sponsored by MeitY and training of officials from other organizations such as PSU officials, bank officials, industry etc., shall be conducted on payment basis. The objective of enrolling candidates on payment basis would ensure optimal utilization of efforts/ resources, while increasing the target number of candidates. In the initial phase of one year, the training programme will be conducted at 10 identified States. After completion of one year, the training will be extended to remaining states so that a total of 29 States are targeted on PAN India basis.

This training manual will help to provide the information on e-waste management through self -explanatory and engaging mode..

The objectives of the manual are the following:

To act as a tool for enhancing the understanding of the trainers who would be involved in conducting the training for Government Employee on the subject of e-waste.

To serve as a ready reference for trainers to design and organize trainings on the subject of e-waste for Government Employees.

To serve as a guide for implementing initiatives by Government Employees that contribute to safe e-waste management in India.

To serve as a compilation of information on the following issues related to the subject of e-waste:

- Background on E-Waste
- Hazardous Substances in E-Waste
- Policies for e-waste management in our country
- Inventorization of e-waste
- Efficient E-Waste Collection Mechanism
- Best Practices on Dismantling and Recycling
- Extended Producer Responsibility
- Compliance Mechanisms on E-Waste
- IEC Activities
- Developing an Action Plan

Objectives of the training of trainers:

The training of trainers has been designed with the objective to enhance the understanding on the subject of e-waste amongst Government Employees. This will be achieved by a training of trainers on the subject of e-waste and providing them with adequate tools to organize trainings for Government Employees.

The training of trainers will be followed by trainings for Government Employees so that they can contribute to effective handling and management of e-waste.

This specific trainings manual aims at regulators, policy-makers and other govt. departments. It informs them about the current situation in the e-waste recycling sector in India, the background of e-waste management and recycling as well as the legal provisions regarding and the responsibilities of the regulators and bulk consumers. This shall support the regulators in their duty to effectively implement the Rules.

Training Course Structure

The proposed structure of 1, 2 and 5 days of the workshop could be as below:

Table 1: Training Course Structure

Day 1	Day 2	Day 3
Introduction and Overview Background on E-Waste Hazardous Substances in E-Waste	Policies for e-waste management in our country E-waste Value Chain *Site visit to a e-waste recycling plant/ clusters of e-waste recycling*	Compliance Mechanisms on E-Waste Developing a personal Action Plan

How to use the manual

This manual has 3 major components to it with of the objective of providing experiential learning to its users.

Component 1 is "Introduction & Overview" will be the first section covered in the subsequent chapter 1. Component 2 will be covered in Chapter 2 and so forth.

Each chapter contains the guidelines on the presentation of the respective session. The chapter opens with a general summary of the session, followed by a structure of the session content in bullet points and the objectives of the session. This allows you to get a quick idea on what the training session is about. The rest of each chapter follows the outline and chronology of the presentation. This enables you as the trainer to use this manual together with the PowerPoint slides to prepare yourself and give the presentation.

At certain points in the manual you will find "trainer's note". These trainers's note directly addresses you as the trainer and reminds you of an important point, or some other task to be carried out before giving the respective part of the presentation.

At the end of the manual few activities are given, which will help in effective e-waste effective training programme. The activities are defined as group work, role play and present a case study etc.

Day 1

1. Introduction & Overview

1.1 Introduction

In this session, the trainers will be introduced to the concept of the training material. The agenda and objective of the training will be also made clear to the trainers; the participants will also talk about their expectations and outcomes of the programme.

1.1.1 Objectives of the Session

The objective of the session will be in the form of outcomes of the participants, which are followings:

- To understand the objectives of the training course
- Know about the expected outcomes of the training course
- Formulate their own expectations regarding the training
- Know about the structure of the training course

1.1.2 Overview of the Session

- General Objectives
- Expected Outcomes
- Participants' Expectations
- Training Course Outline

1.2 General Objectives:

- The objective of the training is to provide information about e-waste and associated health and environmental issue due to the presence of hazardous substances
- Gain the information relevant to bulk consumers and govt. officials
- Further steps taken towards the successful implementation of E-waste (Management) of Rules, 2016
- Encourage participants to draw their actions for implementing the Rules and improving the management of e-waste in their state and within their Organisation
- Provide exposure to the ground reality of e-waste management and recycling in the country

1.3 Expected Outcomes

Expected outcomes of the training are

- Making participants understand the basics of e-waste such
- Clear understanding of responsibilities of all stakeholders in value chain for implementing the Rules
- Information regarding key challenges of e-waste management from a regulator's
- Knowledge about Resources and toxic material in e-waste and their effects
- Supporting participants in developing an action plans containing detailed steps and activities on
- how to proceed with the proper implementation of the Rules

1.4 Training Course Outline

A possible course structure for day 1 of the workshop could be as below:

Table 2: Training Course Outline

Session Title	Time
Introduction and Overview	10:30- 11:00
Tea Break	11:00-11:30
What is e-waste	11:30- 1:00
Lunch	1:00- 2:00
Policies Governing E-waste in India	2:00- 3:30
Tea Break	3:30-4:00
Best Practices for E-waste Management – within India and Across the World	4:00- 5:00

2. Background On E-waste

2.1 Introduction

In this session the participants are introduced to the issues associated with the generation, management and disposal of E-Waste. It is discussed what e-waste is composed of, how much e-waste is generated and by whom as well as where. The participants will also be aware about the resources embedded in e-waste as well as environment and health effects due to toxic substances.

2.1.1 Objectives of the Session

At the end of this session the participants should:

- Have a basic understanding on the problems associated with e-waste management
- Know what e-waste is composed of
- Know where e-waste is produced and in what quantities
- Understanding of Policies Governing E-waste in India

2.1.2 Overview of the Session

- What is e-waste
- Composition of e-waste
- Generation of e-waste
- Environment and heatlh hazards of e-waste
- State and city wise e-waste in India
- Policies Governing E-waste in India

2.2 What is E-waste?

'E-waste' means electrical and electronic equipment, whole or in part discarded as waste by the consumer or bulk consumer as well as rejects from manufacturing, refurbishment and repair processes. It includes electrical and electronic equipment including their components, consumables, parts and spares covered under the rules.

Growth of Information and Communication Technology Sector has enhanced the usage of the electronic equipment exponentially. Today electronic waste is one of the fastest growing waste streams in the country with a growth rate of 10% per annum[1] (Chatterjee 2011). There is no comprehensive and recent inventory of e-waste in the country however as per Central Pollution Control Board's (CPCB) preliminary estimates the e-waste generation in India has been estimated to be 0.8 million tonnes by 2012. Also according to a report by United

[1] http://mit.gov.in/sites/upload_fi les/dit/fi les/EWaste_Sep11_892011.pdf

Nations (UN) the world wide generation of e-waste is estimated around 30-50 million tonnes per annum[2] (Indian Central Pollution Control Board 2011).

In developed countries E-waste equals 1% of total solid waste on an average. In USA it accounts for 1% - 3% of the total municipal solid waste generation. In European Union, Waste Electrical and Electronic Equipment (WEEE) or e-waste increases by 16-28% every year which is three times faster than the average annual municipal solid waste generation. In India and China although the per capita generation is less than 1 kg it is growing at an exponential pace. The increasing "market penetration" in developing countries, "replacement market" in developed countries and "high obsolescence rate" make WEEE/E-waste one of the fastest waste streams[3] (UNEP 2007a).

E-Waste can be defined by the following characteristics:

- Electronic waste or e -waste is any broken or unwanted electrical or electronic appliance.
- E-waste includes computers, consumer electronics, phones, medical equipments, toys and other.
- Items that have been discarded by their original users.
- E-Waste also includes waste which is generated during manufacturing or assembling of such equipments.

Categories of E-waste according to E-Waste (Management) Rules, 2016

Table 3: Categories of electrical and electronic equipment including their components, consumables, parts and spares covered under the rules

Sr. No.	Categories of electrical and electronic equipment	Electrical and electronic equipment code
i.	**Information technology and telecommunication equipment :**	
	Centralised data processing: Mainframes, Minicomputers	ITEW1
	Personal Computing: Personal Computers (Central Processing Unit with input and output devices)	ITEW2
	Personal Computing: Laptop Computers(Central Processing Unit with input and output devices)	ITEW3
	Personal Computing: Notebook Computers	ITEW4
	Personal Computing: Notepad Computers	ITEW5
	Printers including cartridges	ITEW6
	Copying equipment	ITEW7
	Electrical and electronic typewriters	ITEW8

[2] http://cpcb.nic.in/ImplementationOfE-WasteRules.pdf
[3] http://www.unep.or.jp/ietc/Publications/spc/EWasteManual_Vol1.pdf

Sr. No.	Categories of electrical and electronic equipment	Electrical and electronic equipment code
	User terminals and systems	ITEW9
	Facsimile	ITEW10
	Telex	ITEW11
	Telephones	ITEW12
	Pay telephones	ITEW13
	Cordless telephones	ITEW14
	Cellular telephones	ITEW15
	Answering systems	ITEW16
ii.	**Consumer electrical and electronics:**	
	Television sets (including sets based on (Liquid Crystal Display and Light Emitting Diode technology)	CEEW1
	Refrigerator	CEEW2
	Washing Machine	CEEW3
	Air-conditioners excluding centralised air conditioning plants	CEEW4
	Fluorescent and other Mercury containing lamps	CEEW5

2.3 E-waste generation in India

India is the fifth biggest producer of e-waste in the world; discarding 1.7 million tonnes (Mt) of electronic and electrical equipment in 2014, a UN report have warned that the volume of global e-waste is likely to rise by 21 per cent in next three years4. IT and electronic industry have contributed significantly to the overall economic growth.

In India, there are 10 States that contribute to 70 per cent of the total E-waste generated in the country, while 65 cities generate more than 60 per cent of the total E-waste. Among the 10 largest E waste generating States, Maharashtra ranks first followed by Tamil Nadu, Andhra Pradesh, Uttar Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh and Punjab. Among the top ten cities generating E-waste, Mumbai ranks first followed by Delhi, Bengaluru, Chennai, Kolkata, Ahmedabad, Hyderabad, Pune, Surat and Nagpur. The main sources of E-waste in India are the government, public and private (industrial) sectors, which account for almost 70% of total e-waste. The contribution of individual households is relatively small at about 15%; the rest being contributed by manufacturers. Though individual households are not large contributors to waste generated by computers, they consume large quantities of consumer goods and are responsible to generate waste. An Indian market Research Bureau (IMRB) survey of 'E-waste generation at Source' in 2009 found that out of the total e-waste volume in India, televisions and desktops including servers comprised 68 per cent and 27 per cent respectively. Imports and mobile phones comprised of 2 per cent and 1 per cent respectively (Rajya Sabha Secretariat 2011). However an Assocham-

[4] India fifth biggest generator of e-waste in 2014: UN report - The Hindu

cKinetics study pointed out that global volume of e-waste generated is expected to reach from 93.5 MT in 2016 to 130 MT in 2018 at a CAGR of 17.6 percent during the period

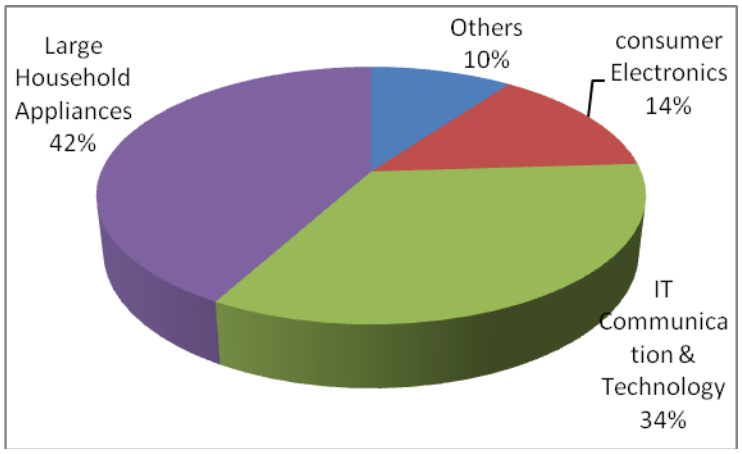


Figure 1: Sources of E-waste in India (% of total E-waste generated)

Source: MAIT, 2013

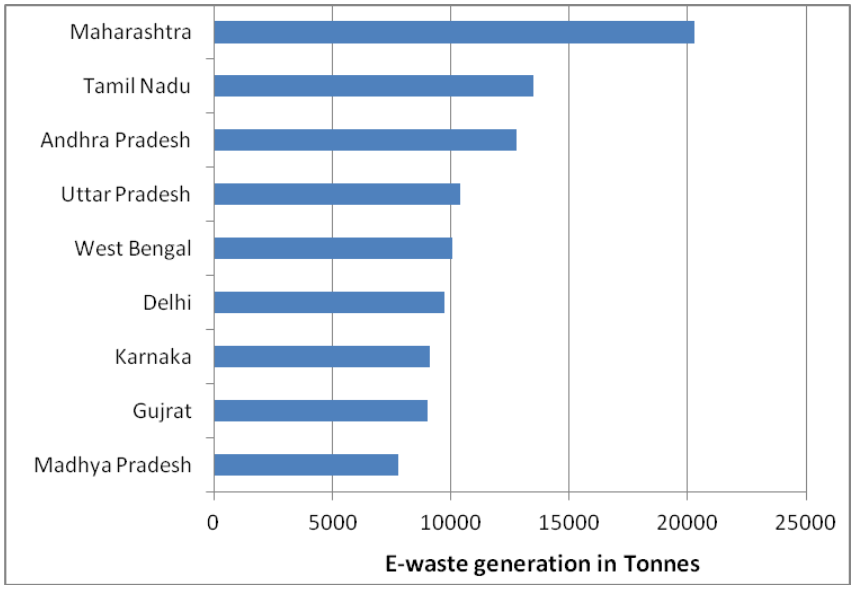


Figure 2: State wise E-waste Generation in India (% of total waste)
Source: IRGSS, 2005

2.4 Resources Embedded in E-waste

The electronic and electrical item consists of more than 1000 different substances which can fall under hazardous and non-hazardous categories. The resources embedded in e-waste are very diverse and contains products across different categories. As shown in the below picture, the major constituents are ferrous and non-ferrous metals, plastics, glass and plywood, printed circuit boards, concrete and ceramics, rubber and other items.

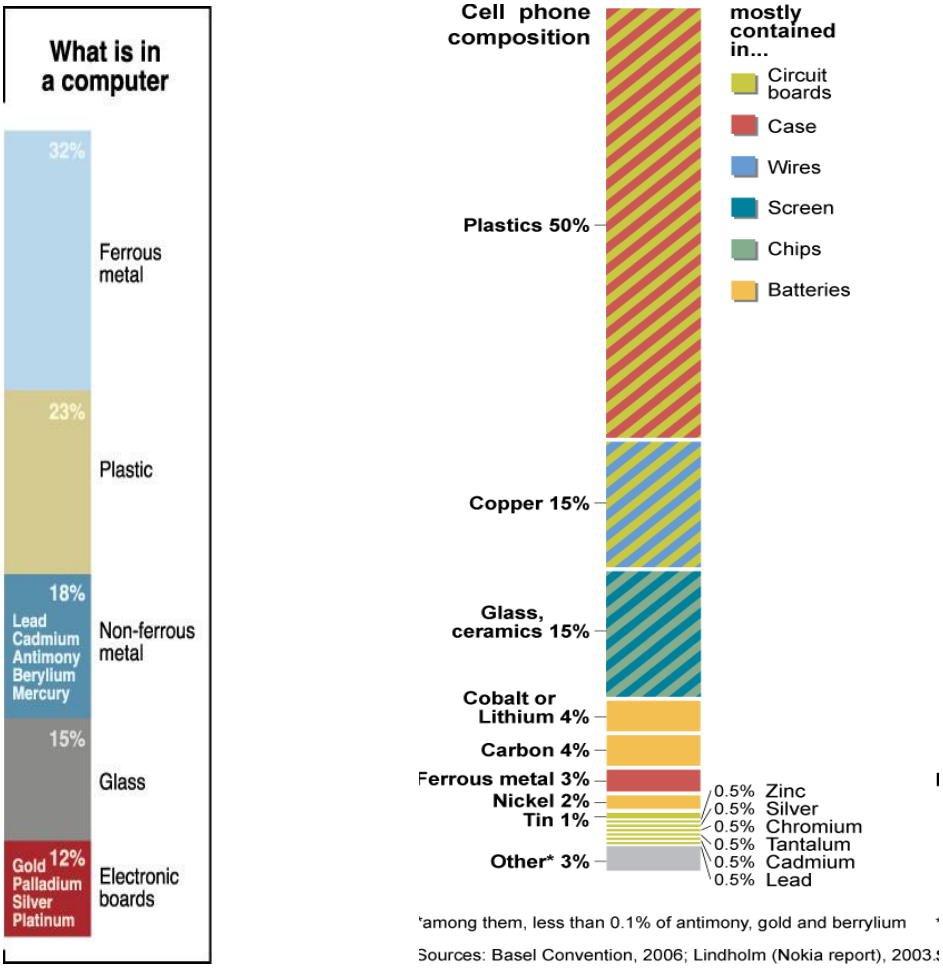


Figure 3: Resource embedded in E-waste
Source: UNEP

2.4.1 Benefits from environmentally sound management of e-waste

The given below table shows the average weight and composition of some selected electronic and electrical appliances which is most commonly used electronics and electrical that constitutes bulk quantities of WEEE/E-waste in developing countries. The presence of elements like lead, mercury, arsenic, cadmium, selenium, and hexavalent chromium and flame retardants beyond threshold quantities in WEEE / E-waste classifies them as hazardous waste.

Table 4: Percentage weight of different materials in e-waste

Appliances	Average Weight(kg)	Iron(Fe) % Weight	Non Fe-metal % weight	Glass % weight	Plastic % weight	Electronic Components % weight	Others % Weight
Refrigerators and freezers	48	64.4	6	1.5	13		15.1
Washing machine	40-47	59.8	4.6	2.6	1.5		31.5
Personal computer	29.6	53.3	8.4	15	23.3	17.3	0.7
TV sets	36.2	5.3	5.4	62	22.9	0.9	3.5
Cellular telephones	0.08-0.100	8	20	10.6	59.6		1.8

Source: (UNEP) 2007

The recovery of the elements embedded in e-waste has economic value and recovery material makes it a source of secondary raw material for manufacturing of the products, which can lead a profitable business. The tables given below explain recoverable quantities of elements in some common household electronics which can be reused for other purposes.

Table 5: Recoverable quantities of elements in a TV

Elements	Percentage	Ppm	Recoverable weight of element(kg)
Aluminium	1.2		0.4344
Copper	3.4		1.2308
Lead	0.2		0.0724
Zinc	0.3		0.1086
Nickel	0.038		0.013756
Iron	12		4.344
Plastic	26		9.412
Glass	53		19.186
Silver		20	0.000724
Gold		10	0.000362

Table 6: Recoverable quantities of elements in a Refrigerator

Material Type	Percentage
CFCs	0.20
Oil	0.32
Ferrous metals	46.61

Non Ferrous metals	4.97
Plastics	13.84
Compressors	23.80
Cables/Plugs	0.55
Spend PurfFoam	7.60
Glass	0.81
Mixed Waste	1.31
Total	**100**
Materials disposed of to incinerator	0.20
Materials disposed of to landfill	8.90
Materials sent for recycling	90.90

Table 7: Recoverable quantities of elements in a PC

Elements	Content (% to total weight)	Content (kg)	Recycling efficiency (%)	Recoverable weight of element (kg)
Plastic	23	6.25	20%	1.25069408
Lead	6	1.71	5%	0.08566368
Aluminium	14	3.85	80%	3.08389248
Germanium	0.0016	0.00	0%	0
Gallium	0.0013	0.00	0%	0
Iron	20	5.57	80%	4.45453312
Tin	1	0.27	70%	0.19188512
Copper	7	1.88	90%	1.69614576
Barium	0.0315	0.01	0%	0
Nickel	0.8503	0.23	0%	0
Zinc	2	0.60	60%	0.359790721
Tanialum	0.0157	0.00	0%	0
Indium	0.0016	0.00	60%	0.00026112
Vanadium	0.0002	0.00	0%	0
Terbium	0	0.00	0%	0
Beryllium	0.0157	0.00	0%	0
Gold	0.0016	0.00	99%	0.000430848
Europium	0.0002	0.00	0%	0
Tritium	0.0157	0.00	0%	0

Elements	Content (% to total weight)	Content (kg)	Recycling efficiency (%)	Recoverable weight of element (kg)
Ruthenium	0.0016	0.00	80%	0.00034816
Cobalt	0.0157	0.00	85%	0.00362984
Palladium	0.0003	0.00	95%	0.00007752
Manganese	0.0315	0.01	0%	0
Silver	0.189	0.01	98%	0.005037984
Antinomy	0.0094	0.00	0%	0
Bismuth	0.0063	0.00	0%	0
Chromium	0.0063	0.00	0%	0
Cadmium	0.0094	0.00	0%	0

Selenium	0.0016	0.00	70%	0.000304643
Niobium	0.0002	0.00	0%	0
Yttrium	0.0002	0.00	0%	0
Rhodium	0	0.00	50%	0
Mercury	0.0002	0.00	0%	0
Arsenic	0.0013	0.00	0%	0
Silica	24.8803	6.77	0%	0

Source: Cambodian Ministry of Environment 2009

3. Hazardous Substances in E-Waste

3.1 Introduction

In this session, the trainers will be introduced about the hazardous substances in e-waste. The pollutants and their occurrence will also be defined to the participants. The participants will get knowledge about the health impacts due to these hazardous substances.

3.1.1 Objectives of the Session

The objective of the session will be in the form of outcomes of the participants, which are followings:

- To understand the hazards of e-waste
- To know about the hazardous substance and their occurrence
- Health and environment impacts of e-waste due to processing of e-waste

3.1.2 Overview of the Session

- Possible hazardous substances in WEEE/E-waste components
- Pollutants and their occurrence in WEEE
- Hazards from e-waste substances
- Risks to Health and Environment during E-Waste Processing
- Case Studies

Electronic waste is filled with a variety of toxic materials, which creates a serious risk for human health and the environment if they are released during processing, recycling or disposal. The major constituents are ferrus and non- ferrous metals, plastics, glass and plywood, printed circuit boards, concrete and ceramics, rubber and other items. Iron and steel constitutes about 50% of the WEEE followed by plastics (21%), non-ferrous metals (13%) and other constituents. Non-ferrous metals consist of metals like copper, aluminum and precious metals like silver, gold, platinum, palladium etc. Other than these resources heavy metals and organic compounds are also found which contains in e-waste such as lead, cadmium, mercury, arsenic, beryllium, polyvinyl chloride (PVC), Brominated Flame Retardants (BFRs) and phthalates.

Table 8 : Possible hazardous substances in WEEE/E-waste components

Component	Possible Hazardous Content
Metal	
Motor/compressor	
Cooling	ODS

Component	Possible Hazardous Content
Plastic	Phthalate plasticize, BFR
Insulation	Insulation ODS in foam, Asbestos, refractory ceramic fiber
Glass	
CRT	Lead, antimony, mercury, phosphors
LCD	Mercury
Rubber	Phthalate plasticizer, BFR
Winning/electrical	Phthalate plasticizer, lead , BFR
Concrete	
Transformer	
Circuit Board	Lead Beryllium , antimony, BFR
Fluorescent Lamp	Mercury, Phosphorus, Flame retardants
Incandescent Lamp	
Healing element	
Thermostat	Mercury
BFR – containing plastic	BFRs
Batteries	Lead, lithium, Cadmium, Mercury
CFC, HCFC , HFC , HC	Ozone depleting substances
External electric cables	BFRs, plasticizers
Electrolyte capacitors (over L/D 25mm)	Glycol, other unknown substances

Source: Indian Central Pollution Control Board 2008

Among the substances mentioned in the table above, of most concern are the heavy metals such as lead, mercury, cadmium and chromium (VI), halogenated substances (e.g. CFCs), polychlorinated biphenyls, plastics and circuit boards that contain brominated flame retardants (BFRs). BFR can give rise to dioxins and furans during incineration. Other materials and substances that can be present are arsenic, asbestos, nickel and copper. These substances may act as a catalyst to increase the formation of dioxins during incineration.

Many of these pollutants are embedded in e-waste and are the constituents of complex materials, e.g. flame retardants in plastics, or are hidden inside electrical components, such as mercury in switches, therefore these materials are difficult to isolate and separate from the other components. The material fusions with equipments make the recycling of e-waste complicated and costly. Pollutants or toxins in E-waste are concentrated in circuit boards, plastics, batteries and LCDs (Liquid crystal displays). To avoid serious environmental pollution and human exposure, adequate treatment of e-waste is crucial; particularly considering the huge amounts of e-waste we are producing globally[5].

Table 9: Pollutants and their occurrence in WEEE

Pollutant	Occurrence
Arsenic	Semiconductors, diodes, microwaves, LEDs (light emitting diodes), solar cells
Barium	Electron tubes, filler for plastic and rubber, lubricant additives

[5] Swedish Environmental Protection Agency 2011

Pollutant	Occurrence
Brominated flame –proofing agent	Casing, circuit boards (plastic), cables and PVC cables
Cadmium	Batteries, pigments solder, alloys, circuit boards, computer batteries, monitor cathode ray tubes (CRTs)
Chrome	Dyes/pigments, switches, solar
Cobalt	Insulators
Copper	Conducted in cables, copper ribbons, coils, circuitry, pigment
Lead	Lead rechargeable batteries, solar, transistors, lithium batteries PVC(polyvinyl chloride) Stabilizers, lasers, LEDs, thermoelectric elements, circuit boards
Liquid crystal	Displays
Lithium	Mobile telephones, photographic equipment, video equipment (batteries)
Mercury	Components in copper machines and steam irons; batteries in clocks and pocket calculators, switches, LCDs
Nickel	Alloys, batteries, relays, semiconductors, pigments
PCBs (Polychlorinated biphenyls)	Transformers, capacitors, softening agent for paint, glue plastic
Selenium	Photoelectric cells, pigments, photocopiers, fax machine
Silver	Capacitors, switches (contacts), batteries, resistors
Zinc	Steel, brass, alloys, disposable and rechargeable batteries, luminous substances.

Source: Raiya Sabha Secretariat 2011

The major hazards associated with the harmful elements in the composition of WEEE are listed in the table below. As shown in the table, toxic substances are found in components of the electronic or electrical products, which release highly toxic dioxins, furans and acid when burned to retrieve metals from the product. Many of these substances are toxic and carcinogenic[6]. The materials are complex and have been found to be difficult to recycle in an environmentally sustainable manner even in developed countries.

Table 10: Hazards from e-waste substances

Metal	Danger
Lead	A neurotoxin that affects the kidneys and the reproductive system, high quantities can be fatal. It affects mental development in children. Mechanical breaking of CRTs (cathode ray tubes) and removing solder form microchips release lead as powder and fumes.
Plastic	Found in circuit boards, cabinets and cables, they contain carcinogens. BFRs or Brominated flame retardants give out carcinogenic Brominated dioxins and furans Dioxins can harm reproductive and immune systems. Burning PVC, a component of plastics, also produces dioxins BFR can leach into landfills Even the dust on computer cabinets contains BFR.
Chromium	Used to protect metal housings and plates in a computer from corrosion, inhaling Hexavalent chromium or chromium 6 can damage liver and kidney and cause bronchial maladies including asthmatic bronchitis and lung cancer.

[6] E-Waste in India, Rajyasabha Secretarial New Delhi, 2011

Metal	Danger
Mercury	Affect the central nervous system, kidneys and immune system. It impairs foetus growth and harms infants through mother's milk. It is released while breaking and burning of circuit boards and switches mercury in water bodies can form methylated mercury through microbial activity. Methylated mercury is toxic and can enter the human food chain through aquatic.
Beryllium	Found in switch boards and printed circuit boards. It is carcinogenic and causes lung diseases.
Cadmium	A carcinogen. Long-term exposure causes Itai-Itai disease, which causes severe pain in the joints and spine. It affects the kidneys and softens bones. Cadmium is released into the environment as powder while crushing and milling of plastics, CRTs and circuit boards. Cadmium may be released with dust, entering surface water and groundwater.
Acid	Sulphuric and hydrochloric acids are used to separate metals from circuit board's furnes contain chlorine and sulphur dioxide, which cause respiratory problems. They are corrosive to the eye and skin.

E-waste typically contains complex combinations of materials and components down to microscopic levels. The wastes are broken down not just for recycling but for the recoverable materials such as plastic, iron, aluminium, copper and gold. However, since e-waste also contains significant concentration of substances that are hazardous to human health and the environment, even a small amount of E-waste entering the residual waste will introduce relatively high amount of heavy metals and halogenated substances. Such harmful substances leach into the surrounding soil, water and air during waste treatment or when they are dumped in landfills or left to lie around near it. Sooner or later, they would adversely affect human health and ecology.

Typical pathways for the release of pollutants from e-waste are:

Heavy metals

- Dust generated during mechnical treatment, for example, the dismantling and crushing of WEEE.
- Flue gas released during thermal treatment, for example, the release of metals from compounds during the incineration of plastic.
- Vaporization wherein metals are released from compounds in an acid bath

Dioxins and Furans

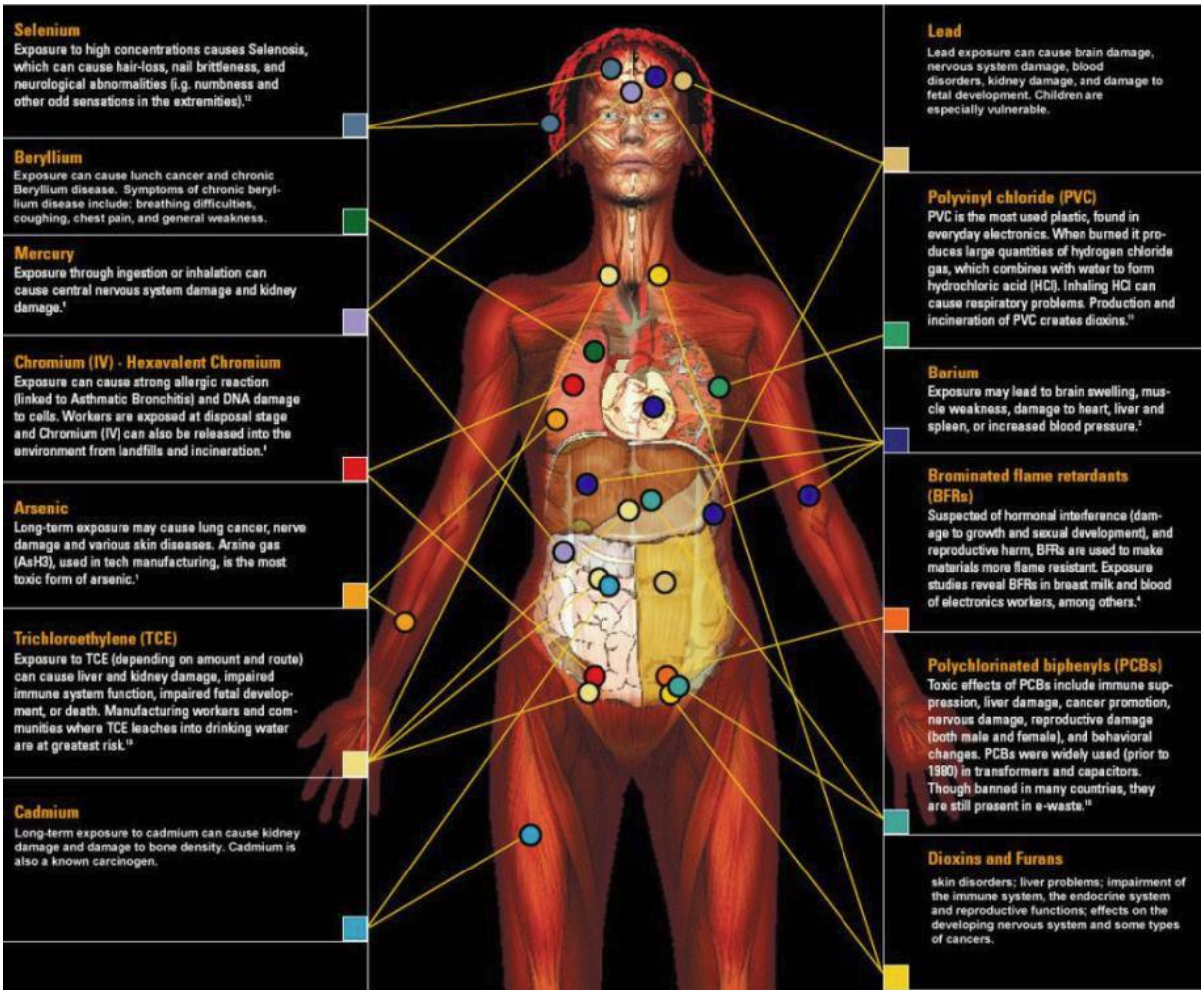
- Dioxins and furans are emitted during the thermal treatment of WEEE, for example during -
- The combustion of cable insulation containing PVC in order to recycle copper wiring
- The incineration of epoxy resin containing flame retardant from circuit boards in order to recycle the metal they contain

Acids

- Released in the form of vapour when metals are released from compounds. May also get distributed throughout the surrounding area in the following ways
- Factory air and dust being blown into the vicinity
- Leaching through waste water and seepage
- Release of flue gas into the atmosphere as a result of open incineration of furnace combustion

Constituents of E-Waste:

E-Waste Source	E-Waste Component	Environmental Hazard	Effects on Human
CRTs (used in TVs, Monitors, ATM, Video Camera, etc), Batteries, PVC cables, Paints	Lead, barium & other heavy metals	These metals leaching into the ground water and release of toxic phosphor	Anemia, Renal Toxicity, Insomnia
Batteries, Housing & Medical Equipment	Mercury	Air emissions as well as discharge into rivers of glass dust	Renal Toxicity, Muscle tumors, Mental retardation, Cerebral palsy
Plastics from printers, keyboards, monitors, etc	plasticizer bisephenol-A(or BPA), as well DEHP and DBP, plastic compounds known as phthalates	Chlorinated plastics release harmful chemicals into the surrounding soil, which seep into ground water or other surrounding water sources which cause serious harm to the species that drink this water.	Risk in developing heart problems, obesity, reproductive disease
PVC & polymer, Paints, Printing inks, Electrical transformers & capacitors	Polychlorinated Biphenyls (PCBs)	include extreme pollution from production, toxic chemical exposure during use, hazards from fires	Suppression of immune system; Damage to the liver, nervous and reproductive systems



Picture: Adverse Impact of e-waste
Source: http://www.capeewaste.co.za/why_recycle_ewaste.html

3.2 Risks to Health and Environment during E-Waste Processing

Collection risk: Release of hazardous substances during breakage; release of Hg: breakage of light sources, switches

Dismantling risk: Emission of lead and barium oxide from crushing of CRT glass, risk of explosion because of vacuum in CRT

Shredding risk: Emission to air (e.g. plastic will give rise to various organic compounds as well as metals; evidence shows that Cd and Pb levels PBDE levels, and PBDD levels among workers in TV recycling facility are very high)

Pyro-metallurgical process risk: Fly ash has high amount of metal and PCDD/PBDD

Hydro-metallurgical process risk: Irritation of skin, eyes, respiratory tract kidney central nerve system, pollution of groundwater & environment

Landfilling risk: Leachate and evaporation of hazardous substance

Identification of toxic substances and awareness of hazards

Different components of electrical and electronic equipment have different hazardous substances, it is easier to identify the components and then determine how to handle the component considering the hazardous substance present in it.

Substance	Occurrence in e-waste
Halogenated compounds:	
- PCB (polychlorinated biphenyls)	Condensers, Transformers
- TBBA (tetrabromo-bisphenol-A) - PBB (polybrominated biphenyls) - PBDE (polybrominated diphenyl ethers)	Fire retardants for plastics (thermoplastic components, cable insulation) TBBA is presently the most widely used flame retardant in printed wiring boards and casings.
- Chlorofluorocarbon (CFC)	Cooling unit, Insulation foam
- PVC (polyvinyl chloride)	Cable insulation
Heavy metals and other metals:	
- Arsenic	Small quantities in the form of gallium arsenide within light emitting diodes
- Barium	Getters in CRT
- Beryllium	Power supply boxes which contain silicon controlled rectifiers and x-ray lenses
- Cadmium	Rechargeable NiCd-batteries, fluorescent layer (CRT screens), printer inks and toners, photocopying-machines (printer drums)
- Chromium VI	Data tapes, floppy-disks
- Lead	CRT screens, batteries, printed wiring boards
- Lithium	Li-batteries
- Mercury	Fluorescent lamps that provide backlighting in LCDs, in some alkaline batteries and mercury wetted switches
- Nickel	Rechargeable NiCd-batteries or NiMH-batteries, electron gun in CRT
- Rare Earth elements (Yttrium, Europium)	Fluorescent layer (CRT-screen)
- Selenium	Older photocopying-machines (photo drums)
- Zinc sulphide	Interior of CRT screens, mixed with rare earth metals
Others:	
- Toner Dust	Toner cartridges for laser printers / copiers
Radio-active substances - Americium	Medical equipment, fire detectors, active sensing element in smoke detectors

Source: E-waste guide.info, (2016) Hazardous Substances in E-waste.

Case Study

Hazards of e-waste recycling to human health and the environment:

Case study 1: Brazil

- Brazil is among the largest producers of electronic waste globally, with more than 1.4 million tons of this material produced each year.
- According to data from the Ministry of Environment, or Ministério do Meio Ambiente, only 13% of e-waste is treated correctly and 500 million of devices remain in the home unused.
- Brazil generates the most electronic waste from computers, with about 0.5 kg/person/year.
- In November 2013, the number of mobile phones in use in Brazil reached 271 million, i.e., well above the Brazilian population, which is 200 million.

Case study 2: Taizhou of Zhejiang province, China

- UK exports 1,00,000 tonnes of e-waste every year: majority goes to China
- Process adopted in China is rudimentary, with minimum emphasis on technology and health aspects
- Study was conducted in Taizhou of Zhejiang province (60,000 people and 2 million tonne of e-waste to recycle metal)
- Air samples were collected in the downstream and workers health check were conducted
- Release of POP and heavy metals: accumulated in body due to inhalation
- Test were conducted: Pollutants level were in the workers blood
- High probability of DNA damage which can induce cancer

Case study 3: Guiyu, China

- E-waste recycling region
- Highest level of dioxins ever recorded
- Chendian, a town 9 km away has 12-18 times less dioxins concentration
- Lianjiang and Nanyang river are highly polluted because of e-waste disposal
- Lianjiang river: high level of Ar, Cr, Li, Mo, Sb, Se
- Nanyang river: Ag, Be, Cd, Cu, Ni, Pb, Zn

Case Study 5: Kolkata, India

- As per GIZ-MAIT Assessment Study, 2010, Kolkata generates around 26000 tonnes of potential annual e-waste annually, of which 9290 tonnes is available for recycling and only 2000 tonnes gets recycled
- Unorganized e-waste recycling industry (dismantling/recycling activities) is only present in Howrah region of Kolkata.

Case Study 6: Banglore, India

- As per ASSOCHAM Study, 2013, E-waste generation in Bangalore is 18,000 tonnes in a year
- Only 5-10 percent of the e-waste generated in the city is making it to the recyclers and 90 per cent of e-waste is still going into the informal sector
- As per E-parisara Survey report, a citizen from a middle-income household generates 21 kg of e-waste a year.
- As per Karnataka State Pollution Control Board (KSPCB). “Scrap dealers often just burn components in the open, which given the metallic content is hazardous to their health. Or they may dump what they cannot extract in drains and with other garbage, and this can leach into the ground and pollute groundwater.”

Case Study 7: Moradabad, India

- As per CSE Study, 2015, the e-waste in Moradabad comes from all the metro cities, majorly from New Delhi (Shastri Park, Silampur, Mundka and Mandoli), Mumbai, Kolkata, Bangalore and Chennai.
- The soil and water of the river of bank Ramganga is highly contaminated with heavy metal such as zinc, copper, arsenic, chromium, lead, nickel and mercury above permissible limits.
- The circuit boards are sourced from computer monitors, CPUs, keyboards, television, remote control sets, radios, CD/DVD players, cell phones, compact fluorescent lamps (CFLs) and other electrical appliances.
- According to an estimate, 50 per cent of the PCBs used in appliances in India end up in Moradabad

Day 2

4. Policies for e-waste management in our country

4.1 Introduction to the Session

The session on the E-Waste (Management) Rules 2016 provides the participants with details on their content. This session will explain the various provisions of the and the responsibilities of the each stakeholder in the value chain.

4.1.1 Objectives of the Session

At the end of this session the participants should:

- Know about the provisions of the Rules
- Know about the various important terms used in the Rules and their defi nition
- Know about their responsibilities for the implementation of the Rules
- Know about the responsibilities of other stakeholder groups as per provision of the Rules
- Be sensitized about the challenges in implementing the Rules

4.1.2 Overview of the Session

- E-Waste (M&H) Rules, 2011
- E-waste (Management) Rules 2016
- Definitions in the Rules
- Responsibilities of the different stakeholders

Policies for e-waste management in our country

The following policies and regulations are applicable to the management of e-waste.

- The National Environmental Policy 2006
- The Environment (Protection) Act 1986
- The Hazardous Wastes (Management and Handling) Rules 1989 (amended in 2003 & 2008)

- The E-Waste (Management & Handling) Rules, 2011 (amended in 2016), renamed E-waste (Management) Rules, 2016. They have been notified under the Environment (P) Act, 1986

First regulatory intervention for e-waste management was done in 2008, where the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 placed e-waste in schedule IV, meaning any person handling e-waste (dismantling/ recycling) has to take registration and authorisation of his facility under Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008.

The E-waste (Management & Handling) Rules were notified in May 2011 and became effective from May 2012 by Indian Ministry of Environment and Forests 2011with the objective to put in place an effective mechanism to regulate the generation, collection, storage, transport, import, export, environmentally sound recycling, treatment and disposal of the e-waste.

The rules focus the mandatory provisions to introduce an Extended Producer Responsibility (EPR) system and a collection and recycling system and to manage the reduction of the hazardous substances (RoHS). In order to further strengthening, E-waste (Management) Rules 2016, thus the supersession rules lay the primary responsibility of e-waste management on the producers. The supersession on E-waste (Management and Handling) Rules 2011 was done with the consultation of all stakeholders in the value chain and supersession rules E-waste (Management), 2016 was notified on 23rd March, 2016. The present Rule also lists down the responsibility of other important stake-holders in the e-waste value chain. The legislation was primarily introduced to tackle the increasing issues of E-waste as well as to facilitate safe disposal, channelization and environmentally sound recycling of e-waste.

In order to extend major responsibility of e-waste management on the producers of the electrical and electronic equipment, the new E-waste Rules mandates collection targets for the producers. Many countries are already following target based approach for implementation of EPR. For example, Japan has recycling rate 50% to 60%, South Korea maintains recycling rate of 55% to 70%, whereas UK follows the recycling and recovery rate as 50% to 80% and Netherlands has recycling rates 45% to 75%. Though, the minimum target internationally ranges been 45-55%, India has however targeted phase wise approach in order to gain experience. India has defined 30% of the quantity of waste generation as indicated in EPR Plan during first two year of implementation of rules followed by 40% during third and fourth years, 50% during fifth and sixth years and 70% during seventh year onwards. The qualities could be either in number or weight. Collection is now exclusively Producer's responsibility, which can set up collection centre or point or even can arrange buy back mechanism for such collection. No separate authorization for such collection will be required, which will be indicated in the EPR Plan of Producers.

The new rules describe many flexibilities provision for producers for effective implementation of the rules. These flexibilities include option for setting up of Producer Responsibility Organization (PRO), e-waste exchange, e-retailer, Deposit Refund Scheme (DRF) etc. The rules also simplified the EPR authorization for better implementation of the rule, single EPR Authorization for Producers is now being made CPCB's responsibility to ensure pan India implementation.

Rules, 2016 also extended to components, consumables, spares and parts of EEE in addition to equipment as listed in Schedule I as well as Compact Fluorescent Lamp (CFL) and other mercury containing lamp brought under the purview of rules.

The main objective of the rule is to put in place an effective mechanism to regulate the generation, collection, storage, transport, import, export, environmentally sound recycling, treatment and disposal of the e-waste. The mandatory provisions of the Rules are to introduce an Extended Producer Responsibility (EPR) system and a collection system, to organize the authorisation of dismantlers and recyclers and to oversee the reduction of the hazardous substances (RoHS).

E-waste (Management) Rules, 2016 is provided in annexure

4.2 Building blocks of a policy on e-waste disposal

Building blocks of a policy on e-waste requires identification of responsibilities of each of the stakeholders involved in the value change from manufacturing of EEE to its safe recycling. Some instruments that serve as building blocks include:

'Extended Producer Responsibility' means responsibility of any producer of electrical or electronic equipment, for channelisation of e-waste to ensure environmentally sound management of such waste. Extended Producer Responsibility may comprise of implementing take back system or setting up of collection centres or both and having agreed arrangements with authorised dismantler or recycler either individually or collectively through a Producer Responsibility Organisation recognised by producer or producers in their Extended Producer Responsibility - Authorisation;

e-waste exchange' means an independent market instrument offering assistance or independent electronic systems offering services for sale and purchase of e-waste generated from end-of-life electrical and electronic equipment between agencies or organisations authorised under these rules;

'Extended Producer Responsibility Plan' means a plan submitted by a producer to Central Pollution Control Board, at the time of applying for Extended Producer Responsibility - Authorisation in which a producer shall provide details of e-waste channelisation system for targeted collection including detail of Producer Responsibility Organisation and e-waste exchange, if applicable;

'Producer Responsibility Organisation' 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;

4.2.1 How and where can you get information on the locally available collection, dismantling and recycling services for e-waste?

All manufacturers, producers and dealers should provide information about locally available collection, dismantling and recycling services through their web platforms, outlets. The information should also be available at the SPCB web platforms. Regular awareness

campaigns and advertisements should be organized for providing information about locally available collection, dismantling and recycling services.

4.2.2 What questions should you ask the manufacturers when you do bulk procurement of electrical and electronic goods? What conditions can you introduce in your tender specification to enable easy disposal of e-waste?

The questions that can be asked from the manufacturers and conditions that can be introduced in tender are:

1. Ask whether 'Extended Producer Responsibility - Authorisation' is available with the manufacturer. It means a permission given by Central Pollution Control Board to a producer, for managing Extended Producer Responsibility with implementation plans and targets outlined in such authorisation including detail of Producer Responsibility Organisation and e-waste exchange, if applicable. This can be a mandatory condition in tender.
2. Ask if manufacturer has submitted the 'Extended Producer Responsibility Plan' means a plan submitted by a producer to Central Pollution Control Board, at the time of applying for Extended Producer Responsibility - Authorisation in which a producer shall provide details of e-waste channelisation system for targeted collection including detail of Producer Responsibility Organisation and e-waste exchange, if applicable. This can be a mandatory condition in tender.
3. Ask if manufacturer has 'facility' or any location wherein the process incidental to the collection, reception, storage, segregation, refurbishing, dismantling, recycling, treatment and disposal of e-waste are carried out. This can be a mandatory condition in tender.
4. Ask if the manufacturer has set up 'deposit refund scheme' means a scheme whereby 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. This can be a mandatory condition in tender.
5. Ask regarding tie up with dismantlers and recyclers. This can be a mandatory condition in tender.

4.2.3 What questions should you ask the e-waste collector/ dismantler/ recycler when you dispose of your e-waste?

The following questions can be asked from the e-waste collector/ dismantler/ recycler:

1. Does the organization or individual has authorization from the CPCB or SPCB for collecting, dismanting or recycling the e-waste.

2. Does it has safe working conditions, tools and equipment to ensure safe treatment and disposal of e-waste.

4.2.4 How can you engage your employees in such an awareness and collection drive and what are the additional interesting concepts that can be used to introduce the idea of depositing e-waste for recycling?

By providing a short presentation on the harmful effects of e-waste on environment and its social and economic dimensions it should be possible to motivate employees for participating in collection and awareness drive. Information leaflets, emails with links to more information about e-waste management can be shared with employees to increase their engagement.

4.2.5 How can you organize a collection drive for e-waste in your organization? Which agencies can support you in organizing such a collection and awareness drive? How to set up a collection centre?

A collection drive for e-waste can be organized by contacting manufacturer or dealers who would then refer to the authorized collector, dismantler and recycler of e-waste. A record of each item collected in the drive should be maintained and provided to the collector, dismantler and recycler. The local pollution control board officer can be informed about the drive and the e-waste collected during the drive so that they can audit if safe recycling of the collected e-waste has been conducted.

All manufacturers, dealers and government's environment department could support collection and awareness drive. In addition national, international and local environmental NGOs can be partners for such a drive.

Setting up a collection center for e-waste:

As per the e-waste management and handling rules to set up a collection center there is a need to apply for authorization from the State Pollution Control Board or Pollution Control Committee as per FORM – 1(a). There is a need to have agreements with producers who are willing to get the e-waste covered under their EPR collected at your center as well as with dismantlers and recyclers who will be taking the e-waste from the collection center for further processing. It should be ensured that systems for record keeping and training for safe handling and storage of e-waste is provided to the people who will be managing the collection center.

Responsibilities of Collection Centers include:

(1) Ensure that the facilities are in accordance with the standards or guidelines prescribed by the Central Pollution Control Board from time to time;
(2) The e-waste collected by them is stored in a secured manner till it is sent to registered dismantler or recycler as the case may be;

(3) Ensure that no damage is caused to the environment during storage and transportation of e-waste;

(4) Maintain records of the e-waste handled in Form 2 and make such records available for scrutiny by the State Pollution Control Board or the Pollution Control Committee concerned.

4.3 Challenges of Implementing the Rules

The following challenges exist for the implementation of the Rules:

4.3.1 Uncertain Financial Mechanism

The Rules have included the provision of Extended Producer Responsibility to encourage take back system for electronics but its implementation mechanism is not certain. The current rules do not specify any charge inbuilt in the product in form of any visible or invisible fee to get back the products for recycling.

4.3.2 Capacity Building of regulatory authorities

Another significant issue that the Rules deals with is the management and disposal of historical products (products present in the market prior to the enforcement of rules) and orphan products (non-branded or assembled). The non-branded/ assembled products or products from the grey market are cheaper, used on a large scale and comprise a large proportion in the waste stream. The Rules have designated Urban Local Bodies (ULBs) with the responsibility to collect and channelize the orphan products to the authorized collection centres, dismantlers or recyclers. It is clear from the Rules that regulatory bodies have been allotted several responsibilities right from authorization and registration to monitoring and implementation of the law. However the regulatory bodies of a large number of states/UTs lack capacity and are also overburdened with other responsibilities. The urban local bodies or municipalities suffer from lack of manpower, expertise and resources. Rules should mention that the agencies, organizations having expertise can be engaged in streamlining the entire e-waste management process. The Public Private Partnership (PPP) model which is currently practiced for Municipal solid waste management, hazardous waste management can also be put into practice.

The capacity building of the regulatory bodies is also very important. A thorough development of standards, benchmarks, training must be provided to the PCBs/PCCs. A significant allocation of budget should also be set aside for PCBs/PCCs for systemic implementation of the Rules. The important topics should be cover during the training of PCBs/ PCCs are mentioned below:

- Setting up of Collection Systems
- Inventorization of E-waste Generation
- Promotion for development of infrastructure for recycling
- Monitoring Mechanisms for EPR and RoHS

4.3.3 Formalisation of informal activities in the sector

It should be possible to formalize the informal activities in the sector through the following steps:

1. Capacity building of informal sector so that they can be part of the formal sector either as employees or as entrepreneurs involved in collection and dismantling of e-waste should be conducted.
2. Manual sorting and dismantling operations can be made safer with limited investment in tools and personal protective equipment so government or private sector can provide some initial support to the informal sector to set up safe collection, sorting and dismantling facilities.
3. Informal sector actors should be organized in form of e-waste management cooperatives and then they should be provided technical and financial support so that safe recycling of e-waste can be ensured. In New Delhi, for instance, the NGO Chintan Environmental Research and Action Group helped Safai Sena, an active organization of 12,000 members form a cooperative for e-waste recycling.

One other approach to ensure that e-waste is collected by the informal sector but in place of unsafe recycling they deposit the e-waste to formal sector following safe recycling practices involves establishing a Deposit Refund Mechanism that will take a deposit equivalent to the value that can be obtained by extracting all possible valuable components to the best possible extent. The rationale behind setting the deposit at that level is that if informal recycler is aware that even after putting extensive efforts in recycling he or she is likely to earn the same amount of money that can be obtained by depositing it at the formal recycling collection centre then it is certain that unsafe informal recycling will cease to exist. If this deposit refund mechanism is established government will only have to ensure that formal sector recyclers do not end up selling the e-waste back to the informal sector for metal and useful products extraction. Rather than regulating and tracing operations of numerous and distributed informal recyclers an appropriately priced deposit refund mechanism will require monitoring the operations of formal recyclers only.

Developing an action plan to implement improvement measures

1. Identify informal sector actors, gain their confidence by providing them formal status as cooperative and remove any past charges of illegal recycling.

2. Inform them about the harmful impacts of unsafe recycling.

3. Provide them identity proofs for collection of e-waste and link them to collection centres or to recyclers who will buy e-waste from them as sorted or dismantled which could be done safely with limited investment.

4. Provide them training and tools to conduct safe sorting and dismantling.

Establish a Deposit Refund Mechanism that provides informal sector same money that they would have earned by unsafe recycling for just collecting or sorting and dismantling the electronic or electrical equipment.

5. Inventorization of E-Waste

5.1 Introduction to the Session

The session on inventorization explain how to evaluate generation of e-waste in a particular area. For effective implementation of the E-Waste Management Rules, regulators need to allocate the right amount of funds and report on the success of their work, they must know how much e-waste is generated in their jurisdiction. In the future, this figure can be derived more easily once every manufacturer is actually reporting sales figures as per the requirement of the Rules.

In this session, the participants are introduced to an estimation method that uses readily available data for calculating the amount of e-waste generated per year. To verify the accuracy of estimated quantities, the methods of validation are also suggested.

5.1.1 Objectives of the Session

At the end of this session the participants should:

- Be aware about general approach of conducting an inventorization
- Be able to assess whether a consultant is able to conduct a thorough inventorization of e-waste in the respective city or state
- Have the expertise to find major flaws in an incorrect inventorization approach
- Understand the challenges and hurdles in conducting an inventorization

5.1.2 Overview of the Session

- Inventorization of E-Waste
- Assessment Method – Input and Obsolescence
- Assessment Method – Stepwise Approach
- Validation – Tracker Method
- Exercise on Inventorization

The scope of the inventory study should be defined in terms of geography and product categories.

- **Geographical scope** – City/Region/State or country where inventory needs to be done
- **Product Category Wise Scope** – Computers (Desktops and Laptops), Printers, UPS, televisions, Refrigerators, DVD/VCD Players, Mobile Phones

5.2 Assessment Method – Input and Obsolescence

The market size of WEEE generated can be estimated using the input method:

Input refers to the **sales and imports** of these products

- The source of the sales data will include **government statistics, secondary data** available from Indian Market Research Bureau (IMRB), Industry Associations, etc.
- After collecting the sales data, calculate the average life / obsolescence rate of the products. Average life of a product can be divided into the following parts:
-
- **Primary usage life** (first user)
- **Second use life**

The inventorization of e-waste can be conducted with a module-based approach. The individual modules are presented below.

Module 1

What?	How?	Why?
•Quantitative estimation of e-waste	•Input and obsolescence method •Secondary data collection for estimating the quantities of e-waste •Quantitative survey to calculate the obsolescence age	•To map the annual quantities of ewaste being generated •To estimate these quantities for coming years

Module 1 – For estimating the quantities of e-waste, Input and Obsolescence method can be used which is explained in detail in later part of this chapter.

Module 2

What?	How?	Why?
•Understanding current disposal Practices	•By carrying out extensive primary Quantitative survey among both the user segments – households and establishments	•To calculate product wise and user segment wise obsolescence rates • To identify the most common methods of disposal used currently • To understand user considerations while disposing

Module 2 - For understanding the obsolescence rates and disposal behaviour among the users, a quantitative survey can be conducted across the household and the business establishments of the stipulated area (under the scope of the inventory study)

What?	How?	Why?
•Studying current e-waste recycling practices	•Through Qualitative research with existing recyclers – both informal as well as formal (if any)	•To understand the existing •recycling practices •To identify various stakeholders in the e-waste value-chain; •To evaluate the capabilities and infrastructures of existing stakeholders

Module 3 – To map the current recycling practices of the region, quantitative in-depth interviews can be conducted with different stakeholders of e-waste recycling industry such as scrap collectors, dismantlers and recyclers.

5.3 Assessment Method – Stepwise Approach

In this next section the participants are exposed to the different steps of conducting an assessment on the amount of e-waste generated per year. First, they are asked what steps they would take for conducting such as assessment.

Trainer's note

Write the steps the participants propose on a white-board or pin-board. Facilitate the discussion in a way that the group decides on a certain sequence of steps. These steps can then be compared with the actual process shown in the next slide.

The process as presented on the slide is a 5-step process:

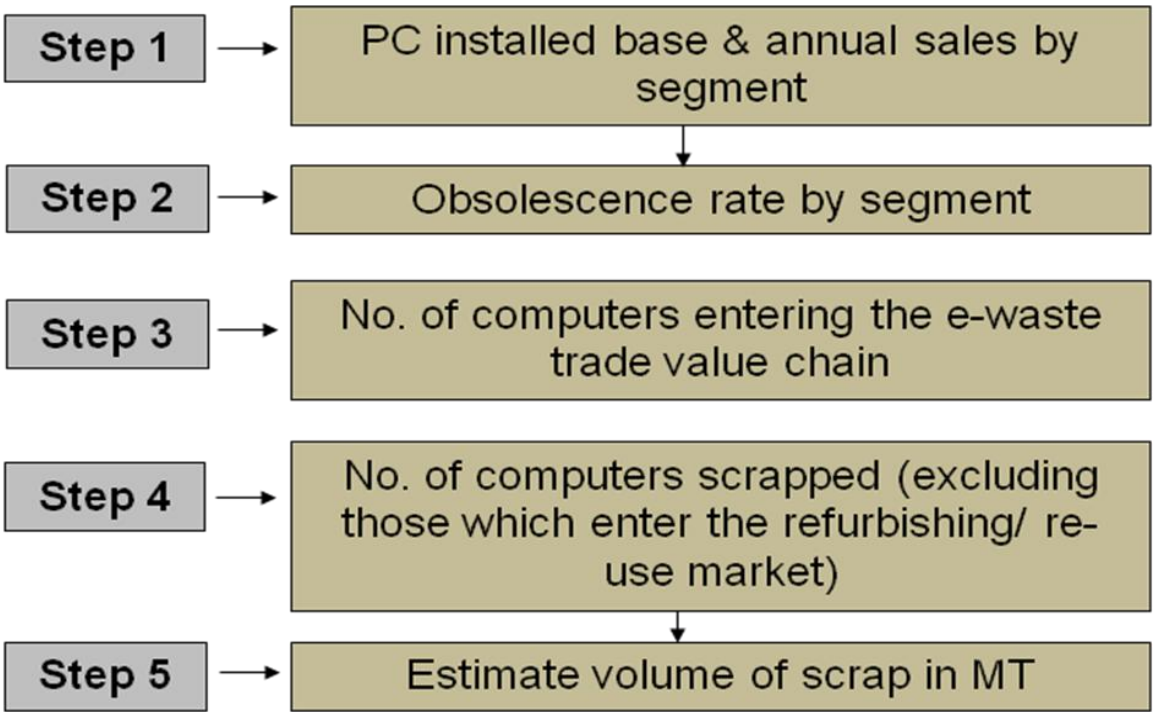


Figure 4: Stepwise approach to inventorization

Subsequently, each step is presented in the detail. The group is asked for each step, how they would implement it. After their inputs have been collected the procedure according to the official assessment method is presented.

Step 1 → PC installed base & annual sales by segment

All computing devices can be categorized broadly in:

- *Desktops*
- *Laptops*

Installed base of desktops and notebooks over the last 10 years shall be obtained from IMRB - Integrated Technology and Operations (IMRB-ITOPS)

Installed base and annual market size shall be broken-up into

- *Household*
- *Businesses*

Further, the data shall be categorized by town-class

Step 2 → Obsolescence rate by segment

Question to the audience: How can you collect this information?
Suggested approach:

***ITOPS data**: segment wise obsolescence rate (on the basis of town class, nature of business and SEC)*

***Sample Question:** on an average, after how many years do you replace your old P.C.*

***Primary Survey**: questions on the use-life of devices will be asked to households and businesses*

***Expert interviews**: with players in the organized sectors on their experience of the use-life of devices*

For the collection of data a sample grid is presented:

Businesses – Obsolescence Rate			
Town size	**Services**	**Manufacturers**	**Traders**
>50 lakh			
10-50 lakh			

5-10			
1-5			
Households Obsolescence Rate			
Town size	**SEC A**	**SECB**	**SEC C/D**
>50 lakh			
10-50 lakh			
5-10			
1-5			

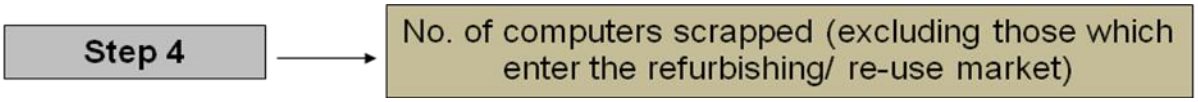
Question to the audience: How can you collect this information?

Suggested approach:

Once the sales figures and obsolescence rate are available, we can calculate the number of Desktops and Notebooks which will enter the e-waste trade value chain using following calculation:

N = I.B. x O.R.

- *N is the number of computers entering the e-waste cycle*
- *I.B. is the Installed Base*
- *O.R. is the Obsolescence Rate]*



Question to the audience: How can you collect this information?

For estimating the ratio or percentage break-up of refurbished and scrapped, qualitative data can be collected from the following stakeholders:

- *Scrap collectors*

- *Recyclers or e-waste processors*
- *Organized players in e-waste trade*

Based on the share suggested, the number of computers which are to be scrapped will be multiplied by the average weight of the computers which were sold in the n^{th} year

The following information needs to be taken into account before doing the final estimation:

Technological Advancements:

- *Reduction in weight*
- *Change in composition of desktops and notebooks*
- *Changes (increase or decrease) in the technical life*

Changes in the consumer behavior

- *Increase or decrease in the disposal rate*

5.4 Validation – Tracker Method

This method will verify the **obsolescence rate** and **quantity estimates** by tracking the movement of some components (trackers) of each product across the e-waste trade value chain.

Example of trackers:

- *LCD in case of mobile phones*
- *CRT in case of televisions*
- *Motherboards & CRT in case of computers*

The **verification of the obsolescence rate** can take place through a qualitative approach:
Once the trackers are identified, qualitative study will be done across the various channel members involved in that e-waste processing For e.g. in case of TVs, random and repetitive visits will be made to CRT dismantlers and the movement of CRTs will be noted down; 5 to 6 areas of CRT collection shall be identifi ed per city

- *3-4 collectors or recyclers shall be identifi ed in each area*
- *Regular visits to these places shall be conducted to observe models and date of manufacturing over a period of time*

The **verification of the estimated quantity of scrap** can also take place through a qualitative approach:
Interviews will be done with channel members (for the case of CRT) to fi nd out the daily input of e-waste and the break-up of:

- Total CRT accepted for dismantling per day
- Percentage of CRT in working condition that are re-sold in market
- CRT broken or dismantled
- Final ratio of broken CRT and re-sold CRT

Example:

- *Dismantled/re-sold ratio 50:50; 30 CRT dismantlers receive 100 CRTs daily*
- *Therefore, the e-waste generated from televisions in Delhi would be approximately 1500 televisions/day*

5.5 Exercise: Inventorization

In the exercise on inventorization the participants are supposed to practice the calculation of the amount of e-waste generated in a sample city. The objective of this exercise is to sensitize the participants on the difficulty of drawing inferences from data. Also, it is demonstrated how critical it is to obtain good quality data to be used for the calculation. By conducting this exercise and the calculations themselves, the SPCB / PCC offi cers become aware of which details to check if an inventorization is conducted by a consultant. For conducting the exercise, a worksheet with the input data, a calculation example and boxes for data entry are provided. Additionally, a solution sheet and presentation slides with the results are available.

Trainer's note

Several points should be kept in mind when conducting the exercise:

- There should be enough time for conducting the exercise; calculations should take about 45 – 60 min; another 15 min should be planned for presenting the solution of the exercise
- The fi rst part of the calculation is the most challenging. Make sure that the participants read the example provided carefully to understand the method.
- Make sure that the participants use the adequate use time of a PC; a PC at some point during 2007 with a use time of 5 years will enter the e-waste stream in 2012.

6. Site visit to e-waste recycling plant/ clusters of e-waste

6.1 Introduction

Site visit will provide the practical knowledge about the e-waste recycling facility and as a regulator the important aspects to be noticed while monitoring the facility. The FAQ will help to the participants about the various points as a checklist. The visit will also help them to get knowledge whether the facility is complying with the rules, 2016.

6.1.1 Objectives of the Session

At the end of the visit, participants should be aware about:

- Basic understanding of e-waste recycling and the flow of the material
- Checklist while monitoring of recycling facility
- Flow of the recycled materials
- Occupation, Health and Safety requirement for workers

6.1.2 Overview of the Session

- Visit to recycling facility
- Monitoring
- Practical knowledge about recycling of e-waste and material flow

6.2 FAQ for Field Visit- Recycling Facility

Logistic

- What kind of e-waste is accepted in your facility?

  Consumer electronics/ IT & Electronics/ Any specifics item/s

- Do you pay for old equipment, which you receive from consumers?
- Do you have list of the rates of e-waste?
- How do you evaluate the cost of e-waste product?
- What is the logistic arrangement to pick up e-waste from consumers?
- Is there any collection event for consumers?
- Do you provide any certificate to the consumer for pick-ups?
- Do you have inventory log in your facility?
- How do you maintain the record of collected / handled and channelized e-waste?

- Do you have any record of collected/ handled and channelized e-waste during the inspection from CPCB/SPCB
- Do your recycling facility is linked with any producer/s?
- Do you have authorisation from SPCB/ Producer/s?
- How do you apply to bid for collection of E-waste from any organisation/agency?

Technical:

- What is the storage and treatment capacity of your facility?
- Do you have any facility of data destruction?
- Is there any facility for the treatment of CFL/ Tube light and other lighting equipments?
- What is the treatment option for Mercury, released from CFL and other lighting equipments?
- What happens to the batteries of e-waste? Is there any treatment option for this?
- What are the equipments in your facility for recycling the product?
- Do you send the product to other facility for tertiary treatment to recover the precious metals?
- What is the treatment option during the leakage of gas and other fluids while processing of the product?
- What happens with the recovery of the metals and other materials?

OHS

- What occupation, Health and Safety procedures do you follow for your workers?
- Do you have First Aid room/ kit for First aid treatment if any accident occurs during the process of e-waste?
- Is there proper sanitation and drinking water facility for workers?
- Is there any health insurance policy for workers?

Training

- Is there any training programme to be conducted for workers of the facility?
- If Yes! What are the topics of training programme for workers?
- What is the timeframe of training programme for workers?
- Is there any exposure visit (National/ international) to be provided to the workers?
- What is the business plan and sustainability to run your facility?
- Do you have IEC material (Posters, pictures, and videos) for better understanding of dismantling, recycling and health aspects?

Day 3

7. Efficient Collection Mechanism

7.1 Introduction to the Session

The effective collection mechanism is the key of successful e-waste management and recycling system. The collection is the first step of recycling chain and entire cycle is depending on effective collection mechanism. In India, the most of the e-waste is channelled through the informal sector (MAIT-GTZ 2007). To ensure the effective collection mechanism, formalisation of informal sector and enter in to in legal chain is mandatory. As per the E-waste (Management) Rules, 2016 to establish a take-back system under their extended producer responsibility is only be successful when formalised informal sector involved in the e-waste recycling system.

7.1.1 Objectives of the Session

At the end of this session the participants should:

- Aware about the crucial elements of an effective collection strategy
- To understand the challenges in setting up a collection system
- Know about the specific collection situation in India
- Know about potential options for collection models
- To set up e-waste collection mechanism within their organisation
- Know about possible support measures by the SPCBs/PCCs for setting up an effective collection mechanism

7.1.2 Overview of the Session

- Background on E-Waste Collection
- Collection in India
- Regulators' Support for E-Waste Collection

7.2 Need for E-Waste Collection Channel

As per the Rules an efficient e-waste collection mechanism needs to be established. Each producer is mandated to collect e-waste as per defined target in the rules. The benefits of such a mechanism compared to the current system are:

- Prevents material leakages to backyard recycling
- Increases the availability of material for efficient recycling
- Tracking of material/components becomes easier
- Compliance with E-waste (Management) Rules 2016
- Awareness on e-waste is created among consumers

In E-waste management, first step is proper collection of e-waste. The fact is that because of lack of awareness and infrastructure, the product does not reach in the right stream i.e. to the authorised recycler/ dismantler. Other than the plastic casing, which is the visible part of E-waste, it also contains valuable metals in its mechanical part so, unless the electronic and electric devices trash reaches an authorized recycler or dismantler, who takes care that all the methodologies adopted are safe and scientific in nature, the e-waste is going to trouble us. For this reason, an efficient e-waste collection system is required which is monitored regularly by the Government authorities on a regular basis.

The majority of the population is involved in their jobs, or schools, or colleges. Nobody bothers to go to a dismantler or recycler, neither does anybody have time to go and search for a nearby recycler. So, the option that we are left with is designing a proper e-waste collection system to bring e-waste into a proper channel. There are a lot of options that consumers can undertake in order to bring out their e-waste recycling and dismantling in a proper scientific manner. E-waste rule mandates the handling of e-waste only by companies registered with the Central Pollution Control Board.. Following are the Challenges of Collection in India:

- Presence of informal sector
- Lack of awareness among public
- No proper take-back system
  - Lack of incentives for consumers
  - Size of the country, may require multiple systems
  - Absence of targets for take-back

7.3 E-Waste and Collection Channels

The following figure shows which actors generate e-waste and via which exemplary channels the material reaches the formal and informal sector.

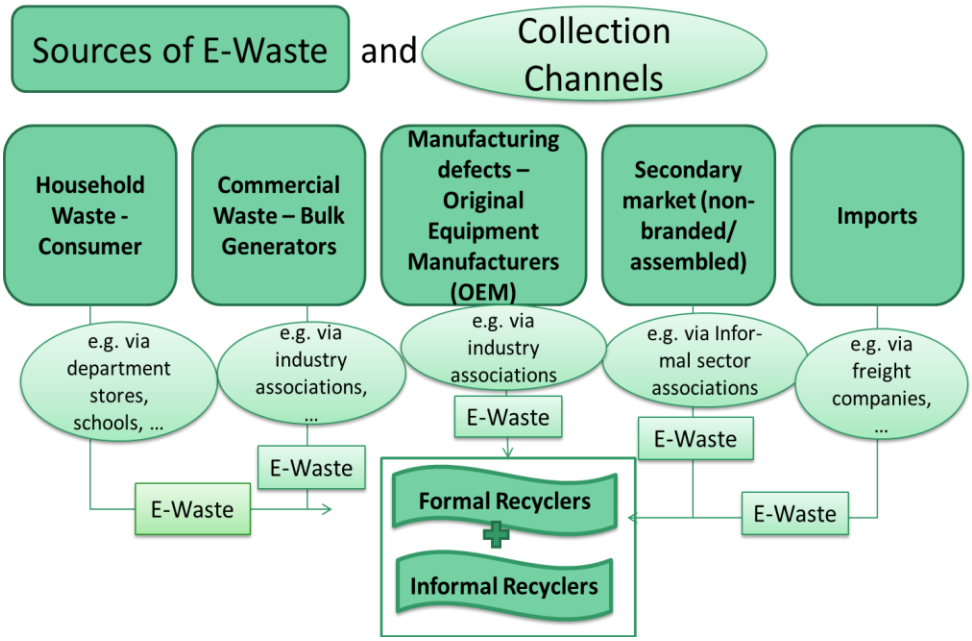


Figure 5: Collection channels in India

7.4 Collection in India

Possible workable models for India:

- Individual Producers Responsibility
- Collective Producers Responsibility
- Integration of informal sector

- The first two options (IPR & CPR) are covered more extensively in the section on the Extended Producer Responsibility. In this section a closer look is taken on the model integrating the informal sector.
- The following figure shows an option for intervention in the Indian e-waste sector:

Figure 6: Collection modes in India

7.5 Intervention Option

Various studies show that 90 percent of the e-waste goes directly to the informal sector. Only 10 percent enters the formal recycling stream. The below given example shows that if we integrate the informal sector then channelization of e-waste can be tackle.

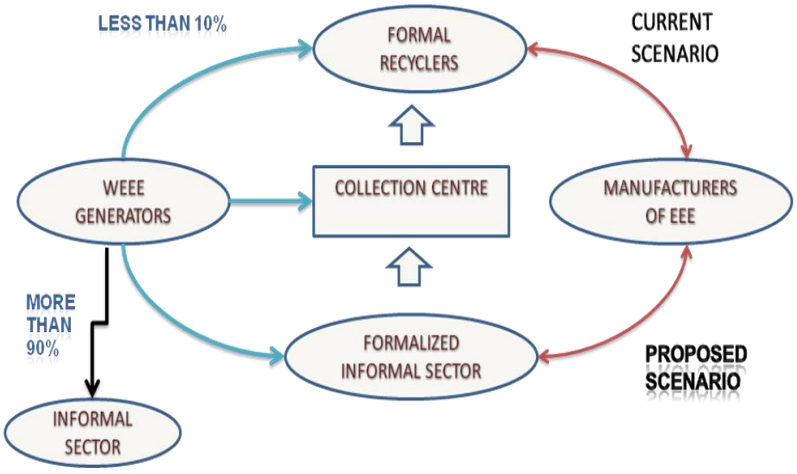


Figure 7: Options for Collection in India

7.6 Integration of the Informal Sector – Linking E-Waste Collectors

7.6.1 First Option:

Formation of waste collector cooperative. These cooperatives would receive identity cards from authorized producers, recyclers and dismantlers and would collect material on behalf of these companies. This would generate trust between the collectors and the consumers as the consumer would that the e-waste enters a proper recycling mechanism.

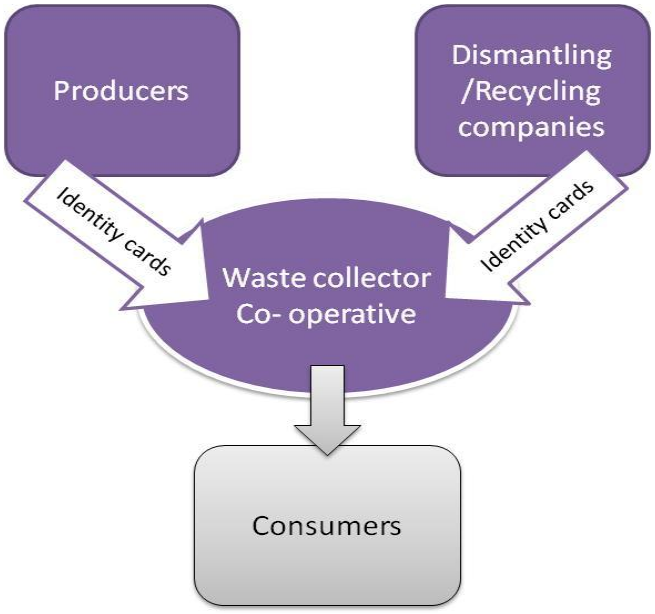


Figure 8: Integration of the Informal Sector – Formation of Waste Collector Co-operative

Second Option:

In this new situation, the formalized informal sector is responsible for collection of material and the manual dismantling and segregation on behalf of producers/ recyclers. Mechanical dismantling and segregation as well as material recovery would lie in the hands of the formal sector.

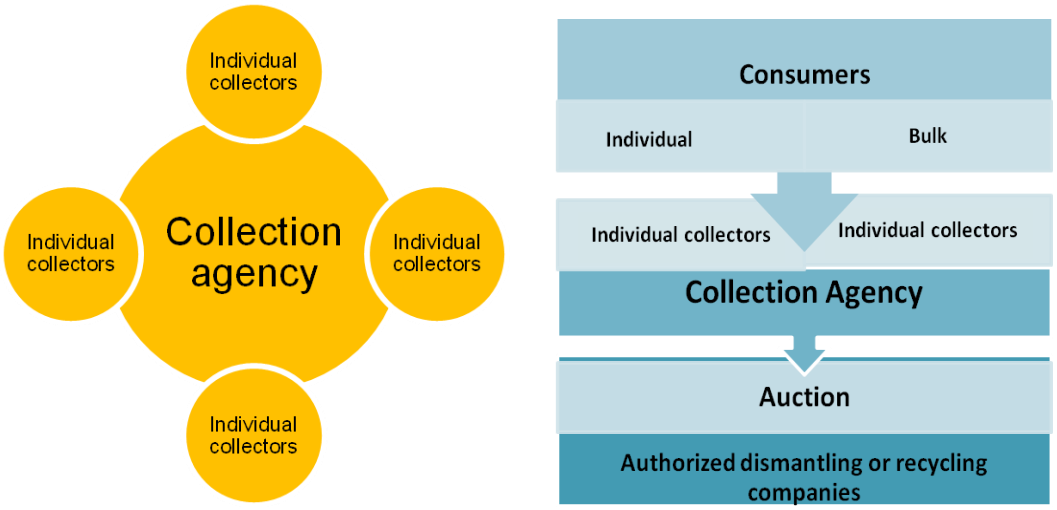


Figure 9: Integration of the Informal Sector – Formation of Collection Agencies

These are three possible models in which the informal sector would take the initiative. As written above, there are also producer-driven models (IPR and CPR) which will be explained in more detail in the section on EPR.

7.7 Regulators‘ Support for Collection

- Support in establishing Extended Producer Responsibility
- Stringent policy implementation
- Effective monitoring mechanism
- Definition of financing structure (transport etc. costs)
- Identifying and incorporating organized informal sector
- Ensure a participation of recyclers
- Notifications/ administrative orders from central or local government to bulk generators
- Providing additional incentives for collection

8. Best Practices on Dismantling and Recycling

8.1 Introduction

In this session an overview is given on the different treatment steps of e-waste i.e. segregation, shredding and separation, and material recovery. The session also provides the knowledge about and appliance of tools equipment, lifting equipment and transport equipment.

8.1.1 Objectives of the Session

At the end of this session the participants should:

- Understand the differences between the three treatment steps of e-waste
- Know about tools equipment, lifting equipment and transport equipment
- Be familiar with the technologies mainly used in India

8.1.2 Overview of the Session

Environmentally Sound E-waste Treatment Technologies

- First Level of Treatment
- Second Level of Treatment
- Third Level of Treatment
- Yields of E-waste Recycling
- Tools equipment, lifting equipment and transport equipment

Recycling is the process of recovering materials from wastes and placing them back into manufacturing of new product. Electronic products contain approx 60 different elements, many of which are valuable and metals and some of which are hazardous too. The precious metals have high economic value such as gold and silver, nickel, copper, cobalt and Titanium etc. Investments are being made to treat e-scrap and reclaim the valuable metals, especially as raw materials become more scarce and expensive.

Source: **http://www.seas.columbia.edu/earth/wtert/sofos/Namias_Thesis_07-08-13.pdf**

Environmentally sound E-waste treatment technologies are used at three levels as described below:

- 1st level treatment
- 2nd level treatment

- 3rd level treatment

All the three levels of e-waste treatment are based on material flow. Each level treatment consists of unit operations, where e-waste is treated and output of 1st level treatment serves as input to 2nd level treatment. After the third level treatment, the residues are disposed of either in TSDF (Treatment, Storage, and Disposal Facility) or incinerated. The efficiency of operations at first and second level determines the quantity of residues going to TSDF or incineration. The simplified version of all the three treatments is shown below.

For non CRT E-waste, the major e-waste treatment facilities in India use the following technologies.

- Dismantling
- Pulverization/ Hammering
- Shredding
- Density separation using water

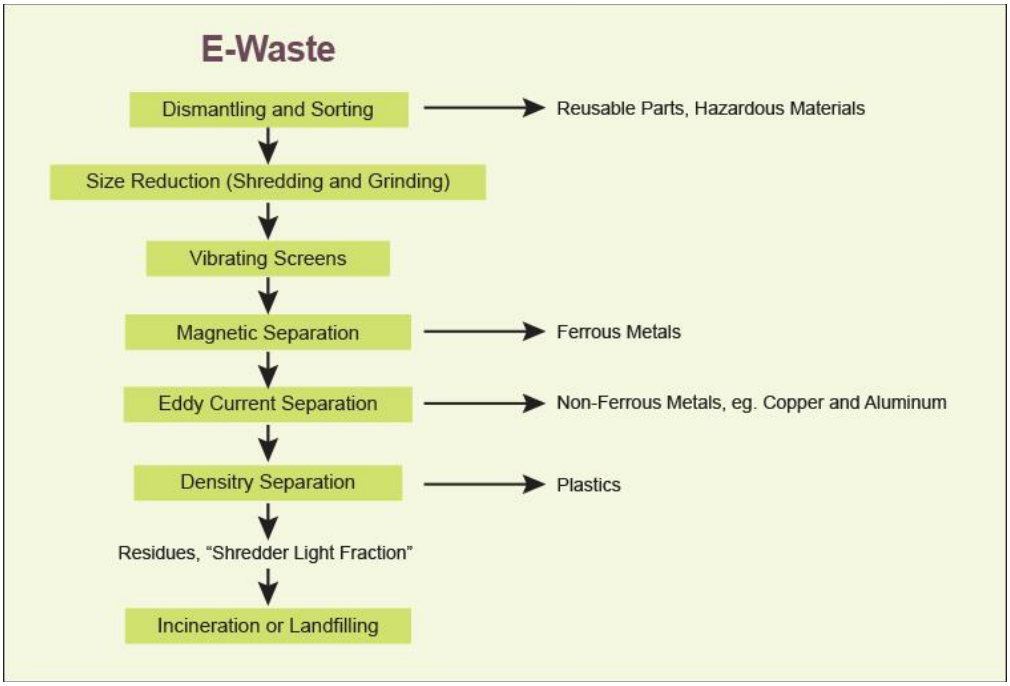


Figure 10: Environmentally sound E-waste treatment technologies

8.2 First Level of Treatment

There are three unit operations at first level of e-waste treatment as shown below:

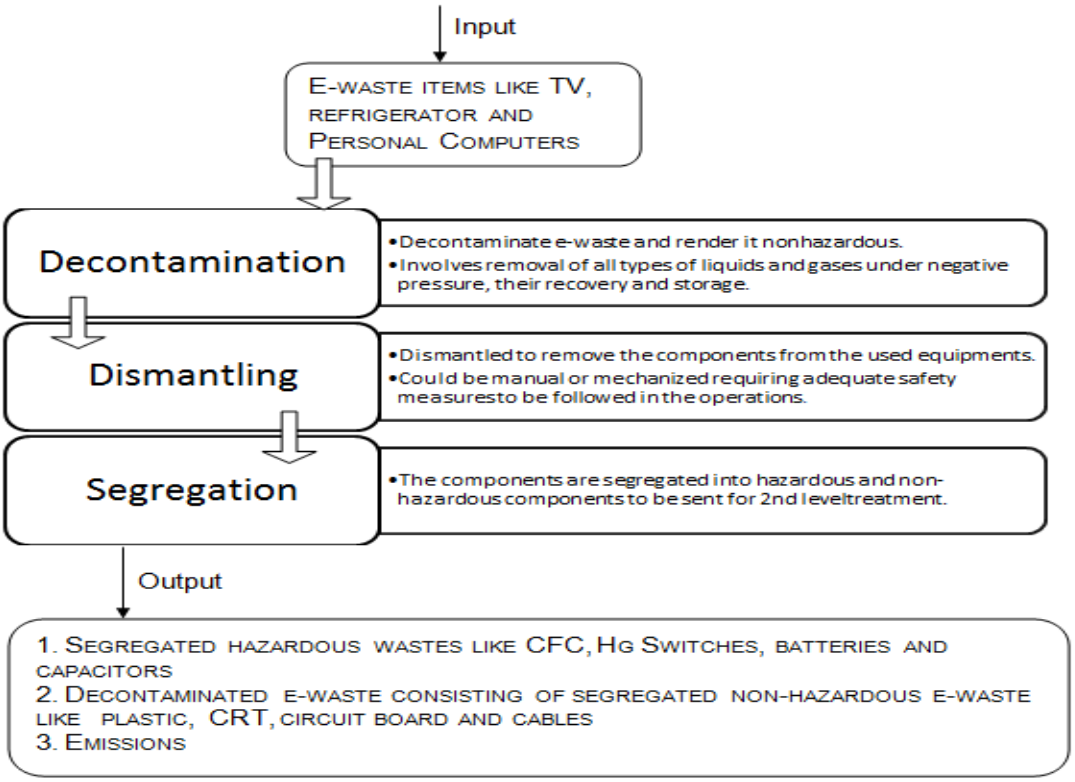


Figure 11: Sorting and Dismantling E-waste

Source: Sims Recycling Facility in Roseville, California
http://www.wired.com/gadgets/miscellaneous/news/2009/03/gallery_ewaste_recycling?currentPage=all

8.3 Second Level of Treatment

The two major unit operations in the second level of treatment

- hammering
- shredding.

The second level treatment also includes:

- Sorting
- Treatment

- recycling
- disposal

Hammering, Shredding & Special processing (CRT treatment - funnel separation and front glass separation ; particle separation process - density separatation, electromagnetic separation etc).

This treatment is fully based on dry process using mechanical operations. The pre-comminuting stage includes separation of Plastic, CRT and remaining non CRT based e-waste. Equipment like hammer mill and shear shredder is used to cut and pulverized e-waste, which is used feedstock to magnetic and eddy current separation. A heavy-duty hammer mill grinds the material to achieve separation of inert materials and metals. After separation of metals from inert material, metal fraction consisting of Ferrous and Non-Ferrous metals are subjected to magnetic current separation. After separation of Ferrous containing fraction, Non-ferrous fraction is classified into different non-metal fractions, electrostatic separation and pulverization.

For non-CRT e-waste the following steps can be applied for the second treatment step of e-waste:

1. The proposed technology for sorting, treatment, including recycling and disposal of E-waste is fully based on dry process using mechanical operations.
2. The pre-comminuting stage includes separation of Plastic, CRT and remaining non CRT based E-waste. Equipment like hammer mill and shear shredder will be used at comminuting stage to cut and pulverize e-waste and prepare it as a feedstock to magnetic and eddy current separation.
3. A heavy-duty hammer mill grinds the material to achieve separation of inert materials and metals.
4. After separation of metals from inert material, metal fraction consisting of Ferrous and Non-Ferrous metals are subjected to magnetic current separation. After separation of Ferrous containing fraction, Non-ferrous fraction is classified into different non-metal fractions, electrostatic separation and pulverization.
5. The ground material is then screened and de dusted subsequently followed by separation of valuable metal fraction using electrostatic, gravimetric separation and eddy current separation technologies to recover fractions of Copper (Cu), Aluminum (Al), residual fractions containing Gold (Au), Silver (Au) and other precious metals. This results in recovery of clean metallic concentrates, which are sold for further refining to smelters. Sometimes water may be used for separation at last stage.
6. Electric conductivity-based separation separates materials of different electric conductivity (or resistivity) mainly different fractions of non-ferrous metals from E-waste. Eddy current separation technique has been used based on electrical conductivity for non-ferrous metal separation from e-waste. Its operability is based on the use of rare earth permanent magnets. When a conductive particle is exposed to an alternating magnetic field, eddy currents will be induced in that object, generating a magnetic field to oppose the magnetic field. The interactions between the magnetic field and the induced eddy currents lead to the appearance of electro dynamic actions upon conductive non-ferrous particles and are responsible for the separation process.
7. The efficacy of the recycling system is dependent on the expected yields/ output of the recycling system. The expected yields/ output from the recycling system are dependent on the optimization of separation parameters like particle size, particle shape, feeding rate (RPM) and optimum operations.
8. Size properties are essential for choosing an effective separation technique. Therefore, eddy current separator is best for granular nonferrous materials having

size greater than 5mm. The eddy current separation will ensure better separation of Al fraction in comparison to fraction containing Cu, Ag and Au.

9. Particle shape is dependent on comminuting and separation. Since hammer mills and screens will be used in the proposed technology, the variations are expected to be the same as that of Best Available Technology (BAT).
10. The feeding rate can be optimized based on the speed and width of the conveyor.

For CRTs, the following steps can be implemented:

- CRT is manually removed from plastic/ wooden casing.
- Picture tube is split and the funnel section is then lifted off the screen section and the internal metal mask can be lifted to facilitate internal phosphor coating.
- Internal phosphor coating is removed by using an abrasive wire brush and a strong vacuum system to clean the inside and recover the coating. The extracted air is cleaned through an air filter system to collect the phosphor dust.
- Different types of splitting technology used are NiChrome hot wire cutting, Thermal Shock, Laser Cutting, Diamond Wire Method, Diamond Saw Separation, Water Jet separation.

Below a depiction of the second e-waste treatment step is given:

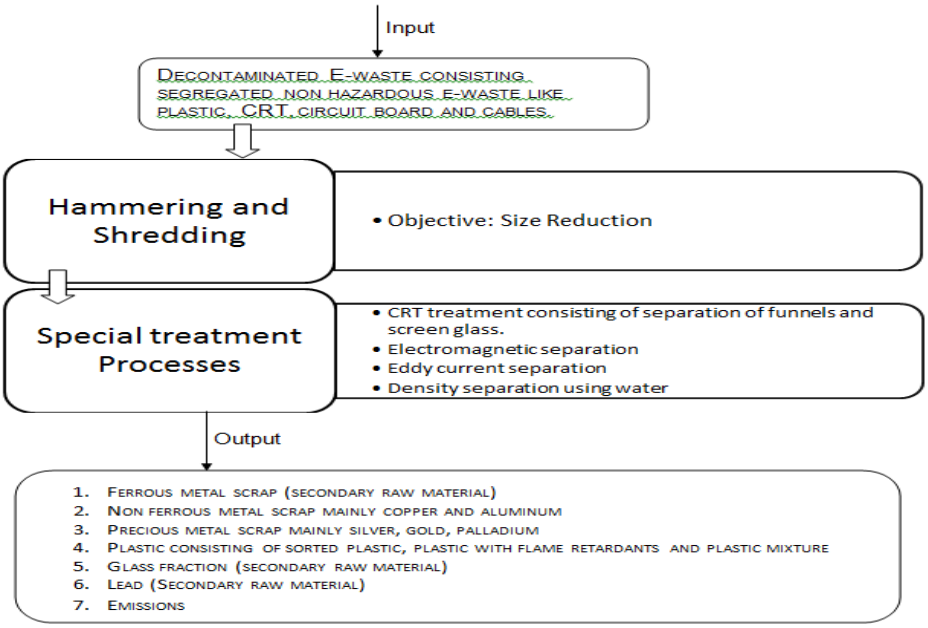


Figure 12: Second Level of Treatment

8.4 Third Level of Treatment

The 3rd level E-waste treatment is carried out mainly to recover ferrous, nonferrous metals, plastics and other items of economic value. The major recovery operations are focused on ferrous and nonferrous metal recovery, which is either geographically carried out at different places or at one place in an integrated facility. The input, output and unit operations at 3rd level treatment are described in the table below.

Table 11: Third level of e-waste treatment

Input/ WEEE residues	Unit Operations/ Disposal/ Recycling Technique	Output
Sorted Plastic	Recycling	Plastic Product
Plastic Mixture	Energy Recovery/ Incineration	Energy Recovery
CRT	Breaking/ Recycling	Glass Cullet
Lead Smelting	Secondary Lead Smelter	Lead
Ferrous metal scrap	Secondary steel/ iron recycling	Iron
Non Ferrous metal scrap	Secondary copper and aluminium smelting	Copper/Aluminium
Precious metals	Au/Ag separation (refining)	Gold/ Silver/ Platinum and Palladium
Batteries (Lead Acid/ NiMH and Li ion)	Lead recovery and smelting remelting and separation	Lead
CFC	Recovery/ Reuse and Incineration	CFC/ Energy Recovery
Oil	Recovery/ Reuse and Incineration	Oil recovery/ Energy
Capacitors	Incineration	Energy recovery
Mercury	Separation and Distillation	Mercury

The metal recovery process in the state-of-the-art smelter in Belgium is depicted below:

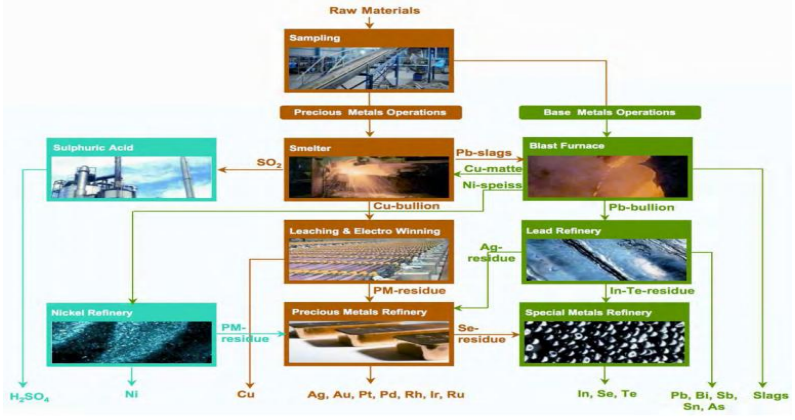


Figure 13: Umicore metal recovery process (Caffarey 2012)

Emissions: The emissions coming out of 1st and 2nd level treatment are given in table below:
First level:

1st Level:

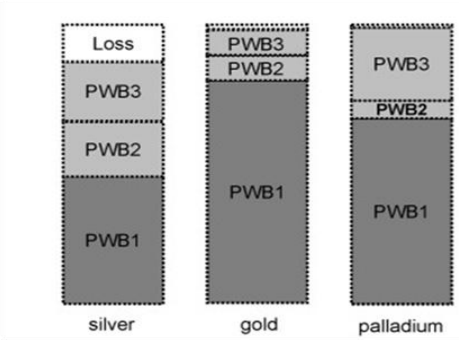
Unit Operations/ Emissions	Dismantling	Segregation
Air	√ (fugitive)	X
Water	X	X
Noise	√	√
Land/ Soil Contamination due to spillage	√	√
Generation of hazardous waste	√	√

2nd Level:

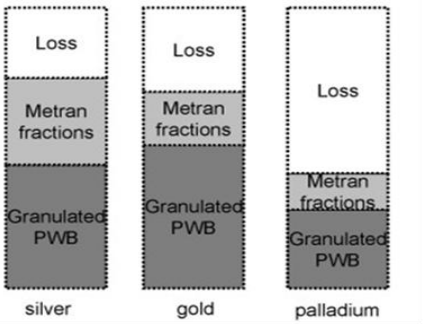
Unit Operations/ Emissions	Dismantling	Shredding	Special Treatment Process			
			CRT	Electro magnetic	Eddy Current	Density
Air	√ (fugitive)	√ (fugitive)	X	√ (fugitive)	√ (fugitive)	X
Water	X	X	√	X	X	
Noise	√	√	√	√	√	X
Land/ Soil Contamination due to spillage	√	√	√	√	√	√
Generation of hazardous waste	√	√	√	X	X	X

Different output yields

Manual dismantling + integrated smelter



Shredding + integrated smelter



Source: Meskers, 2009

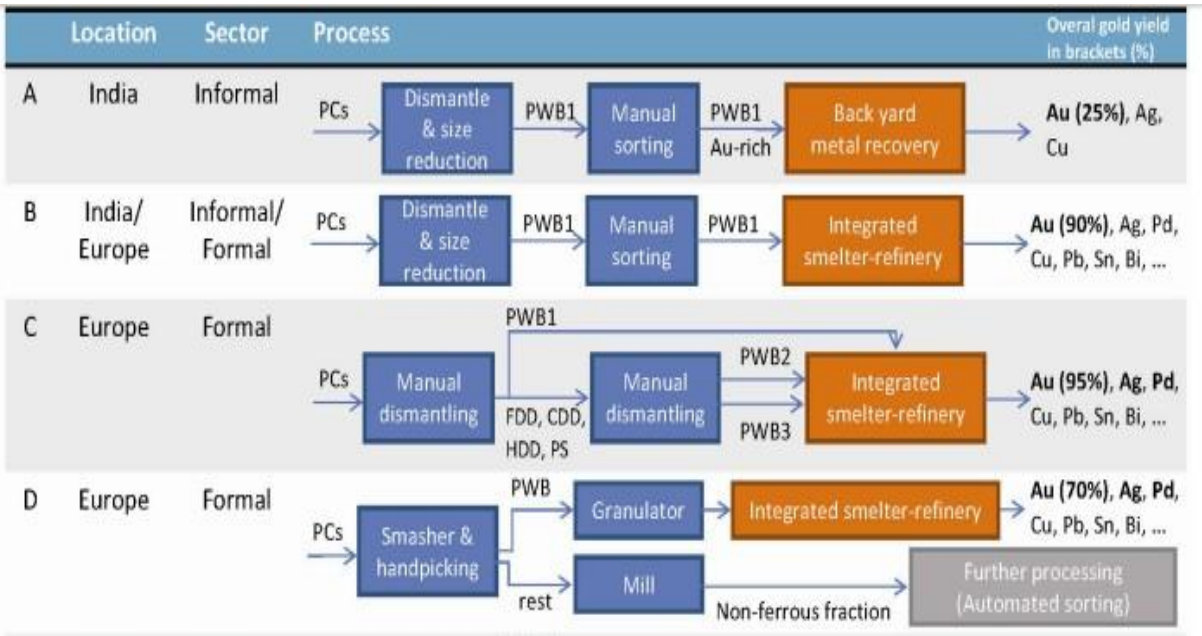


Figure 14: Meskers & Hagelüken 2009

8.5 Dismantling and identification of recyclable material – state of the art

The aim of dismantling and pre-processing is to liberate the materials and direct them to adequate subsequent final treatment processes. Hazardous substances have to be removed and stored or treated safely while valuable components/materials need to be taken out for reuse or to be directed to efficient recovery processes. This includes removal of batteries, capacitors etc. prior to further (mechanical) pre-treatment. The batteries from the devices can be sent to dedicated facilities for the recovery of cobalt, nickel and copper.

For devices containing ODS such as refrigerators and air-conditioners, the de-gassing

Step is crucial in the pre-processing stage as the refrigerants used (CFC or HCFC in older models) need to be removed carefully to avoid air-emissions. For CRT containing appliances (e.g. monitors and TVs) coatings in the panel glass are usually removed as well before end-processing. LCD monitors with mercury-containing backlights need special care too, as the backlights need to be carefully removed before further treatment.

The circuit boards present in ICT equipment and televisions contain most of the precious and special metals as well as lead (solders) and flame retardant containing resins. They can be removed from the devices by manual dismantling, mechanical treatment (shredding and sorting) or a combination of both. Manual removal of the circuit boards from telecommunication and information technologies (IT) equipment prior to shredding will prevent losses of precious and special metals and offers advantages, especially in developing and transition countries with rather low labour costs. Intensive mechanical pre-processing such as shredding and automated sorting to remove circuit boards should be avoided, because significant losses of precious and special metals can occur. One of the

causes is unintended co-separation of trace elements such as precious metals with major fractions such as ferrous, aluminium or plastics due to incomplete liberation of the complex materials. Small, highly complex electronic devices such as mobile phones, MP3 players etc. can (after removal of the battery) also be treated directly by an end-processor to recover the metals.

In the pre-processing phase, manual and semi-manual dismantling can be efficient to further disassemble the components including power supply, hard discs and disc drivers.

Tools like electric or pneumatic screwdrivers can be applied to accelerate the speed of dismantling. The benefit for carrying out manual dismantling is that the products after the disassembly can be easily grouped into different fractions in their complete and intact forms, which could reduce the separation effort in the end-processing phase and also be able to reclaim the reusable parts. For example, PWBs without any other fraction mixed in can give a higher metal yield during end-processing. A stream line assigning a specific dismantling division to different workers would greatly improve the dismantling efficiency.

This approach is eco-efficiently preferable in the areas with a lower labour cost and abundant Workforce.

Decontamination/ Dismantling:

- Decontamination/ Dismantling is done manually. It includes the following steps.
- Removal of parts containing hazardous/ dangerous substances (CFCs, Hg switches, PCB).
- Removal of easily accessible parts containing valuable substances (cable containing copper, steel, iron, precious metal containing parts, e.g. contacts)
- Segregation of hazardous/ dangerous substance and removal of easily accessible parts

Step 1: Collected E-waste entering the disassembly line in the dismantling facility

Step 2: Manual dismantling of monitor (removal of plastic back cover and disposal into a plastic bin)

Step 3: Decontamination by manually removing the hazardous items and their collection in bins

Step 4: Complete dismantling and segregation of E-waste fractions

Figure 15: Manual Dismantling process

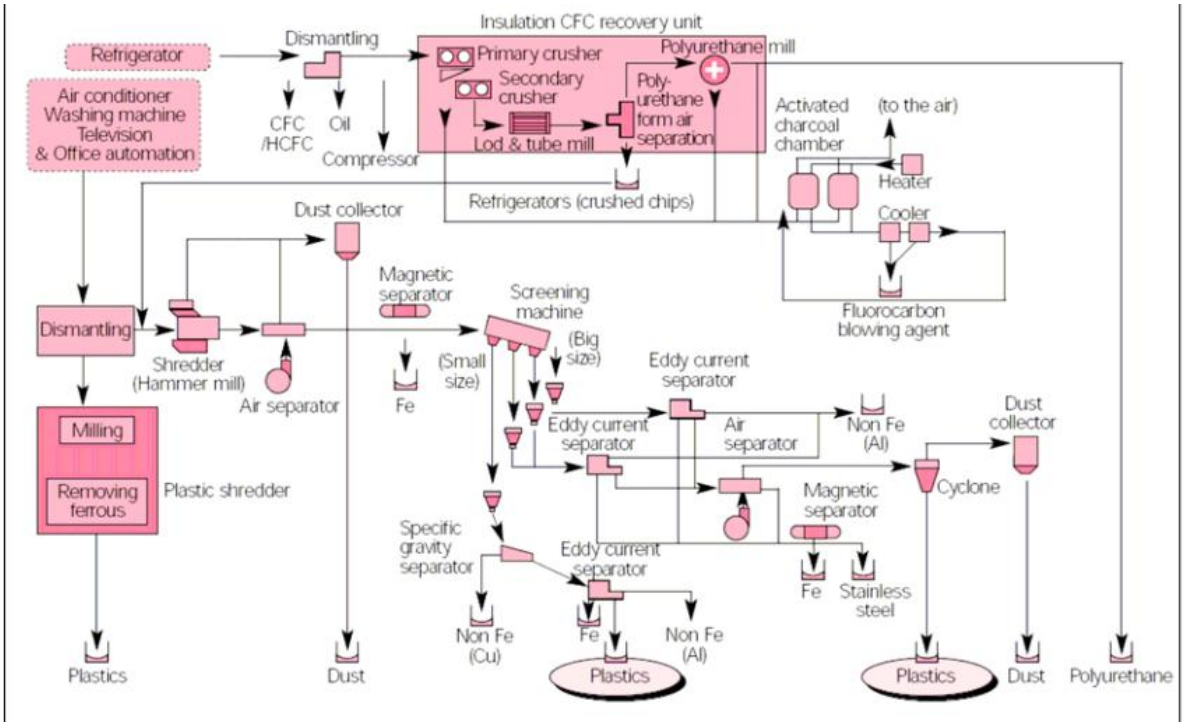


Figure 16: Flow sheet of e-waste recycling plant Japan

End-use recycler who has the facilities and controls in place (e.g. high-tech mechanical printed wire board shredders, cable granulators, plastic injection moulding machines, CRT glass cutters, etc.) to further refine and enrich the material streams that will eventually end up predominantly in local and even international refineries and smelters.

Source

http://www.ewasteguide.info/files/Wang_2012_Bo2W_0.pdf

UNEP, (2007), E-waste management manual Volume II: http://www.unep.org/ietc/Portals/136/Publications/Waste%20Management/EWasteManual_Vol2.pdf

UNEP, (2007), Recycling from E-waste to resource:

http://www.unep.org/pdf/Recycling_From_e-waste_to_resources.pdf

8.6 Dismantling of recyclable material: Why? What? How?

E-waste contain both hazardous and non-hazardous materials. It is possible to use dismantling technique to separate non-hazardous and recyclable materials from hazardous

material. Once the recyclables are separated they can be processed further to produce recycled material that can be used to prepare new products. For example plastics from a computer can be used to make a new computer but it should be ensured that all hazardous components mixed with the waste have been separated. The figure below highlights the steps for recycling:

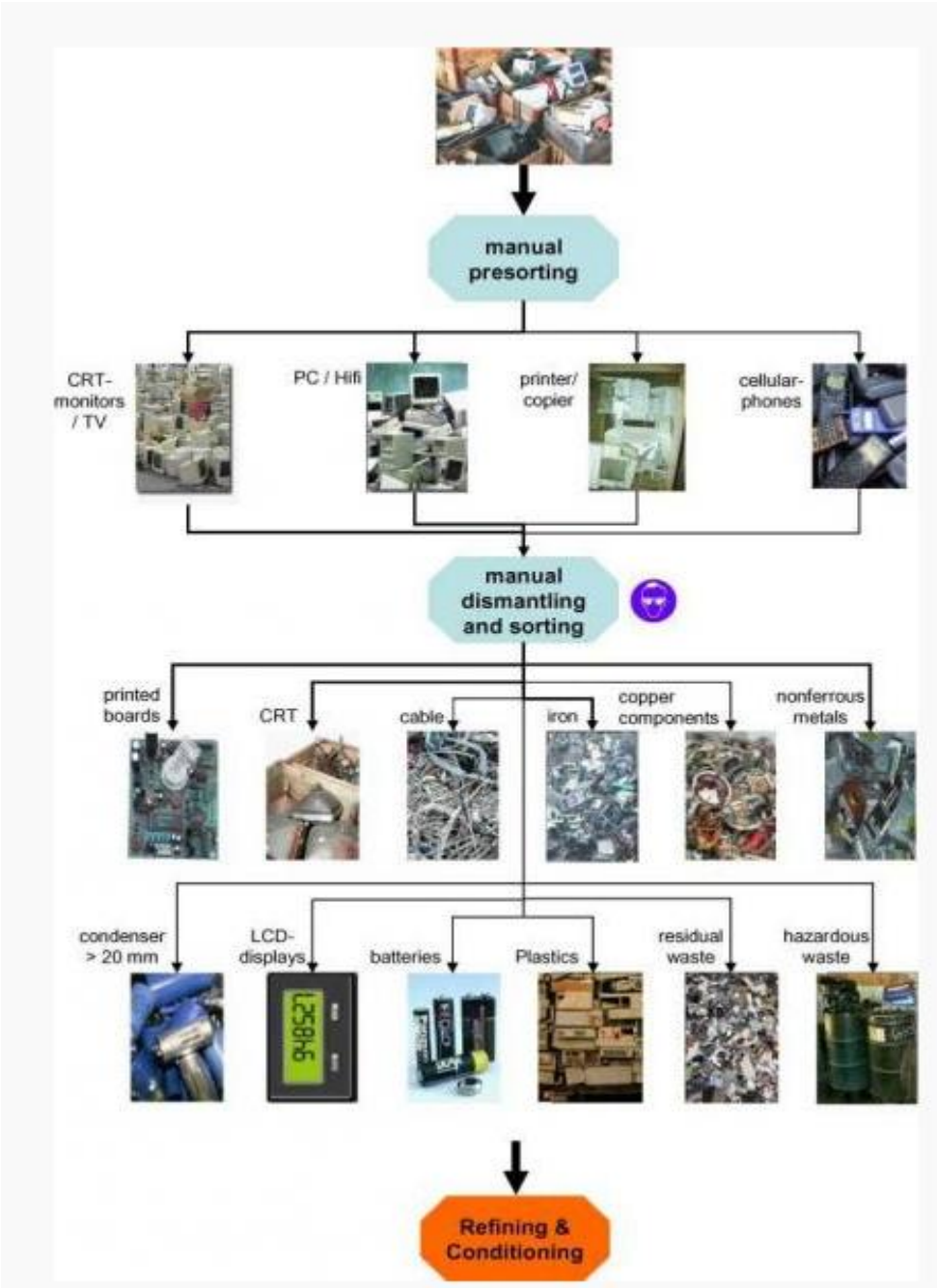


Figure 17: Steps for recycling

Source: E-waste Guide Manual Dismantling http://ewasteguide.info/manual_dismantling

8.7 Knowledge and appliance of tools equipment, lifting equipment and transport equipment

Manual sorting and dismantling is done using appropriate protective equipments (like gloves, masks, shoes, caps etc.) along with tools like hammers, pilers etc.

Equipment for second level treatment include:

S.No.	Equipment	Function
1	Shredder	For size reduction into a size enabling the majority of the ferrous material to be separated from the non-ferrous/insulation and plastic fraction
2	Eddy Current Separator 1	For separation of the heavy mixed metal fraction.
3	Heavy Pre-Granulator	For size reduction of the material prior to separation in the Eddy Current Separator 2.
4	Eddy Current Separator 2	For separation of the light mixed metal fraction
5	Heavy Granulator	For final size reduction of the material
6	Separation Table	For final separation of the remaining fraction into a plastic (organic) fraction and a mixed metal fraction.

Equipment for third level treatment include:

Inputs	Operation/Recycling techniques	Output
Sorted Plastic	Recycling	Plastic product
Plastic mixture	Incineration/Energy Recovery	Energy recovery
CRT	Breaking/Recycling	Glass Cullet
Lead smelting	Secondary lead smelter	Lead
Ferrous metal scrap	Secondary steel/iron recycling	Copper/Aluminium
Non-ferrous metal scrap	Secondary copper and aluminium smelting	Copper/Aluminium
Precious metals	Gold / Silver separation	Gold / silver / platinum and palladium
Batteries	Lead recovery and smelting	Lead
CFC	Recovery/reuse and incineration	CFC/Energy recovery
Mercury	Separation and distillation	Mercury

A sample e-Waste processing plant consists of :

- Cutting Mill for electronic circuit boards, wires and small parts
- Granulation Mill for e-waste with primary separation
- Vibratory Feeder Assembly for Granulation Mill
- Enhanced Air Purification System
- Conveyor Belt (10 ft)
- Magnetic Separator
- Fraction Separator
- Feeder Assembly for Fraction Separator)
- Electrical control panel

WEEE is manually dismantled and separated into electronic circuit boards, wires and external cabinets and casings. The cutting mill is used for reducing the size of the assorted electronic circuit boards, wires, small components, small equipment etc.

A magnetic separator separates ferrous components. The non-ferrous fraction is passed over a conveyor belt to the granulation mill by a vibratory feeder.

The granulated fraction passes through a primary separator. The granulated material is fed to a fraction separator through a feeding assembly.

The dust from the granulating mill and the primary separator is fed to an air purification system. The air purification system separates the dust and minute particles from air and releases clean air in the environment.

The fraction separator separates the granulated material into non metallic and non ferrous mixed metal fraction.

Throughout the entire process, manual handling of material is avoided to a maximum. Material is handled only at input of the cutting mill, handling of separated fraction bins and manual picking of oversized parts after first level size reduction.

The entire process is completely mechanical. No chemicals are used at any stage. Water used in the process is completely recycled and not released as effluent / spent water. Dust generated in the process is collected in proper bags and packed for safe disposal.

The entire operation is free from any kind of polluting processes.

Source: e-Waste Disposal: Project Report
http://www.nswai.com/nswaiadmin/Pdfs/insertPdf/i_2015/i_Nov15/E Waste%20Resposal.pdf

Day 4

9. Extended Producer's Responsibility

9.1 Introduction

To establish an Extended Producer Responsibility is most important and challenging element of Rules. According to the Rules, 2016, the producers of EEE are now responsible for the collection, channelization and recycling of e-waste. To develop and submit the EPR plan to CPCB is responsibility of the producers. The guidelines to the Rules describe two options of EPR i.e. a collective system and an individual system are mentioned as possible options.

9.1.1 Objectives

At the end of this session the participants should:

- Be able to understand the EPR principle
- Know about the duties of the regulators in enforcing the EPR principle
- Know about the possible options for an EPR system
- Understand the fundamental challenged faced by producers to establish an EPR system

9.1.2 Overview

- EPR Models
- EPR in India
- EPR Examples

Extended Producer's Responsibility (EPR)

Extended Producer Responsibility (EPR) is defined as an environmental protection strategy that makes the manufacturer of the product responsible for the entire life cycle of the product and especially for the take back, recycling and final disposal of the product. Thus, the producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle (Sinha Khetriwal et al. 2007). EPR also known as manufacturer take back and product stewardship makes it mandatory for a producer to be physically and financially responsible for the collection of end of life electronics and their recovery, so as to minimize or eliminate the hazardous impacts of such products. A principal reason for assigning responsibility to producers is their capacity to make changes at source to reduce the environmental impacts of their products throughout its life cycle. Assigning responsibility to one actor means would avoid the situation where everyone's responsibility becomes no

one's responsibility. It is also easier to address the producers who are relatively easier to identify, in the policy making and enforcement process than the consumers (Rossem et al.2006).

The major goals of EPR according to OECD (OECD 2001) are:

- Source reduction (natural resource conservation/materials conservation)
- Waste prevention
- Green Product Design more compatible for environmentally
- Closure of material loops to promote sustainable development
- The basic concept is to promote environmental impact reduction at the end of life by:
- Making manufacturers internalize the end of life costs of their products so as to incentivize the design of products that are more recyclable and have lower toxicity

As per the implementation guidelines for the E-waste (Management) Rules "EPR is the responsibility of any producer of electrical or electronic equipment, for their products beyond manufacturing until environmentally sound management of their end of life products, the scope of which has to be clearly defined while issuing authorization to individual producers."

In principle the more responsibility a producer assumes, the stronger are the EPR mechanisms. However, it is not always possible for a producer to be involved in every aspect of EPR to achieve the above mentioned activities. The EPR principle can be implemented though a number of policy instruments such as administrative instruments, economic instruments and informative instruments. An EPR programme typically consists of more than one EPR based policy instrument. For instance, a manufacturer is supposed to take back a discarded EEE that he/she has produced (take back requirement). This requirement may be combined with an introduction of a deposit-refund system to give incentives to the consumers to bring back products to an appropriate collection point. A manufacturer may also be required to label material composition of components and to provide information to recyclers regarding the content and structure of their products. Recyclers must meet certain treatment standards. Some of these policy instruments may be incorporated in the revision of existing law governing waste management or the establishment of supplementary law developed in addition to an EPR programme.

Table 12: Examples of EPR based policy instrument

Administrative instruments	Collection and/or take-back of discarded products, achievement of collection, re-use and recycling targets, fulfillment of environmentally sound treatment standards, fulfillment of minimum recycled material content standards, product standard
Economic instruments	Material/product taxes, subsidies, advance disposal fee systems, deposit-refund systems, upstream combined tax/subsidies, tradable recycling credits.
Informative instruments	Reporting to authorities, marking/labelling of products and components, consultation with local governments about the collection network, information provision to consumers about producer responsibility/source separation, information provision to recyclers about the structure and substances used in products.

Source: Rossem et al. 2006

The emergence and evolution of the concept of EPR clearly refl ects a shift in the environmental policy making from the end of pipe approaches to preventative environmental strategies. It has been observed that EPR policies are preferred over non EPR policies in cases when there is a problem of illegal disposal of the waste stream or as a remedy to poorly functioning recycling markets. The EEE are a major focus of EPR across the world and several countries have come up with an EPR based policy for e-waste (Sinha Khetriwal et al. 2007). The composition and the trend of generation of EEE make them environmentally problematic when they come into waste stream.

In general, the EPR system in India could take two forms, as suggested in the Guidelines. Producers of EEE could either set up an **Individual Producer Responsibility (IPR)** or a **Collective Producer Responsibility (CPR)** system.

The IPR system could be set up as shown in the figure below:

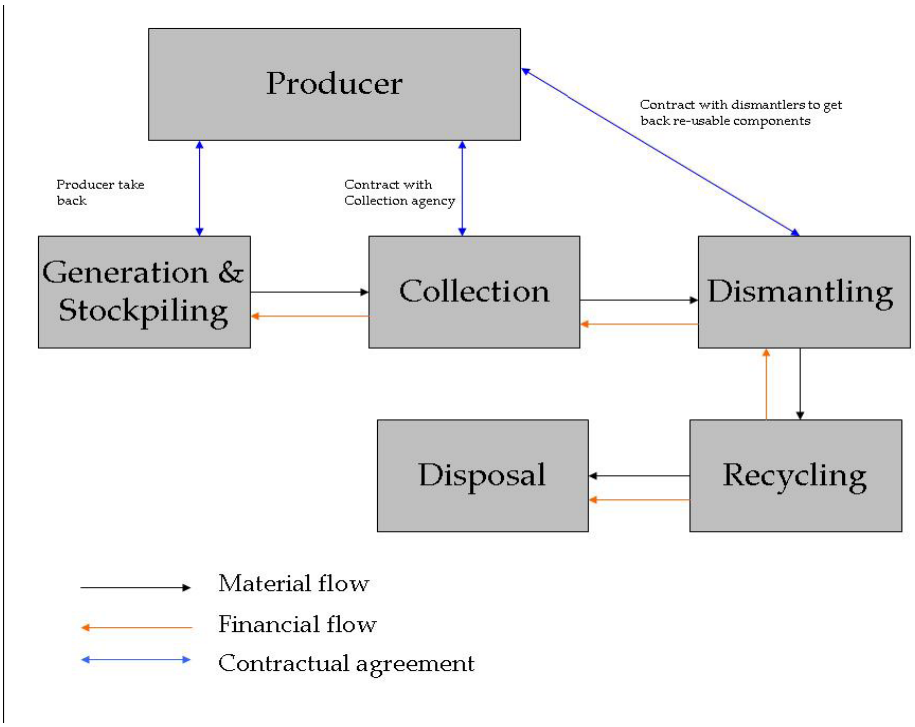


Figure 18: IPR system

The CPR system could be set up as shown in the fi gure below:

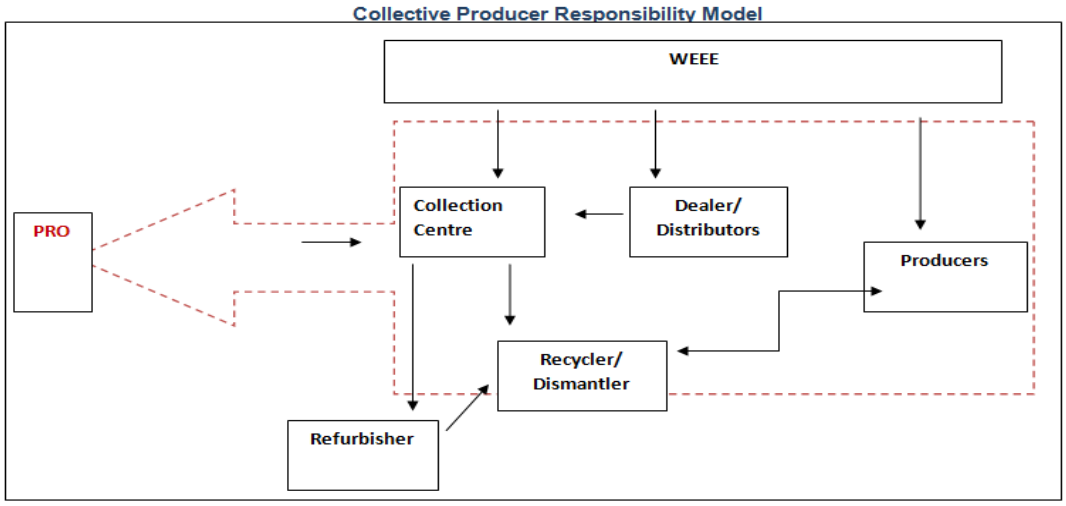


Figure 19: Collective Producer Responsibility Model

Below, some comparisons are given on why the collective approach is better suited than the individual approach:

Key Area	Individual	Collective
Collection & Storage	Less Resource Efficient	More Resource Efficient especially in the case of Multi-Brand retail take-back. Also PRO takes care of and coordinates with all Collection Channels
Reporting & Monitoring	Every producer deals with reports about collection and monitoring individually	PRO takes care of end to end reporting and monitoring for member Brands and Manufacturers and prepares Reports for EPR compliance
Awareness & Capacity Building	Individual Brands approaching same consumer base (e.g. Schools/Colleges) might lead to over-lap and is also less resource efficient	More Resource Efficient. Common awareness and Capacity Building for a consumer base for all brands collectively. Also a common

Key Area	Individual	Collective
		set of personnel and staff dealing with Operations can be trained collectively.
Recycling	Individual Brands deal with their own set of Vendors and Recyclers	Auditing, Rules and Standards based on the best practices in the Industry. Recyclers chosen based on best Standards. PRO takes care of auditing and Reporting with the Recyclers

Table 13: Comparison of individual and collective producer responsibility model

A business model for a PRO could look like this:

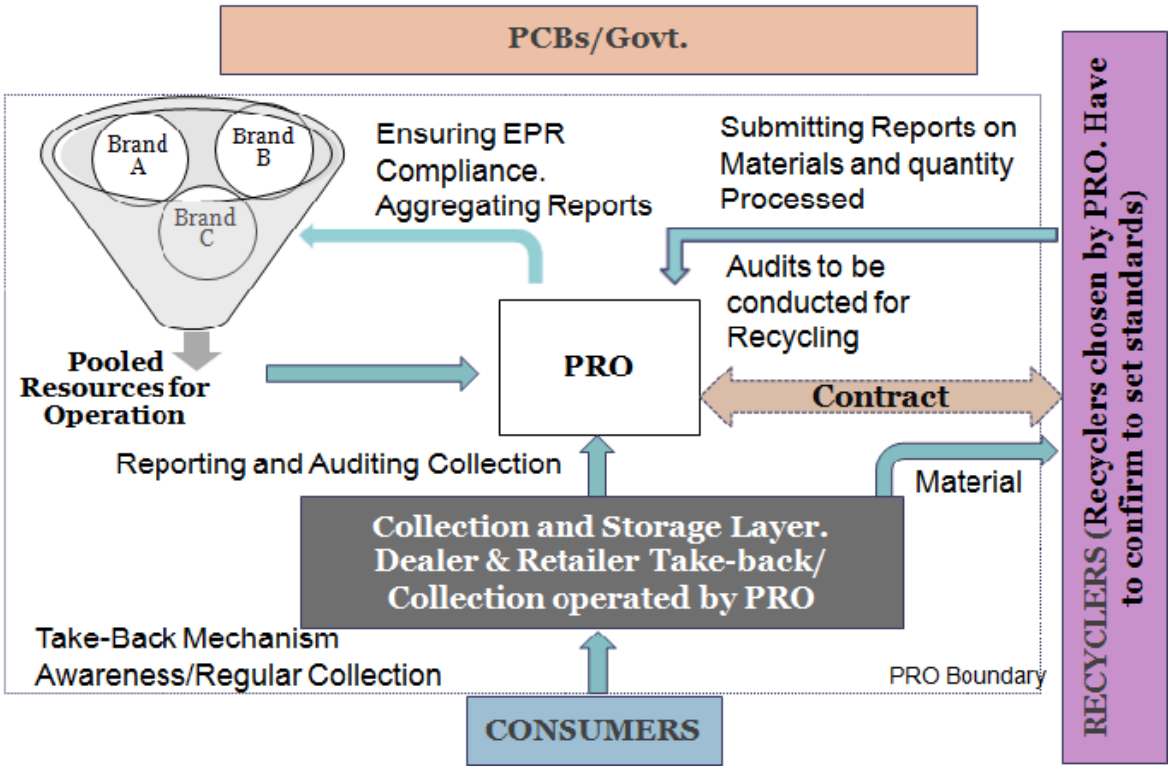


Figure 20: Business model for PRO

Several financing options exist for implementing an EPR system:

- **Advance recycling fee (ARF)** is a fee collected from consumers (producers) at the time of sale, to recycle the products they purchase
- A **disposal fee** model charges the end-user for the cost of recycling
- With a **recycling subsidy**, the recycling party, which can be the producer or a third party, is paid a subsidy per recycled item by the government
- In a **deposit-refund model**, a tax on production and/or consumption is associated with a subsidy proportional to product recycling, where the financing of subsidies can be handled through the taxes collected.

9.2 EPR in India

E-waste (Management) Rules 2016, notified by Ministry of Environment & Forests and Climate Change, introduced the concept of EPR for WEEE. Target based approach for implementation of EPR has been adopted on the basis of existing international best practices which indicate higher success rate for implementation of EPR in those countries having target based EPR mechanism. Target based approach (Minimum) is being used in many countries like Japan (recycling rate 50% to 60%), South Korea (Recycling rate 55% to 70%), UK (Recycling and recovery rate 50% to 80%) and Netherlands (recycling rates 45% to 75%).The qualities could be either in number or weight. The new rules describe many flexibilities provision for producers for effective implementation of the rules. These flexibilities include option for setting up of Producer Responsibility Organization (PRO), e-waste exchange, e-retailer, Deposit Refund Scheme (DRF) etc. The rules also simplified the EPR authorization for better implementation of the rule, single EPR Authorization for Producers is now being made CPCB's responsibility to ensure pan India implementation.

Reason for not proper implementation of EPR in India are as follows:

- **Competition from informal sector:** A lot of e-wastes end up in the informal sector in India. In some cases recyclers collect e-waste from informal markets and also send their e-wastes back to the informal sector for recovery of precious metals and reusable items. So, if the producer were to charge an ARF from the consumer, it has no system to keep track of it, when and by whom the product has been recycled (Agarwal 2012). The informal sectors have an edge over their formal counterparts in terms of their non-compliance with environmentally sound production/specification standards, absence of related costs and tax payment. The materials recovered from WEEE are sold at the secondary materials markets at good prices. Unless, authorized treatment facilities are able to earn higher net profits by processing WEEE in by using more efficient technologies than the informal sector with rudimentary methods the informal sector would have more money to offer to the users of discarded WEEE. Due to the strong existence of informal sector it is very difficult for producers to meet their collection target unless informal sector also be part of formal chain.

- **Regulation and monitoring:** Incorporating EPR in the Rules is a path breaking step to share the responsibility of implementation with the private sector. The strong regulation and monitoring is require for better implementation of EPR.

- **Lack of formal infrastructure:** A major problem in implementing EPR in India is the absence of authorized treatment facilities and collection infrastructure to channelize the e-waste to registered facilities for recycling and recovery. Although

there are many collections and recycling facilities listed in CPCB website, who are authorised for collection and recycling of e-waste. Even after the enforcement of Rules in 2012 very few private parties have come forward to set up and ensure collection of WEEE.

- **Illegally imported EEE:** Illegally imported e-waste poses a great challenge in the effective working of an EPR programme. Around 50,000 tonnes of e-waste are imported to India every year illegally from developed countries (Rajya Sabha Secretariat 2011). The e-waste imported illegally keeps the informal businesses viable. The illegally imported WEEE is present in the market as orphan products and free riders and burdens the entire WEEE management system in terms of collection, sorting, monitoring etc.
- **Identification of producers:** A large share of the market in India comprises of 'no name branded products.' These products are often manufactured by producers who have disappeared from the marker either due to bankruptcy or have withdrawn from the market owing to different reasons. In most cases the transaction between the producers and consumers can also not be tracked down. When such products reach the end of life stage they pose a burden on the formal system.

9.3 EPR Examples

In the final part of the presentation, several examples of EPR models are presented. Figures of the systems in Switzerland, Germany and the Netherlands are shown below:

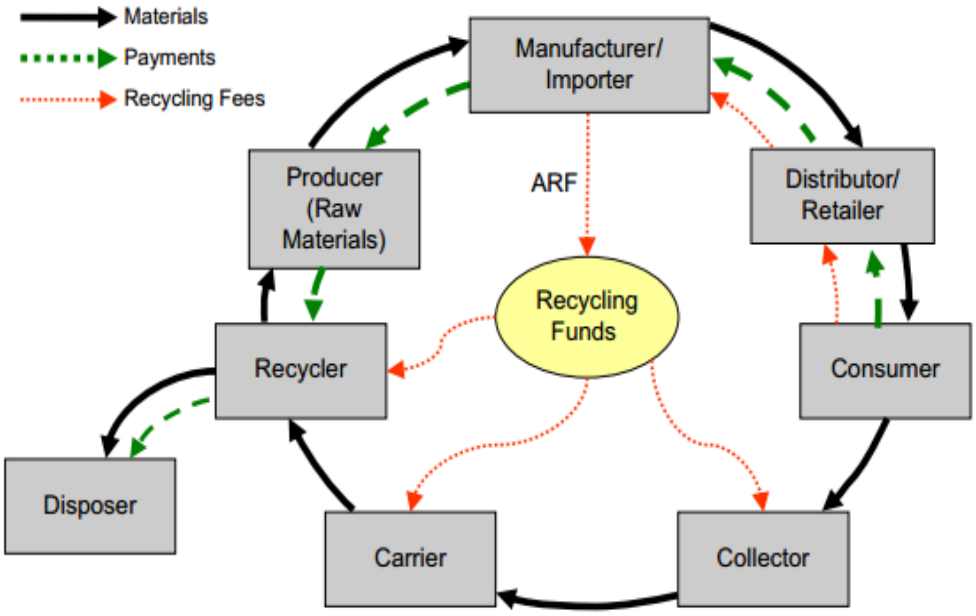


Figure 21: EPR model Switzerland (Sinha Khetriwal et al. 2007)

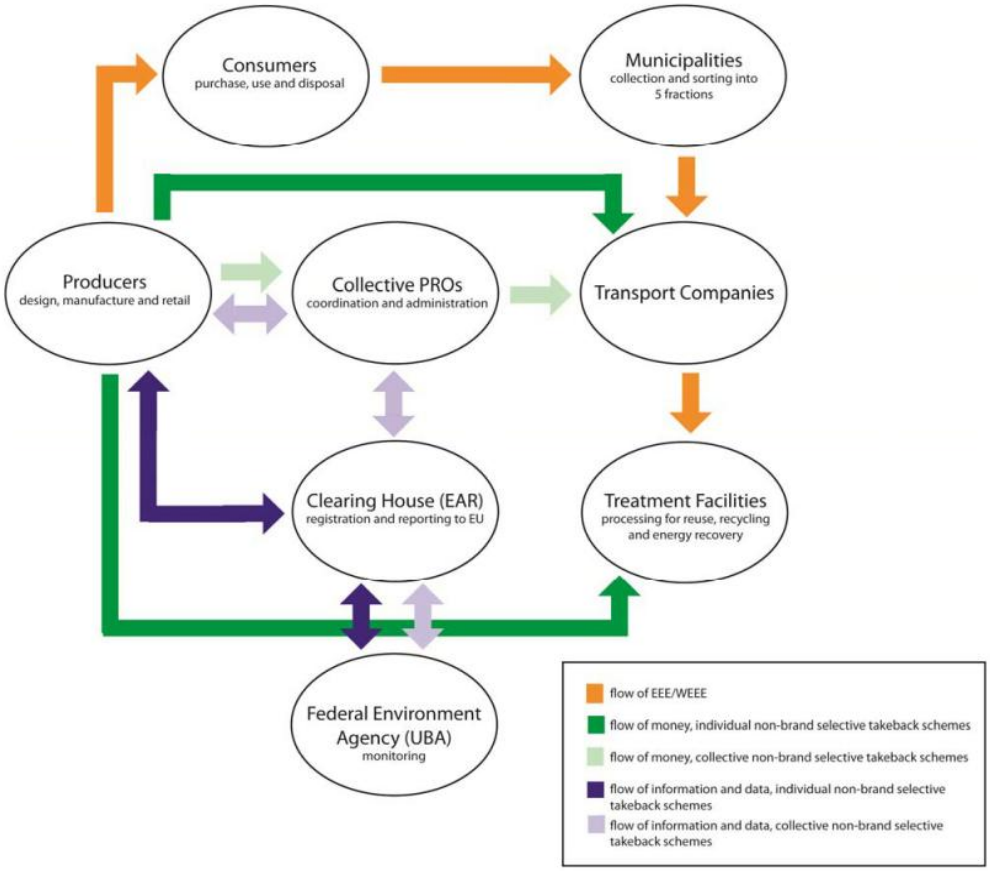


Figure 22: Esther, Lindblad & Mortensen 2011

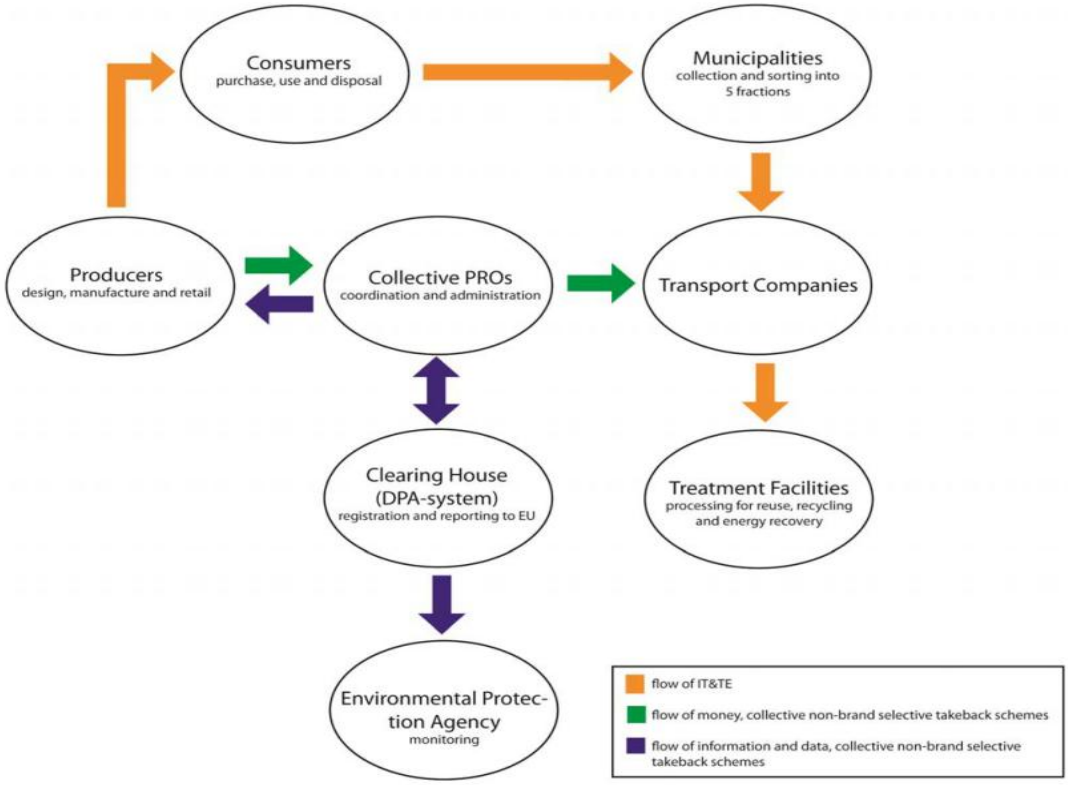


Figure 23: Esther, Lindblad & Mortensen 2011

10. Compliance Mechanism of E-waste Management

10.1 Introduction

In this session, the trainers will be introduced about compliance procedure for each stakeholder. The participants will be aware about the authorisation procedure for producers, manufacturers and refurbishers.

10.1.1. Objectives of the Session

The objective of the session will be in the form of outcomes of the participants, which are followings:

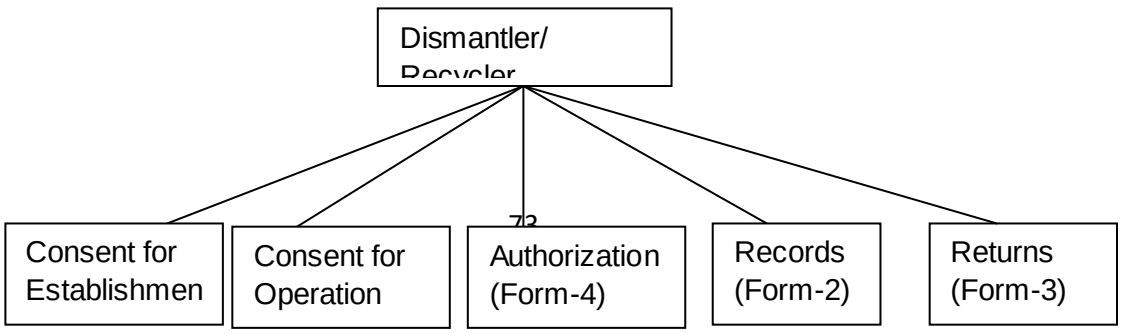
- To know about compliance procedure for each stakeholder.
- To understand about the authorisation procedure for producers, manufacturers and refurbishers
- To get knowledge about e-waste storage provision

10.1.2 Overview of the Session

- Authorisation procedure
- E-waste storage provision

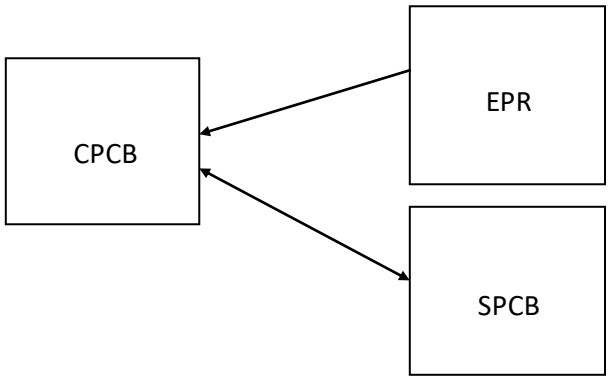
10.2 Authorisation procedure

Stakeholder	Authorisation	Form	Issuing Authority
Producer	EPR authorisation	Form-1	CPCB
Manufacturer	Authorisation	Form- 1 (a)	SPSB
Dismantler/ Recycler	Authorisation/ Renewal	Form- 4	SPSB
Refurbisher	Authorisation/ Renewal	Form- 1 (a)	SPCB



10.3 Compliance Monitoring Authority of E-waste Management

As per E-waste Management Rules, 2016, single EPR Authorization for Producers is now being made CPCB's responsibility to ensure pan India implementation. CPCB needs to inform each SPCB regarding the authorisation of producers' for effective implementation and monitoring.



10.3.1 Procedure for seeking authorisation (Producer)

Every Producer listed in schedule 1, shall obtain an authorisation from CPCB.

Application in Form 1 for authorisation should be submitted within a period of 3 months starting from the date of commencement of the rule

The Central Pollution Control Board will carry out evaluation of the Extended Producer Responsibility Plan and on being satisfied that the producer has detailed out an effective system to manage Extended Producer Responsibility in the country, shall grant Extended Producer Responsibility - Authorisation, in Form 1(aa) within a period of one hundred and twenty days. The Extended Producer Responsibility - Authorisation shall be valid for a period of five years.

10.3.2 Procedure for seeking authorisation (Manufacturer)

The manufacturer shall obtain an authorisation from the concerned State Pollution Control Board.

Application in Form 1 (a) for authorisation should be submitted within a period of 3 months starting from the date of commencement of the rule

the concerned State Pollution Control Board may after being satisfaction that the applicant possesses appropriate facilities, technical capabilities and equipment to handle e-waste

safely, will grant an authorisation in Form 1(bb) within a period of one hundred and twenty days to the applicant to carry out safe operations in the authorised place only, which shall be valid for a period of five years.

10.3.3 Procedure for seeking authorisation (Refurbisher)

The refurbisher shall obtain an authorisation from the concerned State Pollution Control Board.

Application in Form 1 (a) for authorisation should be submitted within a period of 3 months starting from the date of commencement of the rule

the concerned State Pollution Control Board, on being satisfied that the application is complete in all respects and complies with the guidelines prescribed by Central Pollution Control Board from time to time, may grant one time authorisation in Form 1 (bb) within a period of one hundred and twenty days to the applicant to carry out safe operations in the authorised place only, which shall be valid for a period of five years.

10.4 Waste storage provisions

E-waste cannot be stored for a period more than 180 days

10.5 Waste transportation provisions

Transportation of e-waste, being sent for dismantling or recycling to a facility in a State other than the State, where it is generated or collected, does not require ‘No objection certificate’ from the SPCBs/PCCs concerned. However, Transporter of the e-waste is required to give prior intimation to the SPCBs/PCCs concerned i.e. the States in which the e-waste is generated, transited and being sent for the purpose of recycling or dismantling.

11. Information Education Campaign (IEC)

11.1 Introduction

In this session, the trainers will be introduced about E-waste campaign, different mode to provide information regarding e-waste management. The tools will also be explain to the participant for IEC campaign

11.1.1 Objectives of the Session

- To explain the participants that the right tools are require initiating any IEC
- To understand about the need of IEC and how it should be done
- To provide the information regarding different mode of IEC

11.1.2. Overview of the Session

- Information about product and its end of life
- Awareness regarding take back and collection of e-waste

Information Education Campaign (IEC) is a tool which support government and others to provide them necessary knowledge and skills so that they can fulfil their mandates as technical resource and focal points for better dissemination and awareness. IEC interventions are to ensure local officials and city managers understand the e-waste management and its implementation.

11.2 E-Waste Campaign

Why	What	How
• Campaigning activities support the implementation of E-waste Rules for which the regulators are responsible	• Clear communication of messages on environmental consequences, economic consequences and social consequences	• Development of a Communication / outreach strategy on e-waste to communicate with a defined audience through a strategic message to

Why	What	How
• Awareness and engagement with the target group may result in a significant increase in collection of e-waste and the environmentally sound recycling of the material	• It should be considered that different target groups require different strategies in order to be successful; assure that you determine the target group correctly before designing the pitch	achieve a certain goal • Elements of communication strategy • Stakeholder engagement/ analysis for institutionalization

11.3 Various Tools to disseminate the awareness:

11.3.1 Information about product and its end of life

1. **Press Releases/ Written Media Campaigns**

- The amount of e-waste generation in each state/ country can be shared through media
- Sharing of story each month in local news paper
- Article/editorial on hazards of the e-waste menace, extent of the problem

2. **Television Adverts**

The television advertisement designed with govt. agencies can be wider the reach of the audience. Campaign could be telecasted for regional languages across India.

3. **Oral Communication – Radio**

- Expert speech/ interview
- Slogans on improper disposal of e-waste
- Films/ documentaries on E-waste initiatives

4. **Workshops/ Awareness Sessions**

Workshops with different stakeholders like Banks & PSUs, Hotels, Hospitals, Schools, NGOs, and International Organizations etc. to create awareness, develop a collection mechanism and disposal system.

11.4 Awareness regarding take back and collection of e-waste

1. **Education E-waste Awareness Collection Drives**

Regular awareness and collection drives with consumers under Manufacturer's/ Producer's take- back programme for better implementation of EPR. Collection bins can be placed in dealers and retail shops.

2. **Online Take-Back System**

Producers or recyclers can initiate online platform system, where consumers can sell their e-waste at defined rates. This system will promote recycling and re-use through environment friendly manner.

3. **Information accessible and sufficient to inform consumers**

To provide information related to take-back service should be accessible by consumers. The information can be finding in producers' website. For more accessibility, it would be suggested to provide the information in their Indian website not on the global portals

4. **Linking with Swacchh Bharat Mission**

Inter linage with informal sector can be benefitted to the producers in take-back programme. Formalisation of informal sector and their training can be facilitating the disposal of e-waste in environment sound manner and producers can meet their set target to comply the rules, 2016 and Swacchh Bharat Mission.

12. Developing Personal Action Plan

12.1 Introduction to This Session

Many topics have been touched on in this training which is of great relevance to regulators. However, in the end it comes down to the actions actually taken by the participants. It is the goal of this last part of the training course that the participants use the training experience to develop an action plan which they can take back home and use for starting actions on the implementation of the Rules. Therefore, an introductory part exposes the participants to the general concept of planning and the development of an action plan. The far more important part is the exercise in the end in which small groups concentrate on the specifications to be taken by the participating SPCBs/PCCs/ ULBs/ Others for fulfilling their duties regarding the implementation of the Rules.

12.1.1 Objectives of This Session

- At the end of this session the participants should be able to:
- Understand the general approach to a planning process
- Know how to develop an action plan
- Know which actions they are going to take next for the implementation of the Rules

12.1.2 Overview of This Session

- Approach to Planning
- Taking Stock
- Formulating Goals
- Developing an Action Plan
- Exercise: Developing an Action Plan
- Training Evaluation
- The following sections contain the actual training contents.

12.2 Approach to Planning

The first slide shows a very general planning cycle:

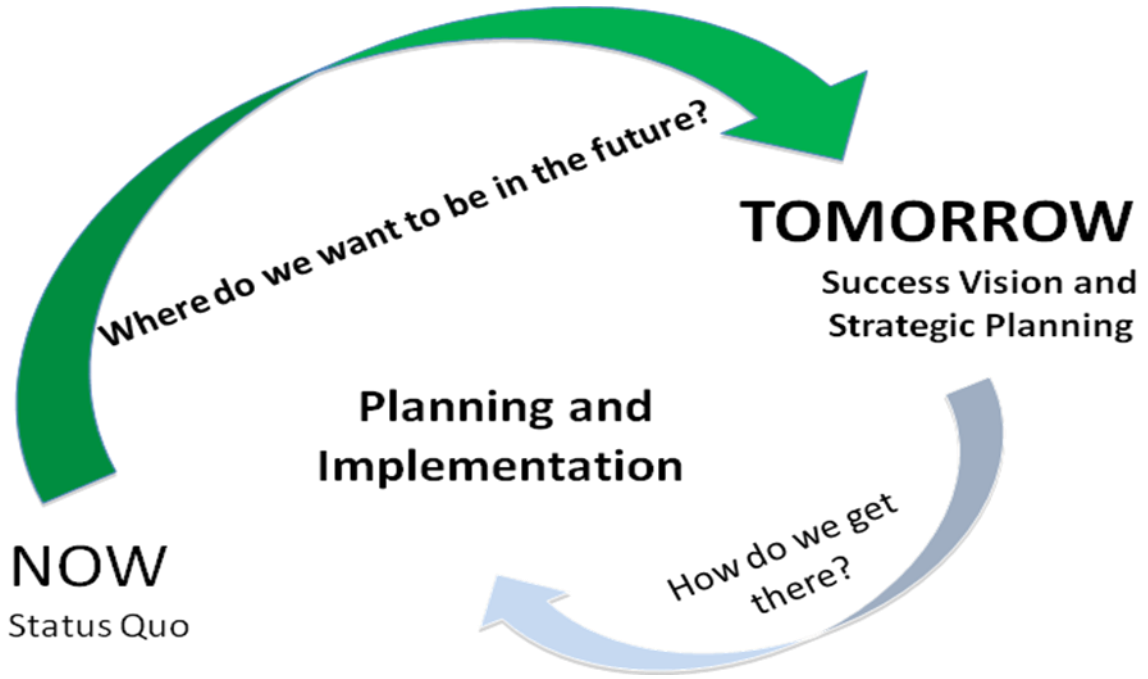


Figure 24: General planning cycle

In planning situation, one starts at the "Now / status quo". From there on you ask yourself where you would like to be in the future. You define a success vision and engage in the task of developing a strategic plan. The details of this plan point out what you will do for achieving your goal. This very simple approach can be ap plied to the implementation of the E-Waste Management & Handling Rules 2011.The participants assess where they stand now, what their goal is, and how they can get there.

The next slide gives some more details on the planning process:

Figure 25: Planning Process

In this depiction, also the part of implementation is included. Once you have decided on a strategy, you need to implement it and then monitor whether you achieve the expected results. This is a continuous process that never stops.

The Plan-Do-Check-Act approach is a general 4-step process which helps you to ensure continuous monitoring and improvement of you action plan.

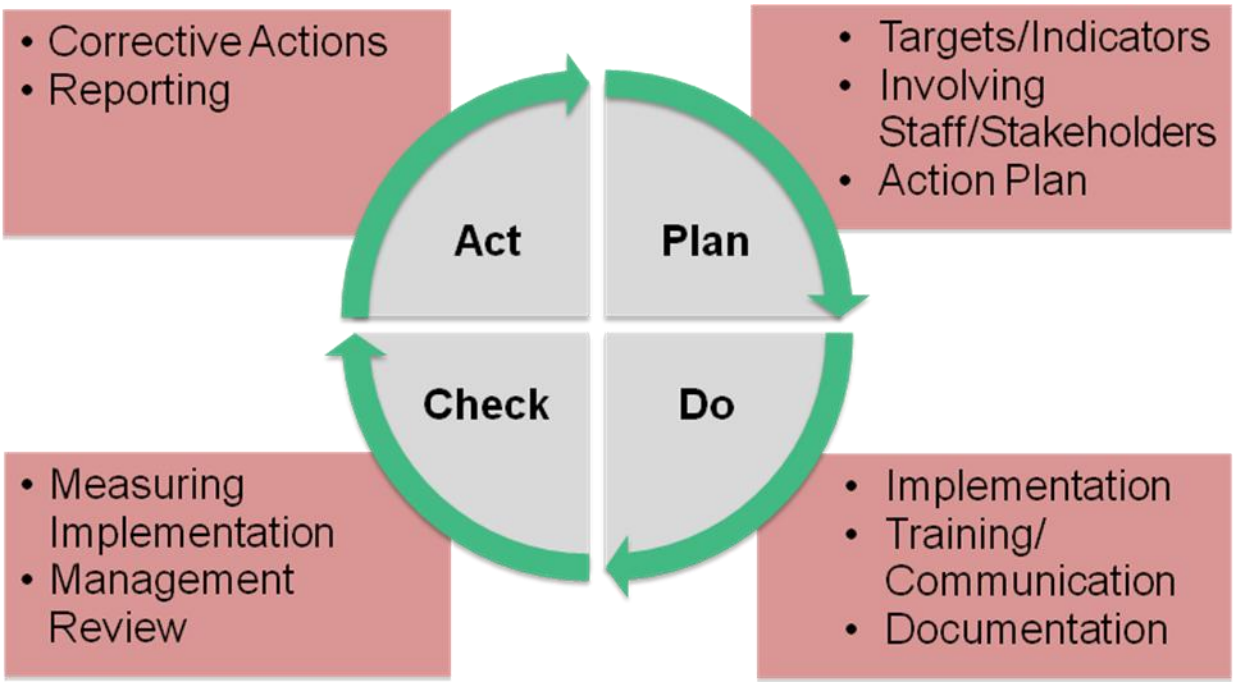


Figure 26: The Plan-Do-Check-Act approach

First, the action to be taken is planned. This is where this session, “Developing an Action Plan”, comes in. Second, the action plan is implemented. Third, results are monitored. And fourth, based on the monitoring, corrective actions are taken to improve the process.

12.3 Taking Stock

In this part, you ask the participants what the current status of the implementation of the Rules is.

The answers of the participants can be written on a white- or note-board and kept in mind for the development of the action plan later on.

12.4 Formulating Goals

As a next step, the participants should formulate goals on

- Where the regulators **have to** go as per the specifications of the Rules, and
- Where regulators **want to** go as per their general mandate

The answers of the participants can be written on a white- or note-board and kept in mind for the development of the action plan later on.

12.5 Developing an Action Plan

For developing an action plan the following questions need to be answered for each action:

- What needs to be done?
- Who will implement it?
- When will it be implemented?
- Which resources are required for the implementation?

WHAT

For deciding on the WHAT the participants need to consider several fields relevant for the implementation of the Rules where action is required. Possible fields are:

Awareness

- Registration
- Reporting
- O&HS
- Inventorization

Of course, additional fields can be relevant as well.
Once these fields or **target areas** have been defined, specific **targets** with suitable **indicators** need to be defined. Then, **measures** or actions for achieving these goals need to be developed.
WHO Subsequently, it needs to be defined for each measure who will be the responsible actor for the implementation. Additionally, it needs to be assessed which will be additional stakeholders that are relevant for the implementation of the measure, however, not directly responsible.

RESOURCES

For each measure it also needs to be assessed whether there are any resources needed for the different tasks? Then, the requirements regarding manpower, expertise, funding, equipment, etc need to be listed. As a fi nal step the participants need to come up with suggestions on how to obtain the necessary resources.

WHEN

For each measure a deadline for the implementation needs to be established. All measures can then be grouped in a Gantt chart or on a timeline for a better visualization of the action plan.
The example of an action plan could look like this:

Table 14: Action Plan

Action Field	Target	Indicator	Measure	Who?	Resources
Reporting	Send reports in due time	Date of report submitted	Develop a planning process for writing the annual report	SPCB staff	-
Registration	Visit 30 % of the units applying for registration	Number of visits / number of applications	Develop a system for selecting companies to be visited	SPCB staff	Testing equipment
Awareness	Conduct 12 awareness events per year	Number of awareness events	Partner with local groups to implement the events	SPCB staff; local groups	Information materials

12.6 Exercise: Developing an Action Plan

The following instructions are given on the action plan worksheet:

Task:

- Split up in groups of five
- Discuss with your group members the current situation regarding the implementation of the E-Waste (Management) Rules
- In the next step you will develop an Action Plan for the effective implementation of the E-Waste (Management) Rules by the SPCB
- Fill in the Action Plan Template
- Write the main parts of the Action Plan on maximum two large sheets of paper
- Present your Action Plan to the group

Details:

- You should state in which fields of e-waste management you want to / have to take action
- For each of these fields, formulate targets you want to / have to achieve
- For each target, specify indicators which you can use to measure whether the target has been achieved
- For each target, provide one / several measure(s) on how to achieve it
- For each measure, specify who will be responsible within the SPCB for implementation and which other stakeholders need to be involved
- Also specify for each measure, which resources will be required
- Finally, think about a timeline for implementing the action plan. Prioritize the measures, think about dependencies between them and be realistic

Materials required:

- Two large sheets of paper per group
- Different colored markers for each group
- Different colored note cards for each group

Trainer's note

- The groups have about 100 minutes for developing the action plan
- The presentation of the action plan should last max. 10 min
- Plan some time for a final discussion at the end of the session

12.7 Training Evaluation

In the evaluation of the training you can use a written training evaluation sheet which is provided to you in the annex. The participants are asked to fill out the sheet and hand it back to you.

Besides this quantitative evaluation you should also facilitate a discussion about training in which each of the participants can voice his or her impressions on the training. As materials for this discussion you can use:

- The participants' expectations on the training which you have collected in the beginning of the training; you can now ask the participants whether these expectations have been fulfilled or not
- The challenges faced by the participants in implementing the Rules; these had also been collected on a flipchart; you can now ask the participants whether they feel better prepared to tackle these challenges

Trainer's note

You should have enough time at the end of the final to evaluate the training and have a final discussion with the participants. Plan with a minimum of 45 min for the evaluation and final discussion.

13. Activities by Participants

Activity 1: E-waste effective training programme

Objective: Participants to deliver training sessions on: The idea is to involve the participants for delivering the session so that they could get hands-on experience in imparting training sessions.

Group work (Four groups – Informal sector, Bulk/individual consumers, regulators, multi stakeholders)

Methodology:

- Presentation
- Inputs from Expert
- Open discussion

Each group will draw a flow of training programme for below mentioned stakeholders. Each group will give the presentation and experts will provide the inputs to improve the same

Suggested Topics:

- Basics of E-waste including material flow (Informal Sector, Bulk Consumer)
- How can e-waste damage the environment and human health? (Informal Sector, regulators)

Activity 2: E-waste Category:

Objective: Participants will chalk out the list of e-waste category according to WEEE directives and E-Waste (Management) Rules, 2016 so that they will get the knowledge about the products come under the category of e-waste.

Ask the participants what they think e-waste is comprised of.
As a solution, the WEEE Directive's definition of EEE is presented from which e-waste is generated as well as the definition from the E-Waste (Management) Rules, 2016

Methodology:
Individual participants will write the e-waste product/ products in the given zop cards then the card will be pasted on the board. The trainers will readout all the cards and if there is missing any product name will fill the same.

Activity 3: Challenges in Implementation of the Rules

Objective: Participants will discuss about the challenges they have faced in implementation of the rules

Methodology:

Collect the challenges with the participants name on a pin-board and address them in the sessions to come. Go through these challenges at the end of the training and discuss with the participants whether they now have a better idea on how to tackle these challenges.

Activity 4: Role play- Clarity on Roles & Responsibilities of producers and regulators

Objective of the session: Clarity of roles and responsibilities of producers and regulators

Method: (Role Play - Experiential learning): Presentation, clarification and preparation of role play.

Roles: Producer and Regulator

Situation: Joint Secretary and Director, MoEF, E-waste Division convey a meeting on E-waste Rules to see steps taken by producers on compliance to the rules

Participants: Four volunteers as producers and four volunteers as regulators. The rest are observers.

Role given to Producers:

Participant 1- You are a CEO of Brand X (Largest Mobile Brand in USA); you have to portray that you are ready to comply but due to lack of information in submitted application, the Indian regulators' do not consider your authorization application. Your application is lying in MoEF since last nine months.

Participant 2- You are a Sustainability Manager, Brand Y (Biggest TV selling company); you are not sure about the reporting procedures under the E-waste Rules.

Participant 3- You are Government Relations in-charge of Brand Z; you have to portray that your company is not generating much E-waste in India and the production plant doesn't exist in India. Therefore you will only comply with the world wide policies

Participant 4- You are the Director, Sustainability and Government Policy of a brand. You have to inform in the meeting about the awareness campaigns conducted by your brand and responsibilities undertaken by you even before the Rules were notified.

Role given to Regulators:

Participant 1- You are the Director, E-waste Division, MoEF. You have to portray that you are completely frustrated because brands are not complying even after a notification period of one year.

Participant 2- You are the Joint Secretary, MoEF. You have to portray those global brands/ companies should know about the extended producer responsibility and its implementation mechanism in India.

Participant 3- You are Divisional In-charge, SPCB. You have to portray that you have made a call to the Toll Free number of Brand Y and collection centre (which claims to have huge IEC campaigns) but their response is not good.

Participant 4- You are a Senior Environment Engineer, CPCB. You have to portray that you have received the authorization application of Brand X. You have not approved the application because you wish them to mention their collection and recycling mechanism.

Scenario

The Joint Secretary initiates the meeting and all the brands have to update on their action taken during the last one year. After a brief round by all the four producer volunteers, the Joint Secretary asks for inputs from the regulators. After this step, the discussion is to be moderated to encourage continuous dialogue between the groups.

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[PUBLISHED IN THE GAZETTE OF INDIA, EXTRAORDINARY PART-II, SECTION-3, SUB-SECTION (i)]

GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 23rd March , 2016

G.S.R 338(E). - Whereas the draft rules, namely the e-waste (Management) Rules, 2015, were published by the Government of India in the Ministry of Environment, Forest and Climate Change *vide* number G.S.R. 472(E), dated the 10th June, 2015 in the Gazette of India, Extraordinary Part II, section 3, sub-section (ii) inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of the period of sixty days from the date on which copies of the Gazette containing the said notification were made available to the public;

AND WHEREAS the copies of the Gazette containing the said notification were made available to the public on the 10th day of June, 2015;

AND WHEREAS the objections and suggestions received within the specified period from the public in respect of the said draft rules have been duly considered by the Central Government;

NOW, THEREFORE, in exercise of the powers conferred by sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), and in supersession of the e-waste (Management and Handling) Rules, 2011, published in the Gazette of India, section 3, sub-section (ii), *vide* number S.O. 1035(E), dated the 12th May, 2011, except as respects things done or omitted to be done before such supersession, the Central Government hereby makes the following rules, namely:-

CHAPTER I

PRELIMINARY

1. Short title and commencement. - (1) These rules may be called the E-Waste (Management) Rules, 2016.
(2) They shall come into force from the 1st day of October, 2016.

2. Application. - These rules 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.

3. **Definitions.** - (1) In these rules, unless the context otherwise requires, -

(a) 'Act' means the Environment (Protection) Act, 1986 (29 of 1986);
(b) 'authorisation' means permission for generation, handling, collection, reception, storage, transportation, refurbishing, dismantling, recycling, treatment and disposal of e-waste, granted to manufacturer, dismantler, refurbisher and recycler;
(c) '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 organisations, 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) and health care facilities which have turnover of more than one crore or have more than twenty employees;
(d) 'Central Pollution Control Board' means the Central Pollution Control Board constituted under sub-section (1) of section 3 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974);
(e) 'collection centre' means a centre or a collection point or both established by producer individually or as association jointly to collect e-waste for channelising the e-waste to recycler and play such role as indicated in the authorisation for Extended Producer Responsibility granted to the producer and having facilities as per the guidelines of Central Pollution Control Board, including the collection centre established by the dismantler or refurbisher or recycler which should be a part of their authorisation issued by the State Pollution Control Board where the facility exists;
(f) 'component' means one of the parts of a sub-assembly or assembly of which a manufactured product is made up and into which it may be resolved and includes an accessory or attachment to another component;
(g) 'consumables' means an item, which participates in or is required for a manufacturing process or for functioning of the electrical and electronic equipment and may or may not form part of end-product. Items, which are substantially or totally consumed during a manufacturing process, shall be deemed to be consumables;
(h) 'consumer' means any person using electrical and electronic equipment excluding the bulk consumers;
(i) 'channelisation' means to direct the path for movement of e-wastes from collection onwards to authorised dismantler or recycler. In case of fluorescent and other mercury containing lamps, where recyclers are not available, this means path for movement from collection centre to Treatment, Storage and Disposal Facility;
(j) 'dealer' means any individual or firm that buys or receives electrical and electronic equipment as listed in Schedule I of these rules and their components or consumables or parts or spares from producers for sale;
(k) 'deposit refund scheme' means a scheme whereby 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;
(l) 'dismantler' means any person or organisation engaged in dismantling of used electrical and electronic equipment into their components and having facilities

as per the guidelines of Central Pollution Control Board and having authorisation from concerned State Pollution Control Board;

(m) 'disposal' means any operation which does not lead to recycling, recovery or reuse and includes physico-chemical or biological treatment, incineration and deposition in secured landfill;

(n) 'end-of-life' of the product means the time when the product is intended to be discarded by the user;

(o) 'environmentally sound management of e-waste' means taking all steps required to ensure that e-waste is managed in a manner which shall protect health and environment against any adverse effects, which may result from such e-waste;

(p) 'electrical and electronic equipment' means equipment which are dependent on electric current or electro-magnetic field in order to become functional;

(q) 'e-retailer' means an individual or company or business entity that uses an electronic network such as internet, telephone, to sell its goods;

(r) 'e-waste' means electrical and electronic equipment, whole or in part discarded as waste by the consumer or bulk consumer as well as rejects from manufacturing, refurbishment and repair processes;

(s) 'e-waste exchange' means an independent market instrument offering assistance or independent electronic systems offering services for sale and purchase of e-waste generated from end-of-life electrical and electronic equipment between agencies or organisations authorised under these rules;

(t) 'Extended Producer Responsibility' means responsibility of any producer of electrical or electronic equipment, for channelisation of e-waste to ensure environmentally sound management of such waste. Extended Producer Responsibility may comprise of implementing take back system or setting up of collection centres or both and having agreed arrangements with authorised dismantler or recycler either individually or collectively through a Producer Responsibility Organisation recognised by producer or producers in their Extended Producer Responsibility - Authorisation;

(u) 'Extended Producer Responsibility - Authorisation' means a permission given by Central Pollution Control Board to a producer, for managing Extended Producer Responsibility with implementation plans and targets outlined in such authorisation including detail of Producer Responsibility Organisation and e-waste exchange, if applicable;

(v) 'Extended Producer Responsibility Plan' means a plan submitted by a producer to Central Pollution Control Board, at the time of applying for Extended Producer Responsibility - Authorisation in which a producer shall provide details of e-waste channelisation system for targeted collection including detail of Producer Responsibility Organisation and e-waste exchange, if applicable;

(w) 'facility' means any location wherein the process incidental to the collection, reception, storage, segregation, refurbishing, dismantling, recycling, treatment and disposal of e-waste are carried out;

(x) 'Form' means a form appended to these rules;

(y) 'historical e-waste' means e-waste generated from electrical and electronic equipment as specified in Schedule I, which was available on the date from which these rules come into force;

(z) 'manufacturer' means a person or an entity or a company as defined in the Companies Act, 2013 (18 of 2013) or a factory as defined in the Factories Act, 1948 (63 of 1948) or Small and Medium Enterprises as defined in Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006), which has facilities for manufacture of electrical and electronic equipment;

(aa) 'orphaned products' means non-branded or assembled electrical and electronic equipment as specified in Schedule I or those produced by a company, which has closed its operations;

(bb) 'part' means an element of a sub-assembly or assembly not normally useful by itself, and not amenable to further disassembly for maintenance purposes. A part may be a component, spare or an accessory;

(cc) 'producer' means any person who, irrespective of the selling technique used such as dealer, retailer, e-retailer, etc.;

(i) manufactures and offers to sell electrical and electronic equipment and their components or consumables or parts or spares under its own brand; or

(ii) offers to sell under its own brand, assembled electrical and electronic equipment and their components or consumables or parts or spares produced by other manufacturers or suppliers; or

(iii) offers to sell imported electrical and electronic equipment and their components or consumables or parts or spares;

(dd) 'Producer Responsibility Organisation' 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;

(ee) 'recycler' - means any person who is engaged in recycling and reprocessing of waste electrical and electronic equipment or assemblies or their components and having facilities as elaborated in the guidelines of Central Pollution Control Board;

(ff) 'refurbishment' means repairing of used electrical and electronic equipment as listed in Schedule I for extending its working life for its originally intended use and selling the same in the market or returning to owner;

(gg) 'refurbisher' for the purpose of these rules, means any company or undertaking registered under the Factories Act, 1948 or the Companies Act, 1956 or both or district industries centre engaged in refurbishment of used electrical and electronic equipment;

(hh) 'Schedule' means the Schedule appended to these rules;

(ii) "spares" means a part or a sub-assembly or assembly for substitution which is ready to replace an identical or similar part or sub-assembly or assembly including a component or an accessory;

(jj) 'State Government in relation to an Union territory means, the Administrator thereof appointed under article 239 of the Constitution;

(kk) 'State Pollution Control Board' means the concerned State Pollution Control Board or the Pollution Control Committee of the Union Territories constituted under sub-section (1) of section 4 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974);

(ll) 'target' means the quantity of e-waste to be collected by the producer in fulfilment of Extended Producer Responsibility;

(mm) 'transporter' means a person or company or entity engaged in the off-site transportation of e-waste by air, rail, road or water carrying a manifest system issued by the person or company or entity who has handed over the e-waste to the transporter, giving the origin, destination and quantity of the e-waste being transported;

(2) Words and expressions used in these rules and not defined but defined in the Act shall have the meanings respectively assigned to them in the Act.

CHAPTER II

RESPONSIBILITIES

4. Responsibilities of the manufacturer. - (1) collect e-waste generated during the manufacture of any electrical and electronic equipment and channelise it for recycling or disposal;

(2) apply for an authorisation in Form 1 (a) in accordance with the procedure prescribed under sub-rule (2) of rule 13 from the concerned State Pollution Control Board, which shall give the authorisation in accordance with Form 1 (bb);

(3) ensure that no damage is caused to the environment during storage and transportation of e-waste;

(4) maintain records of the e-waste generated, handled and disposed in Form-2 and make such records available for scrutiny by the concerned State Pollution Control Board;

(5) file annual returns in Form-3, to the concerned State Pollution Control Board on or before the 30th day of June following the financial year to which that return relates.

5. Responsibilities of the producer. - The producer of electrical and electronic equipment listed in Schedule I shall be responsible for -

(1) implementing the Extended Producers Responsibility with the following frameworks, namely:-

(a) collection and channelisation of e-waste generated from the 'end-of-life' of their products or 'end-of-life' products with same electrical and electronic equipment code and historical waste available on the date from which these rules come into force as per Schedule I in line with the targets prescribed in Schedule III in Extended Producer Responsibility - Authorisation;

(b) the mechanism used for channelisation of e-waste from 'end-of-life' products including those from their service centres to authorised dismantler or recycler shall be in accordance with the Extended Producer Responsibility - Authorisation. In cases of fluorescent and other mercury containing lamps, where recyclers are not available, channelisation may be from collection centre to Treatment, Storage and Disposal Facility;

(c) for disposal in Treatment, Storage and Disposal Facility, a pre-treatment is necessary to immobilise the mercury and reduce the volume of waste to be disposed off;

(d) Extended Producer Responsibility - Authorisation should comprise of general scheme for collection of waste Electrical and Electronic Equipment from the Electrical and Electronic Equipment placed on the market earlier, such as through dealer, collection centres, Producer Responsibility Organisation, through buy-back arrangement, exchange scheme, Deposit Refund System, etc. whether directly or through any authorised agency and channelising the items so collected to authorised recyclers;

(e) providing contact details such as address, e-mail address, toll-free telephone numbers or helpline numbers to consumer(s) or bulk consumer(s) through their website and product user documentation so as to facilitate return of end-of-life electrical and electronic equipment;

(f) creating awareness through media, publications, advertisements, posters, or by any other means of communication and product user documentation accompanying the equipment, with regard to -

(i) information on address, e-mail address, toll-free telephone numbers or helpline numbers and web site;
(ii) information on hazardous constituents as specified in sub-rule 1 of rule 16 in electrical and electronic equipment;
(iii) information on hazards of improper handling, disposal, accidental breakage, damage or improper recycling of e-waste;
(iv) instructions for handling and disposal of the equipment after its use, along with the Do's and Don'ts;
(v) affixing a visible, legible and indelible symbol given below on the products or product user documentation to prevent e-waste from being dropped in garbage bins containing waste destined for disposal;

(vi) means and mechanism available for their consumers to return e-waste for recycling including the details of Deposit Refund Scheme, if applicable;

(g) the producer shall opt to implement Extended Producer Responsibility individually or collectively. In individual producer responsibility, producer may set up his own collection centre or implement take back system or both to meet Extended Producer Responsibility. In collective system, producers may tie-up as a member with a Producer Responsibility Organisation or with e-waste exchange or both. It shall be mandatory upon on the individual producer in every case to seek Extended Producer Responsibility - Authorisation from Central Pollution Control Board in accordance with the Form-1 and the procedure laid down in sub-rule (1) of rule 13;

(2) to provide information on the implementation of Deposit Refund Scheme to ensure collection of end-of-life products and their channelisation to authorised dismantlers or recyclers, if such scheme is included in the Extended Producer Responsibility Plan.
Provided that the producer shall refund the deposit amount that has been taken from the consumer or bulk consumer at the time of sale, along with interest at the prevalent rate for the period of the deposit at the time of take back of the end-of-life product;

(3) the import of electrical and electronic equipment shall be allowed only to producers having Extended Producer Responsibility authorisation;

(4) maintaining records in Form-2 of the e-waste handled and make such records available for scrutiny by the Central Pollution Control Board or the concerned State Pollution Control Board;

(5) filing annual returns in Form-3, to the Central Pollution Control Board on or before the 30th day of June following the financial year to which that return relates. In case of the Producer with multiple offices in a State, one annual return combining information from all the offices shall be filed;

(6) the Producer shall apply to the Central Pollution Control Board for authorisation in Form 1, which shall thereafter grant the Extended Producer Responsibility - Authorisation in Form 1(aa).
(7) Operation without Extended Producer Responsibility-Authorisation by any producer, as defined in this rule, shall be considered as causing damage to the environment.

6. **Responsibilities of collection centres.** - (1) collect e-waste on behalf of producer or dismantler or recycler or refurbisher including those arising from orphaned products;
Provided the collection centres established by producer can also collect e-waste on behalf of dismantler, refurbisher and recycler including those arising from orphaned products
(2) ensure that the facilities are in accordance with the standards or guidelines issued by Central Pollution Control Board from time to time;
(3) ensure that the e-waste collected by them is stored in a secured manner till it is sent to authorised dismantler or recycler as the case may be;
(4) ensure that no damage is caused to the environment during storage and transportation of e-waste;
(5) maintain records in Form-2 of the e-waste handled as per the guidelines of Central Pollution Control Board and make such records available for scrutiny by the Central Pollution Control Board or the concerned State Pollution Control Board as and when asked for.

7. **Responsibilities of dealers.** – (1) in the case the dealer has been given the responsibility of collection on behalf of the producer, the dealer shall collect the e-waste by providing the consumer a box, bin or a demarcated area to deposit e-waste, or through take back system and send the e-waste so collected to collection centre or dismantler or recycler as designated by producer;
(2) the 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;
(3) every dealer shall ensure that the e-waste thus generated is safely transported to authorised dismantlers or recyclers;
(4) ensure that no damage is caused to the environment during storage and transportation of e-waste.

8. **Responsibilities of the refurbisher.** – (1) collect e-waste generated during the process of refurbishing and channelise the waste to authorised dismantler or recycler through its collection centre;
(2) make an application in Form 1(a) in accordance with the procedure laid down in sub-rule (4) of rule 13 to the concerned State Pollution Control Board for grant of one time authorisation;
(a) the concerned State Pollution Control Board shall authorise the Refurbisher on one time basis as per Form 1 (bb) and authorisation would be deemed as considered if not objected to within a period of thirty days;
(b) the authorised Refurbisher shall be required to submit details of e-waste generated to the concerned State Pollution Control Board on yearly basis;
(3) ensure that no damage is caused to the environment during storage and transportation of e-waste;
(4) ensure that the refurbishing process do not have any adverse effect on the health and the environment;

11. Responsibilities of the recycler. – (1) shall ensure that the facility and recycling processes are in accordance with the standards or guidelines prescribed by the Central Pollution Control Board from time to time;

(2) obtain authorisation from concerned State Pollution Control Board in accordance with the procedure under the sub-rule (3) of rule 13;

(3) ensure that no damage is caused to the environment during storage and transportation of e-waste;

(4) ensure that the recycling processes do not have any adverse effect on the health and the environment;

(5) make available all records to the Central Pollution Control Board or the concerned State Pollution Control Board for inspection;

(6) ensure that the fractions or material not recycled in its facility is sent to the respective authorised recyclers;

(7) ensure that residue generated during recycling process is disposed of in an authorised treatment storage disposal facility;

(8) maintain record of e-waste collected, dismantled, recycled and sent to authorised recycler in Form-2 and make such record available for scrutiny by the Central Pollution Control Board or the concerned State Pollution Control Board;

(9) file annual returns in Form-3, to the concerned State Pollution Control Board as the case may be, on or before 30th day of June following the financial year to which that return relates;

(10) may accept waste electrical and electronic equipment or components not listed in Schedule I for recycling provided that they do not contain any radioactive material and same shall be indicated while taking the authorisation from concerned State Pollution Control Board;

(11) operation without Authorisation by any recycler, as defined in this rule, shall be considered as causing damage to the environment.

12. Responsibilities of State Government for environmentally sound management of E-waste. – (1) Department of Industry in State or any other government agency authorised in this regard by the State Government, to ensure earmarking or allocation of industrial space or shed for e-waste dismantling and recycling in the existing and upcoming industrial park, estate and industrial clusters;

(2) Department of Labour in the State or any other government agency authorised in this regard by the State Government shall:

a. ensure recognition and registration of workers involved in dismantling and recycling;
b. assist formation of groups of such workers to facilitate setting up dismantling facilities;
c. undertake industrial skill development activities for the workers involved in dismantling and recycling;
d. undertake annual monitoring and to ensure safety & health of workers involved in dismantling and recycling;

(3) State Government to prepare integrated plan for effective implementation of these provisions, and to submit annual report to Ministry of Environment, Forest and Climate Change.

CHAPTER III

PROCEDURE FOR SEEKING AND GRANT OF AUTHORISATION FOR MANAGEMENT OF E-WASTE

13. Procedure for Seeking and Grant of Authorisation. -

(1) **Extended Producer Responsibility - Authorisation of Producers. –** (i) every producer of electrical and electronic equipment listed in Schedule I, shall make an application for Extended Producer Responsibility - Authorisation within a period of ninety days starting from the date of these rules coming into force in Form-1 to Central Pollution Control Board;

(ii) on receipt of the application complete in all respects, the Central Pollution Control Board will carry out evaluation of the Extended Producer Responsibility Plan and on being satisfied that the producer has detailed out an effective system to manage Extended Producer Responsibility in the country, shall grant Extended Producer Responsibility - Authorisation, in Form 1(aa) within a period of one hundred and twenty days. The Extended Producer Responsibility - Authorisation shall be valid for a period of five years;

This authorisation shall include among others the targeted quantity of e-waste, product code wise, to be collected during the year. The actual target for collection of e-waste for dismantling or recycling will be fixed on the basis of quantity of electrical and electronic equipment, product code wise, placed in the market in the previous years and taking into consideration the average life of the equipment. The estimated quantity of e-waste generated during the current year will be indicated by the producer and the quantity expected to be collected with the collection scheme proposed to be implemented by the producer will be indicated in the Extended Producer Responsibility plan. The Central Pollution Control Board shall fix the targets in accordance with Schedule III.

(iii) the Central Pollution Control Board, after giving reasonable opportunity of being heard to the applicant shall refuse to grant Extended Producer Responsibility – Authorisation;

(iv) in the event of refusal of Extended Producer Responsibility - Authorisation by the Central Pollution Control Board, the producer will forfeit his right to put any Electrical and Electronic Equipment in the market till such time the Extended Producer Responsibility - Authorisation is granted;

(v) the Central Pollution Control Board after grant of Extended Producer Responsibility - Authorisation shall forward the Extended Producer Responsibility Plan to respective State Pollution Control Board for monitoring;

(vi) an application for the renewal of Extended Producer Responsibility-Authorisation shall be made in Form-1 before one hundred and twenty days of its expiry to Central Pollution Control Board. The Central Pollution Control Board may renew the authorisation for a period of five years after receipt of compliance report from the concerned State Pollution Control Board which shall submit the compliance report to Central Pollution Control Board within sixty days from the date of the receipt of the application. In case of non receipt of the compliance report from the State Pollution Control Board within stipulated time period of sixty days, Central Pollution Control Board may renew the Extended Producer Responsibility-Authorisation after examining such case on merit basis, subject to no report of violation of the provisions of the Act or the rules made there under or the conditions specified in the Extended Producer Responsibility - Authorisation;

(vii) every producer of Electrical and Electronic Equipment listed in Schedule I, shall take all steps, wherever required, to comply with the conditions specified in the Extended Producer Responsibility – Authorisation;
(viii) the concerned State Pollution Control Board shall monitor the compliance of Extended Producer Responsibility - Authorisation, take cognizance of any non-compliance and inform Central Pollution Control Board for taking action, as necessary;
(ix) Central Pollution Control Board shall conduct random check and if in its opinion, the holders of the Extended Producer Responsibility - Authorisation has failed to comply with any of the conditions of the authorisation or with any provisions of the Act or these rules and after giving a reasonable opportunity of being heard and after recording reasons thereof in writing cancel or suspend the Extended Producer Responsibility - Authorisation issued under these rules for such period as it considers necessary in the public interest and inform the concerned State Pollution Control Board within ten days of cancellation.
(x) the Central Pollution Control Board shall maintain an online register of Extended Producer Responsibility - Authorisation granted with conditions imposed under these rules for environmentally sound management of e-waste, and which shall be accessible to any citizen of the country.
(xi) The producer authorised under the provision of this rule shall maintain records in Form-2 and shall file annual returns of its activities of previous year in Form-3 to the Central Pollution Control Board on or before 30th day of June of every year;

(2) **Authorisation of Manufacturer. –** (i) the manufacturer generating e-waste shall obtain an authorisation from the concerned State Pollution Control Board;
(ii) the manufacturer shall make an application for authorisation, within a period of ninety days from the date of these rules coming into force in Form 1(a) to the concerned State Pollution Control Board for grant of authorisation;
(iii) on receipt of the application complete in all respects for the authorisation, the concerned State Pollution Control Board may, after such enquiry as it considers necessary and on being satisfied that the applicant possesses appropriate facilities, technical capabilities and equipment to handle e-waste safely, grant within a period of one hundred and twenty days an authorisation in Form 1(bb) to the applicant to carry out safe operations in the authorised place only, which shall be valid for a period of five years;
(iv) the concerned State Pollution Control Board after giving reasonable opportunity of being heard to the applicant may refuse to grant any authorisation;
(v) every person authorised under these rules shall maintain the record of e-waste handled by them in Form-2 and prepare and submit to the concerned State Pollution Control Board, an annual return containing the details specified in Form-3 on or before the 30th day of June following the financial year to which that return relates;
(vi) an application for the renewal of an authorisation shall be made in Form-1(a) before one hundred and twenty days of its expiry and the concerned State Pollution Control Board may renew the authorisation for a period of five years after examining each case on merit and subject to the condition that there is no report of violation of the provisions of the Act or the rules made thereunder or the conditions specified in the authorisation;
(vii) manufacturer shall take all steps to comply with the conditions specified in the authorisation;
(viii) the concerned State Pollution Control Board shall maintain an online register of authorisations granted with conditions imposed under these rules for

environmentally sound management of e-waste, and which shall be accessible to any citizen of the country.

(3) **Procedure for grant of authorisation to dismantler or recycler.** - (i) every Dismantler or Recycler of e-waste shall make an application, within a period of one hundred and twenty days starting from the date of coming into force of these rules, in Form-4 in triplicate to the concerned State Pollution Control Board accompanied with a copy of the following documents for the grant or renewal of authorisation, namely:-

(a) consent to establish granted by the concerned State Pollution Control Board under the Water (Prevention and Control of Pollution) Act, 1974, (25 of 1974) and the Air (Prevention and Control of Pollution) Act, 1981(21 of 1981);
(b) certificate of registration issued by the District Industries Centre or any other government agency authorised in this regard;
(c) proof of installed capacity of plant and machinery issued by the District Industries Centre or any other government agency authorised in this behalf;
(d) in case of renewal, a certificate of compliance of effluent and emission standards, treatment and disposal of hazardous wastes as applicable from the concerned State Pollution Control Board or any other agency designated for this purpose:

Provided that any person authorised or registered under the provisions of the Hazardous Wastes (Management, Handling and Transboundary Movements) Rules, 2008, and the E-waste (Management & Handling) Rules, 2011 prior to the date of coming into force of these rules shall not be required to make an application for authorisation till the period of expiry of such authorisation or registration:

(ii) the concerned State Pollution Control Board, on being satisfied that the application is complete in all respects and that the applicant is utilising environmentally sound technologies and possess adequate technical capabilities, requisite facilities and equipment to dismantle or recycle and process e-waste in compliance to the guidelines specified by Central Pollution Control Board from time to time and through site inspection, may grant authorisation to such applicants stipulating therein necessary conditions as deemed necessary for carrying out safe operations in the authorised place only;
(iii) the concerned State Pollution Control Board shall dispose of the application for authorisation within a period of one hundred and twenty days from the date of the receipt of such application complete in all respects;
(iv) the authorisation granted under these rules shall be valid for a period of five years from the date of its issue and shall be accompanied with a copy of the field inspection report signed by that Board indicating the adequacy of facilities for dismantling or recycling of e-waste and compliance to the guidelines specified by Central Pollution Control Board from time to time;
(v) the concerned State Pollution Control Board may refuse, cancel or suspend an authorisation granted under these rules, if it has reasons to believe that the authorised dismantler or recycler has failed to comply with any of the conditions of authorisation, or with any provisions of the Act or rules made thereunder, after giving an opportunity to the dismantler or recycler to be heard and after recording the reasons thereof;
(vi) an application for the renewal of authorisation shall be made in Form - 4 before one hundred and twenty days of its expiry and the concerned State Pollution Control Board may renew the authorisation for a period of five years after

examining each case on merit and subject to the condition that there is no report of violation of the provisions of the Act or the rules made there under or the conditions specified in the authorisation;

(vii) the Dismantler and Recycler shall maintain records of the e-waste purchased, processed in Form-2 and shall file annual returns of its activities of previous year in Form-3 to the concerned State Pollution Control Board on or before 30th day of June of every year;

(viii) the Central Government and the Central Pollution Control Board may issue guidelines for standards of performance for dismantling and recycling processes from time to time.

(4) **Procedure for grant of authorisation to refurbisher.** – (i) every refurbisher of e-waste shall make an application, with in a period of one hundred and twenty days starting from the date of coming into force of these rules, in Form 1 (a) in triplicate to the concerned State Pollution Control Board accompanied with a copy of the following documents for the grant or renewal of authorisation, namely:-

(a) consent to establish granted by the concerned State Pollution Control Board under the Water (Prevention and Control of Pollution) Act, 1974, (25 of 1974) and the Air (Prevention and Control of Pollution) Act, 1981 (21 of 1981);
(b) certificate of registration issued by the District Industries Centre or any other government agency authorised in this regard;
(c) proof of installed capacity of plant and machinery issued by the District Industries Centre or any other government agency authorised in this behalf.

(ii) the concerned State Pollution Control Board, on being satisfied that the application is complete in all respects and complies with the guidelines prescribed by Central Pollution Control Board from time to time, may grant one time authorisation in Form 1 (bb) to such applicants stipulating therein necessary conditions as deemed necessary for carrying out refurbishing activities in the authorised place only;

(iii) the concerned State Pollution Control Board shall dispose of the application for authorisation within a period of one hundred and twenty days from the date of the receipt of such application complete in all respects;

(iv) the concerned State Pollution Control Board may refuse, cancel or suspend a authorisation granted under these rules, if it has reasons to believe that the authorised refurbisher has failed to comply with any of the conditions of authorisation, or with any provisions of the Act or rules made thereunder, after giving an opportunity to the refurbisher to be heard and after recording the reasons thereof;

(v) the Refurbisher shall maintain records of the e-waste purchased and refurbished in Form-2 and shall file annual returns of its activities of previous year in Form-3 to the concerned State Pollution Control Board on or before 30th day of June of every year.

14. Power to suspend or cancel an authorisation.- (1) The State Pollution Control Board may, if in its opinion, the holder of Manufacturer or Dismantler or Recycler or Refurbisher Authorisation has failed to comply with any of the conditions of the authorisation or with any provisions of the Act or these rules and after giving a reasonable opportunity of being heard and after recording reasons thereof in writing

cancel or suspend the authorisation issued under these rules for such period as it considers necessary in the public interest and inform Central Pollution Control Board within ten days of cancellation;

(2) The Central Pollution Control Board, if in its opinion, the holders of the Extended Producer Responsibility- Authorisation has failed to comply with any of the conditions of the authorisation or with any provisions of the Act or these rules and after giving a reasonable opportunity of being heard and after recording reasons thereof in writing cancel or suspend the Extended Producer Responsibility- Authorisation issued under these rules for such period as it considers necessary in the public interest and inform State Pollution Control Boards or Pollution Control Committees within ten days of cancellation;

(3) Upon suspension or cancellation of the authorisation, the Central Pollution Control Board or State Pollution Control Board may give directions to the persons whose authorisation has been suspended or cancelled for the safe storage and management of the e-waste and such persons shall comply with such directions.

CHAPTER IV

15. Procedure for storage of e-waste. - Every manufacturer, producer, bulk consumer, collection centre, dealer, refurbisher, dismantler and recycler may store the e-waste for a period not exceeding one hundred and eighty days and shall maintain a record of collection, sale, transfer and storage of wastes and make these records available for inspection:

Provided that the concerned State Pollution Control Board may extend the said period up to three hundred and sixty five days in case the waste needs to be specifically stored for development of a process for its recycling or reuse.

CHAPTER V

REDUCTION IN THE USE OF HAZARDOUS SUBSTANCES IN THE MANUFACTURE OF ELECTRICAL AND ELECTRONIC EQUIPMENT AND THEIR COMPONENTS OR CONSUMABLES OR PARTS OR SPARES

16. Reduction in the use of hazardous substances in the manufacture of electrical and electronic equipment and their components or consumables or parts or spares. – (1) Every producer of electrical and electronic equipment and their components or consumables or parts or spares listed in Schedule I shall ensure that, new Electrical and Electronic Equipment 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% by weight in homogenous materials for lead, mercury, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers and of 0.01% by weight in homogenous materials for cadmium.

(2) Components or consumables or parts or spares required for the electrical and electronic equipment placed in the market prior to 1st May, 2014 may be exempted from the provisions of sub-rule (1) of rule 16 provided Reduction of Hazardous Substances compliant parts and spares are not available.

(3) The applications listed in Schedule II shall be exempted from provisions of sub-rule (1) of rule 16.

(4) Every producer of applications listed in Schedule II shall ensure that the limits of hazardous substances as given in Schedule II are to be complied.
(5) Every producer shall provide the detailed information on the constituents of the equipment and their components or consumables or parts or spares alongwith a declaration of conformance to the Reduction of Hazardous Substances provisions in the product user documentation.
(6) Imports or placement in the market for new electrical and electronic equipment shall be permitted only for those which are compliant to provisions of sub-rule (1) and sub rule (4) of rule 16.
(7) Manufacture and supply of electrical and electronic equipment used for defence and other similar strategic applications shall be excluded from provisions of sub-rule (1) of rule 16.
(8) Every producer while seeking Extended Producer Responsibility - Authorisation will provide information on the compliance of the provisions of sub-rule (1) of rule 16. This information shall be in terms of self-declaration.
(9) Central Pollution Control Board shall conduct random sampling of electrical and electronic equipment placed on the market to monitor and verify the compliance of Reduction of Hazardous Substances provisions and the cost for sample and testing shall be borne by the Producer. The random sampling shall be as per the guidelines of Central Pollution Control Board.
(10) If the product does not comply with Reduction of Hazardous Substances provisions, the Producers shall take corrective measures to bring the product into compliance and withdraw or recall the product from the market, within a reasonable period as per the guidelines of the Central Pollution Control Board.
(11) Central Pollution Control Board shall publish the methods for sampling and analysis of Hazardous Substances as listed in sub-rule(1) of rule 16 with respect to the items listed in Schedule I and II and also enlist the labs for this purpose.

CHAPTER VI

MISCELLANEOUS

17. **Duties of authorities. -** Subject to other provisions of these rules, the authorities shall perform duties as specified in Schedule IV.

18. **Annual Report.** – (1) The concerned State Pollution Control Board shall prepare and submit to the Central Pollution Control Board an annual report with regard to the implementation of these rules by the 30th day of September every year in Form-5.
(2) The Central Pollution Control Board shall prepare the consolidated annual review report on management of e-waste and forward it to the Central Government along with its recommendations before the 30th day of December every year.

19. **Transportation of e-waste.** –The 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 the details as per Form-6:

Provided that the transportation of waste generated from manufacturing or recycling destined for final disposal to a treatment, storage and disposal facility shall follow the provisions under Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008.

20. Accident reporting.- Where an accident occurs at the facility processing e-waste or during transportation of e-waste, the producer, refurbisher, transporter, dismantler, or recycler, as the case may be, shall report immediately to the concerned State Pollution Control Board about the accident through telephone and e-mail.

21. Liability of manufacturer, producer, importer, transporter, refurbisher, dismantler and recycler.- (1) The manufacturer, producer, importer, transporter, refurbisher, dismantler and recycler shall be liable for all damages caused to the environment or third party due to improper handling and management of the e-waste;

(2) The manufacturer, producer, importer, transporter, refurbisher, dismantler and recycler shall be liable to pay financial penalties as levied for any violation of the provisions under these rules by the State Pollution Control Board with the prior approval of the Central Pollution Control Board.

22. Appeal.- (1) Any person aggrieved by an order of suspension or cancellation or refusal of authorisation or its renewal passed by the Central Pollution Control Board or State Pollution Control Board may, within a period of thirty days from the date on which the order is communicated to him, prefer a appeal in Form 7 to the Appellate Authority comprising of the Environment Secretary of the State.

(2) The Appellate Authority may entertain the appeal after expiry of the said period of thirty days if it is satisfied that the appellant was prevented by sufficient cause from filing the appeal in time.

(3) Every appeal filed under this rule shall be disposed of within a period of sixty days from the date of its filing.

23. The collection, storage, transportation, segregation, refurbishment, dismantling, recycling and disposal of e-waste shall be in accordance with the procedures prescribed in the guidelines published by the Central Pollution Control Board from time to time. Implementation of e-waste (Management and Handling) Amendment Rules, 2011 shall be in accordance with the guidelines prescribed by the Central Pollution Control Board from time to time.

24. Urban Local Bodies (Municipal Committee or Council or Corporation) shall ensure that e-waste pertaining to orphan products is collected and channelised to authorised dismantler or recycler.

SCHEDULE I

[See rules 2, 3(j), 3(y), 3(aa) and 3(ff); 5; 9; 11(10); 13 (1) (i), 13 (1) (vii) and 16(1), 16(11)]

Categories of electrical and electronic equipment including their components, consumables, parts and spares covered under the rules

Sr. No.	Categories of electrical and electronic equipment	Electrical and electronic equipment code
i.	**Information technology and telecommunication equipment :**	
	Centralised data processing: Mainframes, Minicomputers	ITEW1
	Personal Computing: Personal Computers (Central Processing Unit with input and output devices)	ITEW2
	Personal Computing: Laptop Computers(Central Processing Unit with input and output devices)	ITEW3
	Personal Computing: Notebook Computers	ITEW4
	Personal Computing: Notepad Computers	ITEW5
	Printers including cartridges	ITEW6
	Copying equipment	ITEW7
	Electrical and electronic typewriters	ITEW8
	User terminals and systems	ITEW9
	Facsimile	ITEW10
	Telex	ITEW11
	Telephones	ITEW12
	Pay telephones	ITEW13
	Cordless telephones	ITEW14
	Cellular telephones	ITEW15
	Answering systems	ITEW16
ii.	**Consumer electrical and electronics:**	
	Television sets (including sets based on (Liquid Crystal Display and Light Emitting Diode technology)	CEEW1
	Refrigerator	CEEW2
	Washing Machine	CEEW3
	Air-conditioners excluding centralised air conditioning plants	CEEW4
	Fluorescent and other Mercury containing lamps	CEEW5

SCHEDULE II

[See rules 16 (3), 16 (4) and 16 (11)]

Applications, which are exempted from the requirements of sub-rule (1) of rule 16	
	Substance
1	Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):
1(a)	For general lighting purposes <30 W : 2.5 mg
1(b)	For general lighting purposes ≥ 30 W and <50 W : 3.5mg
1(c)	For general lighting purposes ≥ 50 W and <150 W : 5mg
1(d)	For general lighting purposes ≥150 W : 15 mg
1(e)	For general lighting purposes with circular or square structural shape and tube diameter ≤17 mm : 7mg
1(f)	For special purposes:5 mg
2(a)	Mercury in double-capped linear fluorescent lamps for general lighting purposes not exceeding (per lamp):
2(a)(1)	Tri-band phosphor with normal life time and a tube diameter < 9mm (e.g. T2): 4mg
2(a)(2)	Tri-band phosphor with normal life time and a tube diameter ≥ 9 mm and ≤ 17 mm (e.g. T5): 3 mg
2(a)(3)	Tri- band phosphor with normal life time and a tube diameter >17 mm and ≤ 28 mm(e.g. T8): 3.5 mg
2(a)(4)	Tri-band phosphor with normal life time and a tube diameter >28 mm (e.g. T 12):3.5 mg
2(a)(5)	Tri-band phosphor with long life time (≥25000 h):5mg
2(b)	Mercury in other fluorescent lamps not exceeding(per lamp):
2(b)(1)	Linear halophosphate lamps with tube >28 mm (e.g. T 10 and T12):10 mg
2(b)(2)	Non-linear halophosphate lamps(all diameters):15mg
2(b)(3)	Non-linear tri-band phosphor lamps with tube diameter >17 mm(e.g.T9): 15 mg
2(b)(4)	Lamps for other general lighting and special purposes (e.g. induction lamps):15mg
3	Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL)for special purposes not exceeding (per lamp):
3(a)	Short length(≤ 500 mm):3.5mg
3(b)	Medium length(>500 mm and≤1500 mm): 5mg
3(c)	Long length(>1500 mm): 13mg
4(a)	Mercury in other low pressure discharge lamps (per lamp): 15mg
4(b)	Mercury in High Pressure Sodium(vapour) lamps for general lighting purposes not exceeding (per burner)in lamps with improved colour rendering index Ra>60:

4(b)-I	P ≤155 W : 30 mg
4(b)-II	155 W < P ≤405 W : 40 mg
4(b)-III	P >405 W: 40 mg
4(c)	Mercury in other High Pressure Sodium(vapour)lamps for general lighting purposes not exceeding (per burner):
4(c)-I	P≤155 W:25mg
4(c)-II	155 W < P ≤ 405 W:30 mg
4(c)-III	P >405 W:40 mg
4(d)	Mercury in High Pressure Mercury (vapour) lamps (HPMV)
4(e)	Mercury in metal halide lamps (MH)
4(f)	Mercury in other discharge lamps for special purposes not specifically mentioned in this Schedule
5(a)	Lead in glass of cathode ray tubes
5(b)	Lead in glass of fluorescent tubes not exceeding 0.2% by weight
6(a)	Lead as an alloying element in steel for machining purposes and in galvanized steel containing up to 0.35% lead by weight
6(b)	Lead as an alloying element in aluminium containing up to 0.4% lead by weight
6(c)	Copper alloy containing up to 4% lead by weight
7(a)	Lead in high melting temperature type solders (i.e. lead-based alloys containing 85% by weight or more lead)
7(b)	Lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signalling, transmission, and network management for telecommunications
7(c)-I	Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound.
7(c)-II	Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher
7(c)-III	Lead in dielectric ceramic in capacitors for a rated voltage of less than 125 V AC or 250 V DC
8(a)	Cadmium and its compounds in one shot pellet type thermal cut-offs
8(b)	Cadmium and its compounds in electrical contracts
9	Hexavalent chromium as an anticorrosion agent of the carbon steel cooling system in absorption refrigerators up to 0.75% by weight in the cooling solution
9(b)	Lead in bearing shells and bushes for refrigerant-containing compressors for heating, ventilation, air conditioning and refrigeration (HVACR) application.

11(a)	Lead used in C-press compliant pin connector systems
11(b)	Lead used in other than C-press compliant pin connector systems
12	Lead as a coating material for the thermal conduction module C- ring
13(a)	Lead in white glasses used for optical applications
13(b)	Cadmium and lead in filter glasses and glasses used for reflectance standards.
14	Lead in solders consisting of more than two elements for the connection between the pins and the package of microprocessors with a lead content of more than 80% and less than 85% by weight
15	Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit flip chip packages.
16	Lead in linear incandescent lamps with silicate coated tubes
17	Lead halide as radiant agent in high intensity discharge (HID) lamps used for professional reprography applications.
18(a)	Lead as activator in the fluorescent powder (1% lead by weight or less) of discharge lamps when used as specialty lamps for diazoprinting reprography, lithography, insect traps, photochemical and curing processes containing phosphors such as SMS ($(Sr, Ba)_2Mg\ Si_2O_7$:Pb)
18(b)	Lead as activator in the fluorescent powder (1% lead by weight or less) of discharge lamps when used as sun tanning lamps containing phosphors such as BSP ($Ba\ Si_2O_5$:Pb)
19	Lead with PbBiSn-Hg and PbInSn-Hg in specific compositions as main amalgam and with PbSn-Hg as auxiliary amalgam in very compact energy saving lamps (ESL)
20	Lead oxide in glass used for bonding front and rear substrates of flat fluorescent lamps used for Liquid Crystal Displays (LCDs)
21	Lead and cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glasses
23	Lead in finishes of fine pitch components other than connectors with a pitch of 0.65 mm and less
24	Lead in solders for the soldering to machined through hole discoidal and planar array ceramic multilayer capacitors
25	Lead oxide in surface conduction electron emitter displays (SED) used in structural elements, notably in the seal frit and frit ring.
26	Lead oxide in the glass envelope of black light blue lamps
27	Lead alloys as solder for transducers used in high-powered (designated to operate for several hours at acoustic power levels of 125 dB SPL and above) loudspeakers
29	Lead bound in crystal glass

30	Cadmium alloys as electrical/mechanical solder joints to electrical conductors located directly on the voice coil in transducers used in high-powered loudspeakers with sound pressure levels of 100 dB(A) and more
31	Lead in soldering materials in mercury free flat fluorescent lamps (which e.g. are used for liquid crystal displays, design or industrial lighting)
32	Lead oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes
33	Lead in solders for the soldering of thin copper wires of 100 µm diameter and less in power transformers
34	Lead in cermet-based trimmer potentiometer elements
36	Mercury used as a cathode sputtering inhibitor in DC plasma displays with a content up to 30 mg per display
37	Lead in the plating layer of high voltage diodes on the basis of a zinc borate glass body
38	Cadmium and cadmium oxide in thick film pastes used on aluminium bonded beryllium oxide
39	Cadmium in colour converting II-VI LEDs (<10 µg Cd per mm^2 of light-emitting area) for use in solid state illumination or display systems.

SCHEDULE III

[See rules 5 (1) (a) and 13 (1) (ii)]

Targets for Extended Producer Responsibility - Authorisation

No.	Year	E-Waste Collection Target (Number/Weight)
(i)	During first two year of implementation of rules	30% of the quantity of waste generation as indicated in Extended Producer Responsibility Plan.
(ii)	During third and fourth years of implementation of rules	40% of the quantity of waste generation as indicated in Extended Producer Responsibility Plan.
(iii)	During Fifth and Sixth years of implementation of rules	50% of the quantity of waste generation as indicated in Extended Producer Responsibility Plan.
(iv)	Seventh year onward of implementation of rules	70% of the quantity of waste generation as indicated in Extended Producer Responsibility Plan.

SCHEDULE IV

[See rule (17)]

LIST OF AUTHORITIES AND CORREPONDING DUTIES

Sr. No	AUTHORITY	CORRESPONDING DUTIES
1.	Central Pollution Control Board, Delhi	(i) Grant and Renewal of Extended Producer Responsibility - Authorisation and monitoring of its compliance. (ii) Maintain information on Extended Producer Responsibility - Authorisation on its web site. (iii) Set and revise targets for collection of e-waste from time to time. (iv) Coordination with State Pollution Control Boards (v) Preparation of Guidelines for Environmentally Sound Management of e-waste. (vi) Conduct random check for ascertaining compliance of the e-waste rules and identification of such importers or producers who have not applied for Extended Producer Responsibility authorisation or are not complying with RoHS provision. Wherever necessary, Central Pollution Control Board will seek the help of customs department or any other agency of the Government of India. (vii) Conduct random inspection of dismantler or recycler or refurbisher. (viii) Documentation, compilation of data on e-waste and uploading on websites of Central Pollution Control Board (ix) Actions against violation of these rules. (x) Conducting training programmes. (xi) Submit Annual Report to the Ministry. (xii) Enforcement of provisions regarding reduction in use of hazardous substances in manufacture of electrical and electronic equipment. (xiii) Interaction with IT industry for reducing hazardous substances. (xiv) Set and revise targets for compliance to the reduction in use of hazardous substance in manufacture of electrical and electronic equipment from time to time. (xv) Any other function delegated by the Ministry under these rules from time to time.
2.	State Pollution Control Boards or Committees of Union territories	(i) Inventorisation of e-waste. (ii) Grant and renewal of authorisation to manufacturers, dismantlers, recyclers and refurbishers. (iii) Monitoring and compliance of Extended Producer Responsibility - Authorisation as directed by Central Pollution Control Board and that of dismantlers, recyclers and refurbishers authorisation. (iv) Conduct random inspection of dismantler or recycler or refurbisher. (v) Maintain online information regarding authorisation granted to manufacturers, dismantlers, recyclers and refurbishers.

Sr. No	AUTHORITY	CORRESPONDING DUTIES
		(vi) Implementation of programmes to encourage environmentally sound recycling. (vii) Action against violations of these rules. (viii) Any other function delegated by the Ministry under these rules.
3.	Urban Local Bodies (Municipal Committee or Council or Corporation)	(i) To ensure that e-waste if found to be mixed with Municipal Solid Waste is properly segregated, collected and is channelised to authorised dismantler or recycler. (ii) To ensure that e-waste pertaining to orphan products is collected and channelised to authorised dismantler or recycler.
4.	Port authority under Indian Ports Act, 1908 (15 of 1908) and Customs Authority under the Customs Act, 1962 (52 of 1962)	(i) Verify the Extended Producer Responsibility - Authorisation. (ii) Inform Central Pollution Control Board of any illegal traffic for necessary action. (iii) Take action against importer for violations under the Indian Ports Act, 1908/Customs Act, 1962.

FORM-1

[See Rules 5(1) (g), 13(1) (i), 13(1) (vi)]

Applicable to producers seeking Extended Producer Responsibility - Authorisation

The application form should contain the following information:

1.	Name and full address along with telephone numbers, e-mail and other contact details of Producer (It should be the place from where sale in entire country is being managed)	:	
2.	Name of the Authorised Person and full address with e-mail, telephone and fax number	:	
3.	Name, address and contact details of Producer Responsibility Organisation, if any with full address, e-mail, telephone and fax number, if engaged for implementing the Extended Producer Responsibility	:	
4.	Details of electrical and electronic equipment placed on market year-wise during previous 10 years in the form of Table 1 as given below:	:	

Table 1: Details of Electrical and Electronic Equipment placed on the market in previous years - Code wise

Sr. No.	Electrical and Electronic Equipment Item	Electrical and Electronic Equipment Code	Quantity, number and weight placed on market (year-wise)									
A	**Information technology and telecommunication equipment:**											
1	Centralised data processing: Mainframes, Minicomputers	ITEW1										
2	Personal Computing: Personal Computers (Central Processing Unit with input and output devices)	ITEW2										
3	Personal Computing: Laptop Computers(Central Processing Unit with input and	ITEW3										

	output devices)											
4	Personal Computing: Notebook Computers	ITEW4										
5	Personal Computing: Notepad Computers	ITEW5										
6	Printers including cartridges	ITEW6										
7	Copying equipment	ITEW7										
8	Electrical and electronic typewriters	ITEW8										
9	User terminals and systems	ITEW9										
10	Facsimile	ITEW10										
11	Telex	ITEW11										
12	Telephones	ITEW12										
13	Pay telephones	ITEW13										
14	Cordless telephones	ITEW14										
15	Cellular telephones	ITEW15										
16	Answering systems	ITEW16										
B	**Consumer electrical and electronics:**											
17	Television sets (including sets based on (Liquid Crystal Display and Light Emitting Diode technology)	CEEW1										
18	Refrigerator	CEEW2										
19	Washing Machine	CEEW3										
20	Air-conditioners excluding centralised air conditioning plants	CEEW4										
21	Fluorescent and other Mercury containing lamps	CEEW5										

5. Estimated generation of Electrical and Electronic Equipment waste item-wise and estimated collection target for the forthcoming year in the form of Table 2 including those being generated from their service centres, as given below:

Table 2: Estimated generation of Electrical and Electronic Equipment waste item-wise and estimated collection target for the forthcoming year

Sr. No.	Item	Estimated waste electrical and electronic equipment generation Number and weight	Targeted collection Number and weight

6. Extended Producer Responsibility Plans:

(a) Please provide details of your overall scheme to fulfil Extended Producer Responsibility obligations including targets. This should comprise of general scheme of collection of used/waste Electrical and Electronic Equipment from the Electrical and Electronic Equipment placed on the market earlier such as through dealers and collection centres, Producer Responsibility Organisation, through buy-back arrangement, exchange scheme, Deposit Refund Scheme, etc. whether directly or through any authorised agency and channelising the items so collected to authorised recyclers.

(b) Provide the list with addresses along with agreement copies with dealers, collection centres, recyclers, Treatment, Storage and Disposal Facility, etc. under your scheme.

7. Estimated budget for Extended Producer Responsibility and allied initiatives to create consumer awareness.

8. Details of proposed awareness programmes.

9. Details for Reduction of Hazardous Substances compliance (to be filled if applicable):

(a) Whether the Electrical and Electronic Equipment placed on market complies with the rule 16 (1) limits with respect to lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and polybrominateddiphenyl ethers;

(b)Provide the technical documents (Supplier declarations, Materials declarations/Analytical reports) as evidence that the Reduction of Hazardous Substances (RoHS) provisions are complied by the product based on standard EN 50581 of EU;

(c) Documents required:

i. Extended Producer Responsibility plan;
ii. Copy of the permission from the relevant Ministry/Department for selling their product;

iii. Copies of agreement with dealers, collection centre, recyclers, Treatment, Storage and Disposal Facility, etc.;
iv. Copy of Directorate General of Foreign Trade license/permission as applicable;
v. Self-declaration regarding Reduction of Hazardous Substances provision;
vi. Any other document as required.

(Authorised signature)

Place: _____

Date: _____

FORM 1(a)

[See rules 4(2), 8 (2), 13(2) (ii), 13(2) (vi) and 13(4) (i)]

APPLICATION FOR OBTAINING AUTHORISATION FOR GENERATION OR STORAGE OR TREATMENT OR DISPOSAL OF E-WASTE BY MANUFACTURER OR REFURBISHER*

From: .....
.....

To

The Member Secretary,
..... Pollution Control Board or..... Pollution Control Committee
.....
.....

Sir,

I / We hereby apply for authorisation/renewal of authorisation under rule 13(2) (i) to 13(2) (viii) and/or 13 (4) (i) of the E-Waste (Management) Rules, 2016 for collection/storage/ transportation/ treatment/ refurbishing/disposal of e-wastes.

For Office Use Only

Code No. :
Whether the unit is situated in a critically polluted area as identified by Ministry of Environment and Forests (yes/no);

To be filled in by Applicant

1. Name and full address:
2. Contact Person with designation and contact details such as telephone Nos, Fax. No. and E-mail:
3. Authorisation required for (Please tick mark appropriate activity/ies*)
   - (i) Generation during manufacturing or refurbishing* ☐
   - (ii) Treatment, if any ☐
   - (iii) Collection, Transportation, Storage ☐
   - (iv) Refurbishing ☐

4. E-waste details:
   - (a) Total quantity e-waste generated in MT/A
   - (b) Quantity refurbished (applicable to refurbisher)
   - (c) Quantity sent for recycling
   - (d) Quantity sent for disposal

5. Details of Facilities for storage/handling/treatment/refurbishing:

6. In case of renewal of authorisation previous authorisation no. and date and details of annual returns:

Place : _____ Signature _____

(Name_____)

Date : _____

Designation: _____

FORM 1 (aa)
[See rules 5 (6) and 13(1)(ii)]

FORMAT OF EXTENDED PRODUCER RESPONSIBILITY - AUTHORISATION

[Extended Producer Responsibility Authorisation for Producer of the Electrical & Electronic Equipment]

Ref: Your application for Grant of Extended Producer Responsibility - Authorisation for following Electrical & Electronic Equipment under E-Waste (Management) Rules, 2016

1. Number of Authorisation:

   Date:

2. **M/s. ----------** is hereby granted Extended Producer Responsibility - Authorisation based on:
   (a) overall Extended Producer Responsibility plan
   (b) proposed target for collection of e-waste

3. The Authorisation shall be valid for a period of ___ years from date of issue with following conditions:

   (i) you shall strictly follow the approved Extended Producer Responsibility plan, a copy of which is enclosed herewith;

   (ii) you shall ensure that collection mechanism or centre are set up or designated as per the details given in the Extended Producer Responsibility plan. Information on collection mechanism/centre including the state-wise setup should be provided;

   (iii) you shall ensure that all the collected e-waste is channelised to authorised dismantler or recycler designated as per the details. Information on authorised dismantler or recycler designated state-wise should be provided;

   (iv) you shall maintain records, in Form-2 of these Rules, of e-waste and make such records available for scrutiny by Central Pollution Control Board;

   (v) you shall file annual returns in Form-3 to the Central Pollution Control Board on or before 30th day of June following the financial year to which that returns relates;

   (vi) General Terms & Conditions of the Authorisation:

   a. The authorisation shall comply with provisions of the Environment (Protection) Act, 1986 and the Rules made there under;

   b. The authorisation or its renewal shall be produced for inspection at the request of an officer authorised by the Central Pollution Control Board;

   c. Any change in the approved Extended Producer Responsibility plan should be informed to Central Pollution Control Board on which decision

shall be communicated by Central Pollution Control Board within sixty days;

d. It is the duty of the authorised person to take prior permission of the concerned State Pollution Control Boards and Central Pollution Control Board to close down the facility;

e. An application for the renewal of authorisation shall be made as laid down in sub-rule (vi) of rule of 13(1) the E-Waste (Management) Rules, 2016;

f. The Board reserves right to cancel/amend/revoke the authorisation at any time as per the Policy of the Board or Government.

Authorized signatory
(with designation)

To,
Concerned Producer
Copy to:
1. Member Secretary, Concerned State.
2. In-charge, concerned Zonal Office, Central Pollution Control Board.

FORM 1(bb)

[See rules 4(2), 8(2)(a), 13(2) (iii) and 13(4)(ii)]

FORMAT FOR GRANTING AUTHORISATION FOR GENERATION OR STORAGE OR TREATMENT OR REFURBISHING OR DISPOSAL OF E-WASTE BY MANUFACTURER OR REFURBISHER

Ref: Your application for Grant of Authorisation

1. (a) Authorisation no. ..... and (b) date of issue .....

2. .....of.....is hereby granted an authorisation for generation, storage, treatment, disposal of e-waste on the premises situated at..... for the following:
   a. quantity of e-waste;
   b. nature of e-waste.

3. The authorisation shall be valid for a period from ..... to .....

4. The e-waste mentioned above shall be treated/ disposed off in a manner ..... at .....

5. The authorisation is subject to the conditions stated below and such conditions as may be specified in the rules for the time being in force under the Environment (Protection) Act, 1986.

Signature ----------
Designation ---------- Date: ----------

Terms and conditions of authorisation

1. The authorisation shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made thereunder.
2. The authorisation or its renewal shall be produced for inspection at the request of an officer authorized by the concerned State Pollution Control Board.
3. Any unauthorised change in personnel, equipment as working conditions as mentioned in the application by the person authorized shall constitute a breach of his authorisation.
4. It is the duty of the authorised person to take prior permission of the concerned State Pollution Control Board to close down the operations.
5. An application for the renewal of an authorisation shall be made as laid down in sub-rule (vi) of rule 13(2).

FORM-2

[See rules 4(4), 5(4), 6(5), 8(7), 9(2), 10(7), 11(8), 13 (1) (xi), 13(2)(v), 13(3)(vii) ar 13 (4)(v)]

FORM FOR MAINTAINING RECORDS OF E-WASTE HANDLED OR GENERATE

Generated Quantity in Metric Tonnes (MT) per year

1.	Name & Address: Producer or Manufacturer or Refurbisher or Dismantler or Recycler or Bulk Consumer*		
2.	Date of Issue of Extended Producer Responsibility Authorisation*/ Authorisation*		
3.	Validity of Extended Producer Responsibility Authorisation*/ Authorisation*		
4.	Types & Quantity of e-waste handled or generated**	Category	Quantity
		Item Description	
5.	Types & Quantity of e-waste stored	Category	Quantity
		Item Description	
6.	Types & Quantity of e-waste sent to collection centre authorised by producer/ dismantler/recycler / refurbisher or authorised dismantler/recycler or refurbisher**	Category	Quantity
		Item Description	
7.	Types & Quantity of e-waste transported*	Category	Quantity
		Quantity	
	Name, address and contact details of the destination		
8.	Types & Quantity of e-waste refurbished*	Category	Quantity
		Item Description	
	Name, address and contact details of the destination of refurbished materials		
9.	Types & Quantity of e-waste dismantled*	Category	Quantity
		Item Description	
	Name, address and contact details of the destination		

10.	Types & Quantity of e-waste recycled*	Category	Quantity
	Types & Quantity of materials recovered	Item Description	
		Quantity	
	Name, address and contact details of the destination		
11.	Types & Quantity of e-waste sent to recyclers by dismantlers	Category	Quantity
		Item Description	
	Name, address and contact details of the destination		
12.	Types & Quantity of other waste sent to respective recyclers by dismantlers/recyclers of e-waste	Category	Quantity
		Item Description	
	Name, address and contact details of the destination		
13.	Types & Quantity of e-waste treated & disposed	Category	Quantity
		Item Description	
	Name, address and contact details of the destination		

Note:-

(1) * Strike off whichever is not applicable

(2) Provide any other information as stipulated in the conditions to the authoriser

(3) ** For producers this information has to be provided state-wise

FORM-3

[See rules 4(5), 5(5), 8(6), 9(4), 10(8), 11(9), 13 (1) (xi), 13(2)(v), 13(3)(vii) and 13(4)(v)]

FORM FOR FILING ANNUAL RETURNS

[To be submitted by producer or manufacturer or refurbisher or dismantler or recycler by 30th day of June following the financial year to which that return relates].

Quantity in Metric Tonnes (MT) and numbers

1	Name and address of the producer or manufacturer or refurbisher or dismantler or recycler			
2	Name of the authorised person and complete address with telephone and fax numbers and e-mail address			
3	Total quantity of e-waste collected or channelised to recyclers or dismantlers for processing during the year for each category of electrical and electronic equipment listed in the Schedule I (Attach list) by PRODUCERS			
	Details of the above	TYPE	QUANTITY	No.
3(A)*	BULK CONSUMERS: Quantity of e-waste			
3(B)*	REFURBISHERS: Quantity of e-waste:			
3(C)*	DISMANTLERS: i Quantity of e-waste processed (Code wise); ii. Details of materials or components recovered and sold; iii. Quantity of e-waste sent to recycler; iv. Residual quantity of e-waste sent to Treatment, Storage and Disposal Facility.			
3(D)*	RECYCLERS: i. Quantity of e-waste processed (Code wise); ii. Details of materials recovered and sold in the market; iii. Details of residue sent to Treatment, Storage and Disposal Facility.			
4	Name and full address of the destination with respect to 3(A)-3(D) above			
5	Type and quantity of materials segregated or recovered from e-waste of different codes as applicable to 3(A)-3(D)	Type	Quantity	

✔Enclose the list of recyclers to whom e-waste have been sent for recycling.

Place_____

Date_____ **Signature of the authorised person**

Note:-

(1) * Strike off whichever is not applicable
(2) Provide any other information as stipulated in the conditions to the authoriser
(3) In case filing on behalf of multiple regional offices, Bulk Consumers and Producers need to add extra rows to 1 & 3(A) with respect to each office.

FORM-4

[See rules 13(3)(i) and 13(3)(vi)]

APPLICATION FORM FOR AUTHORISATION OF FACILITIES POSSESSING ENVIRONMENTALLY SOUND MANAGEMENT PRACTICE FOR DISMANTLING OR RECYCLING OF E-WASTE

(To be submitted in triplicate)

1.	Name and Address of the unit			
2.	Contact person with designation, Tel./Fax			
3.	Date of Commissioning			
4.	No.of workers (including contract labour)			
5.	Consents Validity	a. Water (Prevention and Control of Pollution) Act, 1974; Valid up to _____ b. Air (Prevention and Control of Pollution) Act, 1981; Valid up to_____		
6.	Validity of current authorisation if any	e-waste (Management & Handling) Rules, 2011; Valid up to _____		
7.	Dismantling or Recycling Process	Please attach complete details		
8.	Installed capacity in MT/year	Products	Installed capacity (MTA)	
9.	E-waste processed during last three years	Year	Product	Quantity
10.	Waste Management:			
	a. Waste generation in processing e-waste	Please provide details material wise		
	b. Provide details of disposal of residue.	Please provide details		
	c. Name of Treatment Storage and Disposal Facility utilized for			
11.	Details of e-waste proposed to be procured from re-processing	Please provide details		
12.	Occupational safety and health aspects	Please provide details		
13.	Details of Facilities for dismantling both manual as well as mechanised:			

14.	Copy of agreement with Collection Centre	
15.	Copy agreement with Producer	
16.	Details of storage for dismantled e-waste	
17.	Copy of agreement with Recycler	
18.	Details of Facilities for Recycling	
19.	Copy of agreement with Collection Centre	
20.	Copy agreement with Producer	
21.	Details of storage for raw materials and recovered materials	

II. In case of renewal of **authorisation, previous registration or authorisation no. and date**

I hereby declare that the above statements or information are true and correct to the best of my knowledge and belief.

Signature

Place:_____ Name:_____

Date:_____ Designation:_____

Form-5

[See rule 18 (1)]

FORM FOR ANNUAL REPORT TO BE SUBMITTED BY THE STATE POLLUTION CONTROL BOARD TO THE CENTRAL POLLUTION CONTROL BOARD

To,

The Chairman,
Central Pollution Control Board,
(Ministry of Environment And Forests)
Government Of India, 'Parivesh Bhawan', East Arjun Nagar,
Delhi- 110 0032

1.	Number of authorised manufacturer, refurbisher, collection centre, dismantler and recycler for management of e-waste in the State or Union territory under these rules	:	
2.	Categories of waste collected along with their quantities on a monthly average basis:	:	Please attach as Annexure-I
3.	A Summary Statement code-wise of e-waste collected	:	Please attach as Annexure-II
4.	Details of material recovered from recycling of e-waste	:	
5.	Quantity of CFL received at Treatment, Storage and Disposal Facility	:	
6.	The above report is for the period from ……to		

Place: _____

Date: _____

Chairman or the Member Secretary
State Pollution Control Board

Form-6

[See rule 19]

E-WASTE MANIFEST

1.	Sender's name and mailing address (including Phone No.) :	
2.	Sender's authorisation No, if applicable. :	
3.	Manifest Document No. :	
4.	Transporter's name and address : (including Phone No.)	
5.	Type of vehicle :	(Truck or Tanker or Special Vehicle)
6.	Transporter/s registration No. :	
7.	Vehicle registration No. :	
8.	Receiver's name & address :	
9.	Receiver's authorisation No, if applicable. :	
10.	Description of E-Waste (Item, Weight/ Numbers) :	
11.	Name and stamp of Sender* (Manufacturer or Producer or Bulk Consumer or Collection Centre or Refurbisher or Dismantler): Signature: Month Day Year	
12.	Transporter acknowledgement of receipt of E-Wastes	
	Name and stamp: Signature: Month Day Year	
13.	Receiver* (Collection Centre or Refurbisher or Dismantler or Recycler) certification of receipt of E-waste	
	Name and stamp: Signature: Month Day Year	

* As applicable

Note:-

Copy number with colour code (1)	Purpose (2)
Copy 1 (Yellow)	To be retained by the sender after taking signature on it from the transporter and other three copies will be carried by transporter.
Copy 2 (Pink)	To be retained by the receiver after signature of the transporter.
Copy 3 (Orange)	To be retained by the transporter after taking signature of the receiver.
Copy 4 (Green)	To be returned by the receiver with his/her signature to the sender

FORM 7
[See rule 22]

APPLICATION FOR FILING APPEAL AGAINST THE ORDER PASSED BY CENTRAL POLLUTION CONTROL BOARD/STATE POLLUTION CONTROL BOARD

1.	Name and address of the person making the appeal	:
2.	Number, date of order and address of the authority to which passed the order, against which appeal is	: (certified copy of the order be attached)
3.	Ground on which the appeal is being made	:
4.	Relief sought for	:
5.	List of enclosures other than the order referred in point 2 against which the appeal is being filed.	:

Signature.....

Name and address.....

Place:

Date:

Bishwanath Sinha
Joint Secretary to Government of India
(F No. 12-6/2013-HSMD)

****

Annexure- 2

Development an Action Plan

Exercise:
Developing an Action Plan

Task:

- Spilt up in groups of five
- Discuss with your group members the current situation regarding the implementation of the implementation of the e-waste (Management & Handling) Rules
- In the next step you will develop an Action Plan for the effective implementation of the e-waste (Management & Handling) Rules by the SPCB
- Fill in the Action Plan Template below
- Write the main parts of the Action Plan on maximum two large sheets of paper
- Present your Action Plan to the group

Details:

- You would state in which fields of e-waste management you want to/ have to take action
- For each of these fields, formulate targets you want to/have to achieve
- For each target, specify indicators which you can use to measure whether the target has been achieved
- For each target, provide one/several measure (s) on how to achieve it
- For each measure, specify who will be responsible within the SPCB for implementation and which other stakeholders need to be involved
- Also specify for each measure , which resources will be required
- Finally, think about a timeline for implementing the action plan. Prioritize the measures, think about dependencies between them and be realistic

Materials:

- Two large sheets of paper per group
- Different coloured markers for each group
- Different coloured note cards for each group

Action Field	Target	Indicator	Measure	Responsibility/Stakeholder	Resources	Deadline

रा.इ.सू.प्रौ.सं
NIELIT

MAIT