Digital India
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Ministry of Electronics
and Information Technology
Government of India

E-Waste Awareness for School Students

Manual for Training of Trainers

(2018)

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The Project entitled “Awareness Programme on Environmental Hazards of Electronic Waste through Digital India Initiative” is funded by Ministry of Electronics and Information Technology (MeitY)/Government of India.

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Contents

1. About the Project

The Ministry of Electronics and Information Technology (MeitY) has initiated the project “Awareness Programme on Environmental Hazards of Electronic waste” on March 31, 2015. This project is 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 has three components viz., Content Development, Inventory Assessment and Awareness Generation amongst different stakeholders. The project will help in effective implementation of E-waste (Management) Rules, 2016.
The primary focus of the project is to create awareness among different stakeholders in order to reduce the adverse impact on environment and health due to improper disposal of e-waste. MeitY has played a key role in dissemination of knowledge on e-waste rules in the past and wishes to engage all key stakeholders during this exercise. During the project duration of 5 years, a city in each of the 10 identified states viz. Madhya Pradesh, Uttar Pradesh, Jharkhand, Orissa, Goa, Bihar, Pondicherry, West Bengal, Assam and Manipur hasbe coveredin phase I. in phase II, the same has been enhanced to covered more than 30 cities across 30 states and union territories in India. The activities include organising awareness workshops for RWAs/Localities, Schools, Colleges, Bulk Consumers (including corporate & Govt. sectors), Informal Sector, Dealers, Refurbishers, Manufacturers, etc. so as to build capacities of the target groups to channelize e-waste in a manner that the rules are effectively implemented. Suitable course curriculum has also be framed for schools/colleges. Effort would be made to prepare the content in local language.

This project has also stressed on adopting best practices for e-waste recycling available globally, so that the unorganised sector can generate jobs as well as viable business prospects thereby mitigating the impact of improper recycling on the environment. Recycling of e-waste will help in creating jobs and recovery of valuable components and materials through dismantling. The valuable metals recycled from old electronic items can also be used in manufacturing of new products. As a result, this will save energy, reduce pollution, mitigate greenhouse gas emissions, and reduce extraction of finite natural resources through mining. The project will also emphasize on the responsibilities of the producers and convey the message that they must inculcate the principle of Extended Producer Responsibility (EPR) and follow the mechanism for channelization of e-waste from ‘end of life’ products to registered dismantlers or recyclers.

The tools and dissemination material for creating awareness are developed by MAIT to create awareness among various stakeholders in the value chain. The awareness workshops will help to present the current situation on e-waste disposal and practices thereby creating awareness on the issue; its recycling as well as the legal provisions and the responsibilities of the stakeholders.

The program has been able to enhance its reach to cities across each state during the course of 5 years of its implementation. This will help to inculcate better disposal practices amongst all stakeholders thereby reducing the environmental impacts of improper handling and recycling of e-waste.

2. Framework of the Manual

The objectives of the manual are the following:

To actas a tool for enhancing the understanding of the trainers who would be involved in conducting the training for students 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 students.

To serve as a compilation of information on the following issues related to the subject of e-waste:
• What is e-waste?
• What are the categories of e-waste?
• What is the generation of E-waste globally and in India?
• What are hazardous substances?
• What are the hazardous substances in E-waste?
• What are health impacts of unscientific processing of E-waste?
• What are the methods used at present by the informal sector for treating E-waste?
• What is the National Environment Policy of India?
• The E-waste (Management) Rules, 2016 and the challenges of implementing the Rules.
• Defining sustainable consumption and Lifestyles of Health and Sustainability (LOHAS)
• Guidelines for setting up of collection centres of e-waste.
• What is carbon footprint?
• How to measure carbon footprint?
• What are the strategies to reduce carbon footprint?

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

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 students. 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 students.

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

The training provided will increase knowledge amongst students about the generation of e-waste, hazardous substances in e-waste, present status of generation and disposal in India, regulation on management and handling of e-waste in India, role of students as consumers and efforts like setting up of e-waste collection centres that can be undertaken by them. In addition they will be introduced to concepts of secondary resources, sustainable consumption, LOHAS and carbon footprint.

The manual uses different methods to achieve the change objective including the Donna E. Walker's 'Learning Cycle' that has five steps including Mind Jog, Personal Connection, Information Exchange, Information Application and Real World Connection. This method takes into account that different learners have different learning abilities and at least one of the steps of the cycle would be able to transfer the learning effectively.

In addition it uses Harvard case method that involves presenting a case to students where they associate themselves with a role as they read through the situation and identify the problem. The next step is to perform the necessary analysis to determine the cause and possible solutions to the problem. The manual provides essential information and situations that form cases that can be discussed with the students by the trainer.

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 the Harvard case study which tries to rake the issue with the specific stakeholders as the key protagonist. This is done to help identify the present scenario with respect to the problem of e-waste and how it impacts the protagonist's daily life and future. The case study can be enacted in schools to ensure that students are able to learn through this experience and enable them to question on the subject to enhance understanding. Enhancement of understanding will lead to imbibing the learning into practice.

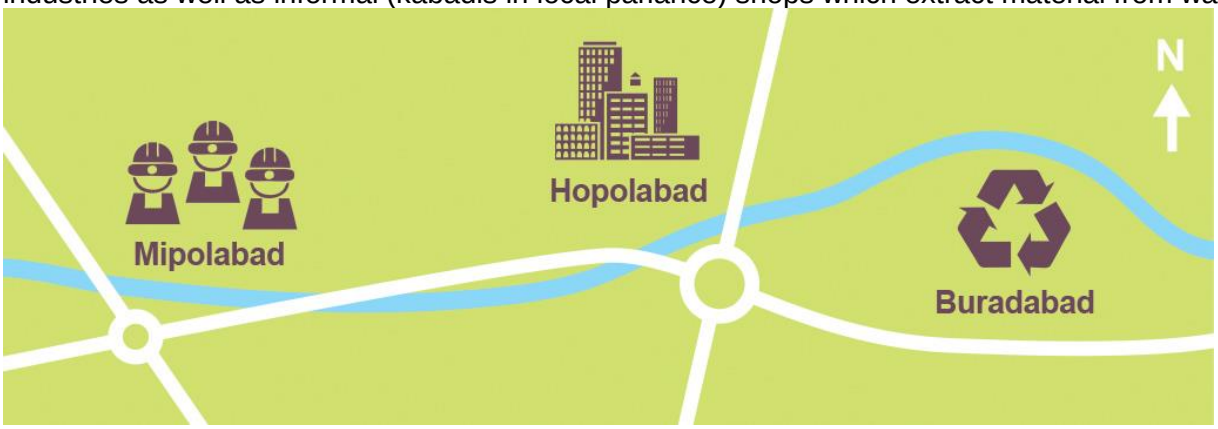
Component 2 is on the learning cycle which has been adopted from the finest techniques available for experiential learning today. The sessions help to unpack the subject at hand and enable to gain a better understanding of solutions in order to solve the problem. It also ensures that engagement is built with participants so that the training sessions are not just monologues from the trainer to the participants but allows the space for dialogue in order to enhance understanding of the subject of e-waste.

Component 3 includes references which have been extensively researched from material available through secondary sources. This includes work which has been done in India as well as around the world and has been published in renowned journals and publications. The links to the material have also been provided so that interested readers can enhance their understanding of the subject of e-waste.

In order to use the manual, the trainer has to go through the case study in order to relate to the problem and read in detail about the different issues that are discussed. For each session as elaborated, the trainers will discuss the subject at length in the time provided in order to ensure that their understanding is enhanced and they can pass the message to the relevant stakeholders during training workshops and activities that they are a part of during the course of the project.

3.Screenplay for a conversation between 2 school students and their respective parents (fathers):

This fictitious conversation is based in the city of Hopolabad. The city of Hopolabad is a business hub and has thriving businesses in the manufacturing and service sectors. Hopolabad shares it borders with Buradabad in the east and Mipolabad on the west. Buradabad is a recycling hub and is dotted with formal recycling industries as well as informal (kabadis in local parlance) shops that extract material from waste. The city is surrounded on the northern and southern sides by agricultural farmland. Hopolabad has a domestic product of INR 72,000 crores annually and has a PPP of INR 7,20,000 (high income population). It has a population of 10lakh people (big metropolis). The city is dotted with apartment complexes, malls and office buildings in the eastern and central areas. The western part of the city is a manufacturing hub for electronic items and vehicles. Buradabad, which is located to the east of Hopolabad, is a recycling hub and is dotted with formal recycling industries as well as informal (kabadis in local parlance) shops which extract material from waste.



The Blue river flows from Buradabad through the city of Hopolabad and then into Mipolabad. Over the last 15 years, the river flow has almost stagnated which has caused floods in these 3 cities in the rainy season.

Introducing the actors:

Dilip: A student of the 9th standard, he has particular interests in gaming and IT applications. He is also interested in acquiring remote operated electronic gadgets. His father has recently bought him a new TV. Dilip is also interested in sports and is a member of the school football team.
Shahid: A classmate of Dilip, Shahid is also interested in gaming. He is also a member of the green club in his school and has gone on day long visits to Mipolabad and Buradabad with the school.
Damodar: He is Dilip's father and is the executive engineer at a mining conglomerate, Prepanta, in Mipolabad. His company is now planning to establish an e-waste recycling facility in Buradabad and he has been tasked to set up the factory.
Iqbal: He is Shahid's father and is the executive engineer at a mining conglomerate, Prepanta, in Mipolabad. His company is now planning to establish an e-waste recycling facility in Buradabad and he has been tasked to set up the factory.

About the conversation:

This conversation has 3 parts to it. Part 1 is the conversation between the parents of 2 students of Hopolabad Community school. These students are the best of friends and keep visiting each others' households. Their fathers interact quite often since both are engineers and alumni from the Hopolabad Community Engineering

college in Hopolabad. Iqbal went on to complete his management degree from HopolabadManagement school while Damodar went on to work in a mining company in the nearby town of Mipolabad.

The second part of the conversation is between Iqbal and Shahid while they are returning home after the visit to Dilip's home. This conversation revolves around what Iqbal has learnt about sustainable consumption from Damodar and how he tries to explain the same to Shahid with the perspective of a TV purchase.

The third part of the conversation takes place in the school next day when Shahid and Dilip interact with each other over purchase of the new TV. The conversation is about sustainable lifestyles and how both friends would like to start a collection center in school for e-waste so that it can be recycled properly.

ACT I

Shahid accompanied by his father Iqbal visit his friend Dilip's house in the neighborhood. While discussing how the day had gone by, Damodar and Iqbal, discuss the intense use of resources and effects of mining. Damodar informs Iqbal how their company is slowly moving towards recycling so that they can extract materials from used products rather than using virgin metals which have to mined and extracted from minerals. The conversation last 10 minutes and the scene ends when Shahid and Iqbal prepare to leave for home.

It is 8 pm and the bell rings. Shahid, accompanied by his father Iqbal walk in and are greeted by Dilip.

Dilip: *Good evening, Uncle! How are you doing?*
Iqbal: *I am fine,…how are you doing? Is Daddy back from work?*
Dilip: *Yes Uncle, he's back. I will tell him you are here. Shahid, let's go to my room, while Uncle and Daddy chat.*
Shahid: *Yeah sure. I would anyways like to see your new TV.*

Dilip and Shahid walk out and as they are doing so, Damodar walks into the room.

Damodar: *Hi Iqbal! How are you doing? Long day at work?*
Iqbal: *Yeah, sort of. How about you?*
Damodar: *Its fine, apart from the environment permissions that we are waiting for to start production at a new mine. If we get these clearances soon, then it will be 'Sone pe Suhaaga' moment for us.*
Iqbal*: Is this new mine being commissioned in Mipolabad?*
Damodar: *Yes, it is.*
Iqbal*: Good to know that your company is growing. What kind of ore will you extractfrom this mine?*
Damodar: *Iron ore primarily. There are also some mica deposits which have been discovered in the geological survey. Apparently there are huge deposits and once the mine starts operating at full capacity, we should see double digit growth of the company for the next 10 years.*
Iqbal: *Ah! Business is booming which means. Calls for a celebration in that case.*
Damodar*: Yeah we will, but I am just keeping my fingers crossed on the environment clearances as I mentioned.*
Iqbal: *Procedural hassles huh. But tell me, where does all this ore get used up?*
Damodar: Oh, there is a huge demand for minerals in our country. Any item which is manufactured needs raw materials.
Iqbal*: So that would mean that the more products we demand, we are contributing to the growth of your company (chuckles)*
Damodar*: Yes, of course. But on the other hand you are also consuming more resources.*
Iqbal*: What would that mean and how does it matter?*
Damodar: *You see all the resources that we mine are ultimately finite. These will end some day. What will we do then? We might not finish everything in our lifetime but then how much we will leave for our children should matter to us as well. Don't you think so?*

Iqbal: *Yes I agree. Hadn't thought of it in that manner. But then again whatever we buy is basis our needs. So should we stop buying things completely?*
Damodar: *Of course not. We would then go out of business (chuckles). But on a serious note, a lot of the things that we buy are lifestyle purchases.*
Iqbal*: What do you mean by lifestyle purchases?*
Damodar*: I will give you an example. You see all these flat screen TV's these days. Just 10 years ago, we used to watch TV on a CRT monitor. But slowly as the flat screen LCD, LED and Plasma screen TVs came around we switched to them.*
Iqbal: *Yes we did. But then the picture quality of these TVs is far better than the CRT TVs. Isn't it?*
Damodar: *Agreed. You see what I am trying to say is that if the CRT would have gone bust and then one would purchase a new one, then it would be termed as a need. But just replacing a working TV with something which offers better technology is something which I would refer to as a lifestyle purchase.*

Iqbal*: Ok I get your point. But one gets value for an old TV as well and that is watched by someone who purchases it second hand. Isn't it?*
Damodar: *Agreed. But you see every product has a lifecycle, especially electronic products. Some electronic products have a higher life cycle, like a TV, refrigerator or airconditioner, while some have a smaller one like mobile phones, laptops and computers. But it is important to bear in mind that all of these are made up of resources which are finite. Hence we must always try and use these products responsibly.*
Iqbal*: This is very interesting Damodar. I never thought about such things in this way. But how did you come across this information.*
Damodar*: You see my company realised that there is amazing potential in sourcing metals from products which have reached their end of use. We planned about a year ago on setting up a recycling factory which will try and recover as much material as possible from electronic products which have been discarded by their respective owners and extract metals from them.*
Iqbal*: So when and where is this factory coming up?*
Damodar: *You see in our neighbourhood, Buradabad has huge potential for recycling. We planned to set the factory there. It should come up by the end of this year.*
Iqbal*: What are the kinds of metals that you can recover from electronics? All I can think of are plastics and some aluminium and steel.*
Damodar:*You will be amazed to know that a computer contains precious metals like gold and silver. There are also some rare metals in electronic items which are scarce and hence command a really high price like platinum and molybdenum.*
Iqbal:*I am amazed to know that. This has been a really informative conversation Damodar. I think its time we head home. Can you call for Shahid please?*

Damodar calls for Dilip and Shahid and they walk into the room.

Iqbal:*Come Shahid, lets leave. Its time to go home and have dinner.*
Damodar:*Thank you for dropping in and we shall catch up again soon.*
Dilip: *Bye Shahid! Bye uncle! We shall catch up in school tomorrow.*

(ACT I completed)

ACT II

The next conversation takes place in the car between Iqbal and Shahid. Shahid has seen the new TV that has been purchased by Dilip and is very impressed. He tells Iqbal about the same and Iqbal brings up the thought of purchasing a new TV for their home as well. Shahid tries to convince him otherwise and talks about things he has learnt from Damodar and Dilip. Shahid then shares with Iqbal that he and Dilip are planning to set up a collection center for e-waste in school and will be making a presentation on the same next week to the Green club which they are a part of. The conversation ends with Iqbal congratulating Shahid.

Its 8.30 pm when Iqbal and Shahid leave from Damodar and Dilip's house. Shahid sits in the passenger seat with Iqbal on the driving seat when they get chatting.

Iqbal: *So what were you and Dilip discussing*
Shahid: *Dilip has just purchased a new flat screen TV for his room. It has HD picture. We were just watching a movie and the picture quality was so very good Dad.*
Iqbal: *Yeah I have heard about these new TVs as well which have HD picture quality. I was planning to get one for our drawing room as well.*
Shahid*: But the present TV is working fine dad. Why would we want a new one?*
Iqbal*: Hmmn. That just reminds me of the conversation that I had with Damodar a short while ago.*
Shahid*: Were you guys discussing about buying a new TV dad?*
Iqbal*: No, it was about electronic waste and what happens after we dispose off our old electronic products.*
*Shahid***:** *Yeah me and Dilip have learnt a lot from uncle on this subject.*
Iqbal: Wow. You never told me anything about that son.
Shahid*: Hardly get to spend time with you dad other than our maths sessions every weekend.*
Iqbal: *Yeah true. So what are you doing with what you have learnt*
Shahid*: As part of the Green club, of which I am a member, me and Dilip are preparing a presentation*
Iqbal: *On e-waste?*
Shahid: *Yes dad, and how we should try and dispose off our e-waste.*
Iqbal: *How to dispose off e-waste? Is it so important that one needs to learn to dispose off something which is waste?*
Shahid*: Yes dad. E-waste has a lot of hazardous substances which are a health hazard for humans as well as cause grave pollution to the environment. It is very important that it is disposed off in a proper manner so that these risks can be mitigated.*
Iqbal: *But how does it become a health hazard son. I still don't understand.*
Shahid*: You see dad, in Buradabad, there are a lot of people who work with waste. They take all the material and try to extract metals from e-waste by using acid baths which cause a great deal of pollution. This is a health hazard for them as well and causes environmental pollution.*
Iqbal*: Oh, that's such a bad thing to do. But why do they do this?*
Shahid*: It is their livelihood dad, which is why they do it. Also they have a lot of access to material since they collect door to door and we as citizens are not aware of proper disposal practices.*

Iqbal: *I am very happy you are working on such an important subject. When is the presentation?*
Shahid: *Its next week dad.*
Iqbal*: And who are you presenting it to?*
Shahid*: Well to start with it would be to the Green club members and some teachers and the principal as well.*
Iqbal: *That's good. And what do you guys want to present.*
Shahid*: We are trying to pitch for setting up of an e-waste collection center in our school.*
Iqbal*: Wow. That would be great. But the target group would be students.*
Shahid*: Yes dad, which is why we are also planning to make it interesting for them. Me and Dilip are travelling with Damodar uncle on the weekend to Buradabad. We will be making a short video on how people are working with e-waste and when we present to the group, we would like to take them through the video as well.*
Iqbal: *Once you shoot that video, show it to me as well. Let me see if I can take the RWA members through the same too.*
Shahid*: Yeah dad I will.*
Iqbal*: Home's here. Lets go and enjoy our dinner.*

(ACT II completed)

ACT III

In ACT III Dilip and Shahid meet at school and discuss the idea of the presentation where they want to talk about setting up a collection center in school.

Its 11 am the next day and time for a short recess in school. Dilip and Shahid get chatting with other members of the Green club to discuss the details of the presentation.

Dilip*: Good morning! (The room echoes with a good morning)*
Shahid*: Friends, we have come up with the presentation on electronic waste and it effects and why we need to set up a collection center in school for e-waste.*
Dilip*: We will also be going across to Buradabad with my dad over the weekend to shoot a small video which we will then show in the assembly next week.*
Shahid*: So coming back to the presentation, we have first introduced what is electronic waste for those who would have very little idea about the subject. Then we move on to hazardous substances in electronic waste and finally we come to setting up the collection center for e-waste.*
Dilip: *But before we come to that, we will be showing the video that we shoot so that students and teachers are aware of the environmental issues surrounding e-waste.*
Shahid: *Yeah and the final bit would be about the carbon footprint that we leave when we consume resources so that we become responsible towards whatever we purchase and whenever we dispose off such items.*
Dilip: *So how does everyone feel about this structure?*
All: *We think its fine, lets take this step and I am sure many people around us will learn from this as well.*
Shahid: *We also have plans to organise essay competitions, quiz shows and drawing and painting competitions amongst students.*
All*: That would be so good.*
Dilip: *Yeah, the idea is that we should all be able to take back these learnings and talk to our parents as well.*
Shahid*: Yeah, that's the idea.*
Dilip: *In fact, I think we should also try and train our teachers so that they are able to talk about this subject to our fellow students in the EWS class.*
All: *Yeah that would be fantastic and will help everyone learn about the same.*
Shahid: *Thank you everyone for the encouragement. The bells rung and its time to run back to class. (Everyone leaves)*

(ACT III completed)

Dilip and Shahid have now set up a collection center in school with the help of their friends from the Green club and the blessings of the school principal. Dilip and Shahid have conducted a training for teachers on what they need to speak to students about while disposing e-waste and the hazards of improper recycling of e-waste. The school has managed to collect about 300 kgs of e-waste in the first month itself. Kudos to Dilip and Shahid on this beginning to save the environment and our planet.

4. References:

a)Resource consumption

It is an umbrella term for the many different ways and rate at which humans consume the products of the natural world. Some resources are finite, meaning that once they are used there are none left, such as fossil fuels and land. Other resources are renewable, such as wind and solar energy.

Resource can be categorized into renewable and non-renewable, Renewable materials are not finite in availability as they can be replenished in a short duration for example agricultural products, livestock, etc. Non-renewable resources are those that cannot be replenished or made again in a short duration and may take billions of years to be made again for example fossil fuels that provide energy, metal ores used to manufacture cars and computers etc (FOE, 2005).

Due to the finite nature of fossil fuels and metals it is likely that we will runout of these resources in future as highlighted in the chart below:

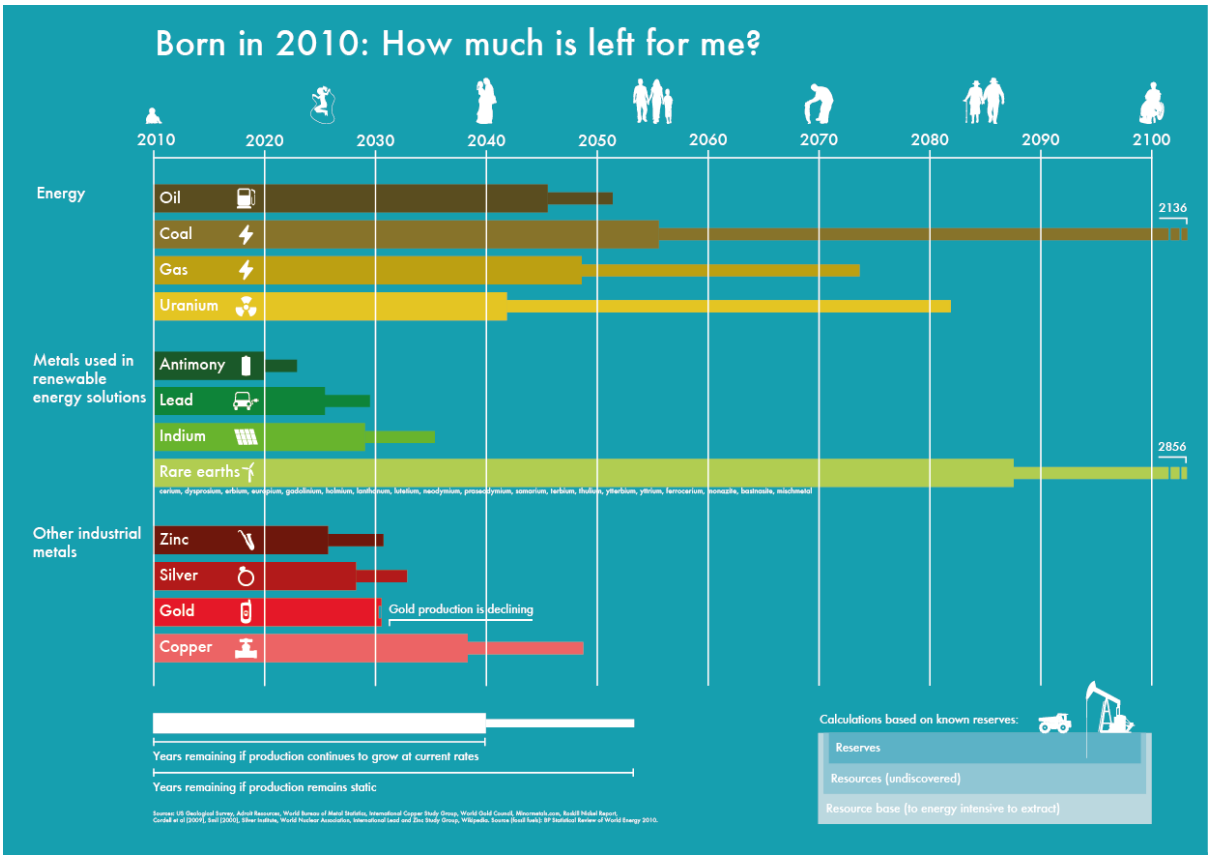


Figure 1: Resource consumption over the years

Overconsumption due to lifestyle changes, higher income levels and increased rate of obsolescence of electrical and electronics goods is leading to overconsumption of resources. Therefore it is necessary to reduce overconsumption and recycle so that we don't run out of resources.

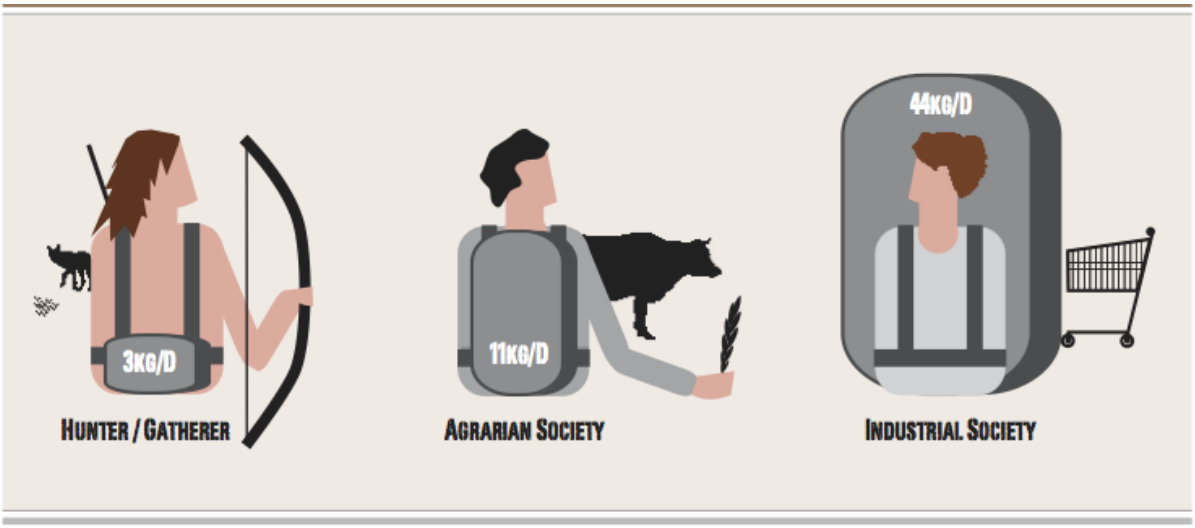


Figure 2: Resource consumption across the ages
Source:
Govt. of Australia, (20011), Background Paper: Resource Consumption, Draft Planning Strategy: http://www.planning.act.gov.au/__data/assets/pdf_file/0007/25684/Planning_Background11_Resource.pdf

Overconsumption: Our use of the world's natural resources: https://www.foe.co.uk/sites/default/files/downloads/overconsumption.pdf

Forecast when we will run out of each metal: http://www.visualcapitalist.com/forecast-when-well-run-out-of-each-metal/

b)LOHAS and how to draw a personal action plan of LOHAS:

LOHAS:

LOHAS is an acronym for Lifestyles of Health and Sustainability and is based on the work of US sociologist Paul H. Ray. LOHAS consumers' lifestyle and purchasing decisions are informed by their values regarding personal, family and community health, environmental sustainability and social justice. These values and attitudes are driving the markets for products as diverse as renewable energy, solar hot water, organic foods, recycled and sustainable homeware, domestic rainwater tanks, sustainable timber, natural cleaning products, alternative medicine, yoga and eco-tourism.

Source:
LOHAS, (2016), Introduction, http://www.lohas.com.au/what-lohas

Personal action plan of LOHAS:

According to the Ellen Macarthur Foundation, today's linear 'take, make, dispose' economic model is reaching its physical limits or is unsustainable. Therefore there is a need to adopt a circular economy that is an attractive and viable alternative as it is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times. As envisioned by the originators, a circular economy is a continuous positive development cycle that preserves and enhances natural capital, optimises resource yields, and minimises system risks by managing finite stocks and renewable flows. It works effectively at every scale.

LOHAS contributes to the concept of circular economy by ensuring that products are used keeping in mind the aim of reducing their adverse environmental and social impacts. LOHAS aims at moving consumers from being purchasers to participants for making a difference in terms of environmental and social impact of the product.

Personal action plan should start with finding and knowing more about the environmental and social impact of the product during manufacturing, use and end of life. For example if we use a television we can find what all metals, minerals and other substances were used to manufacture it and what was the environmental and social impact of the product.

LOHAS consumers actively seek green and sustainable products, support the principle of reduce, reuse and recycle in their day to day life and purchase decisions. Therefore, after the product's impact is known, the person should compare the impact of this product with that of similar products available in the market. He or she should actively ask questions about the environmental management system and recycling program of the company. After comparison the consumer adopting LOHAS should opt for the most eco-friendly and recyclable product even if it costs slightly higher. For example, given a choice that you can buy a computer with 50% less harmful materials and made out of recycled plastic, you should buy it even if it costs more than the computer with high percentage of harmful materials and no use of recycled plastics.

For tackling the e-waste challenge LOHAS consumers should demand from manufacturers that products should be made with minimum amount of harmful substances and they should ensure that e-waste is collected and managed in an environmentally and socially responsible manner. This will motivate the companies to change their manufacturing processes to more sustainable options and implement recycling programs.

Source:

Natural Marketing Institute, (2007), Understand the LOHAS Consumer http://www.lohas.se/wp-content/uploads/2015/07/Understanding-the-LOHAS-Consumer-11_LOHAS_Whole_Foods_Version.pdf

Ellen Macarthur Foundation, (2015), Concept of circular economy http://www.ellenmacarthurfoundation.org/circular-economy/overview/concept

c)Secondary resources:

A secondary resource is something created by the process or consumer of products at their end-of-life for further processing, obviously if it is economically viable to do so. It really is the economic value of secondary resources that drives the recycling system, and the basis of the circular economy. Thus treating secondary resources is principally a matter of considering the economic value that it contains and also the form in which this value is present i.e. the mineralogy, the combinations of materials, linkages etc. The figure below gives a succinct overview of a circular economy (Source: EC Brussels, 2.7.2014 COM(2014))

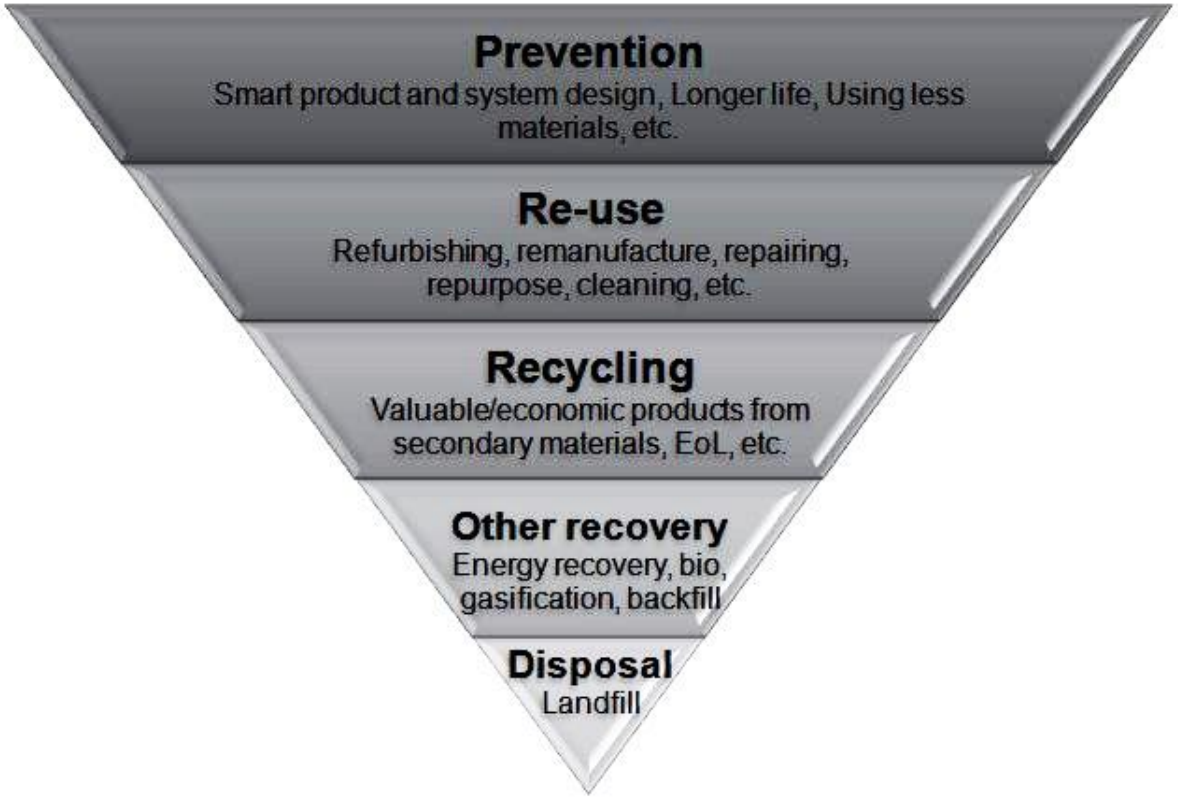


Figure 3: Steps towards a circular economy

The figure very clearly highlights through the “Raw Materials” and “Recycling” sections that process metallurgy is a key aspect in the realization of a closed-loop society. It really is the economic value of secondary resources that drives the recycling system, and the basis of the circular economy.

On the other hand primary resources are mostly extracted through mining operations leading to high economic, social and environmental costs. Use of secondary resources, that use waste as a source of materials, for building useful products leads to reduction in mining and prevents harmful environmental and social impacts.

Companies have already begun to transform themselves as participants of circular economy by design products that can more readily be recycled and reused. For example, Dell has introduced the first computer made with plastics from recycled old electronics.

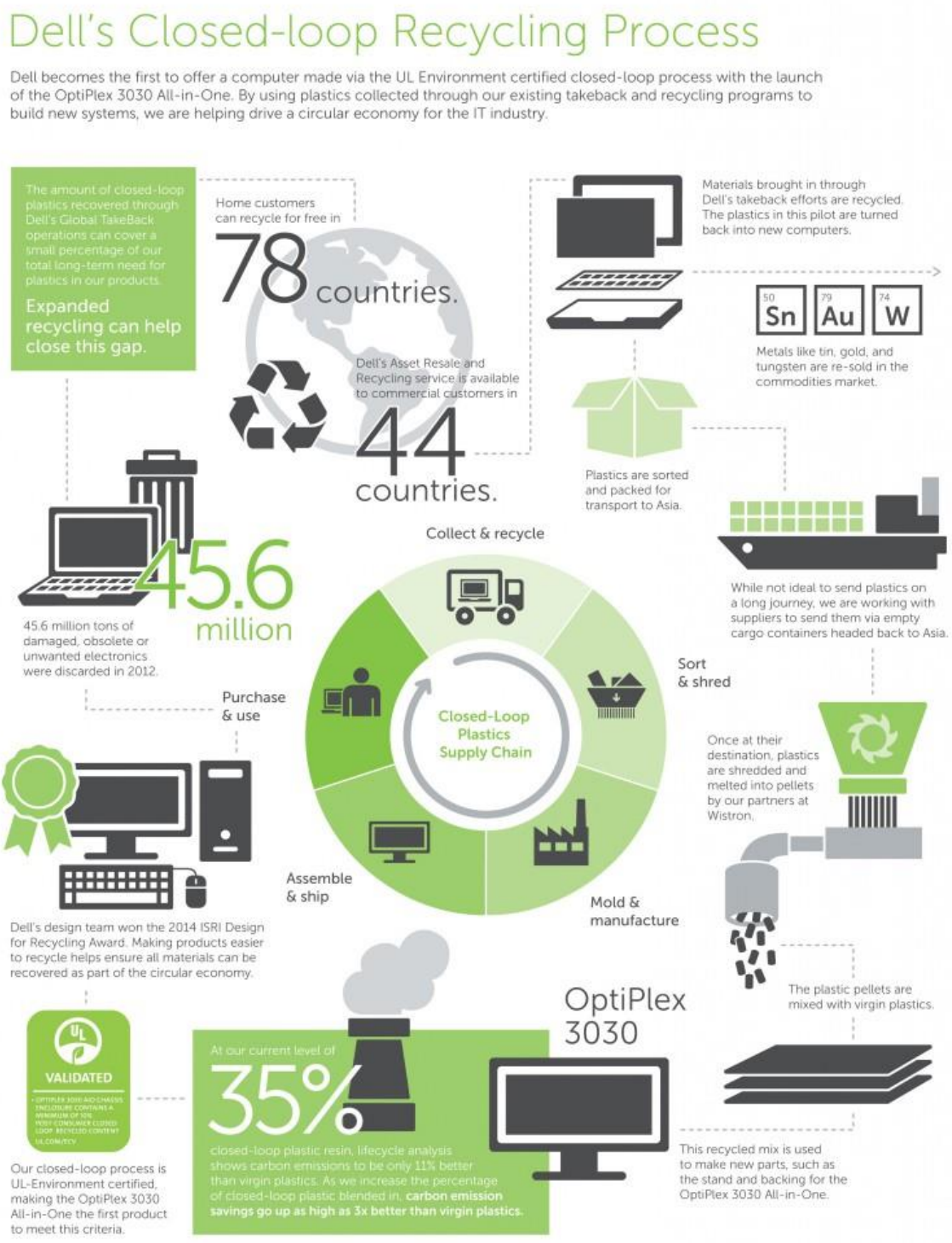


Figure 4: Closed loop recycling process
Source:
USING SECONDARY RESOURCES – TOWARDS SYSTEM INTEGRATED METAL PRODUCTION (SIMP), 30/01/2015, by: Markus Reuter http://www.outotec.com/en/About-us/Blogs/Experts-thinking-ahead/Metal-and-material-recycling/Dates/2015/1/Using-secondary-resources--towards-System-Integrated-Metal-Production-SIMP/
Dell, (2014), Dell has introduced first computer made with plastics from recycled old electronics. http://www.electronicstakeback.com/2014/06/12/dell-introduces-first-computer-made-with-plastics-from-recycled-electronics/

d)Electronic waste or e-waste and related information:

Electronic 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;

Source:
Indian Ministry of Environment and Forests & Climate Change 2016. E-waste (Management) Rules, 2016.
https://cpcb.nic.in/displaypdf.php?id=RS1XYXN0ZS9FLVdhc3RlTV9SdWxlc18yMDE2LnBkZg==
https://cpcb.nic.in/uploads/Projects/E-Waste/e-waste_amendment_notification_06.04.2018.pdfCentral Pollution Control Board (CPCB)
http://cpcb.nic.in/

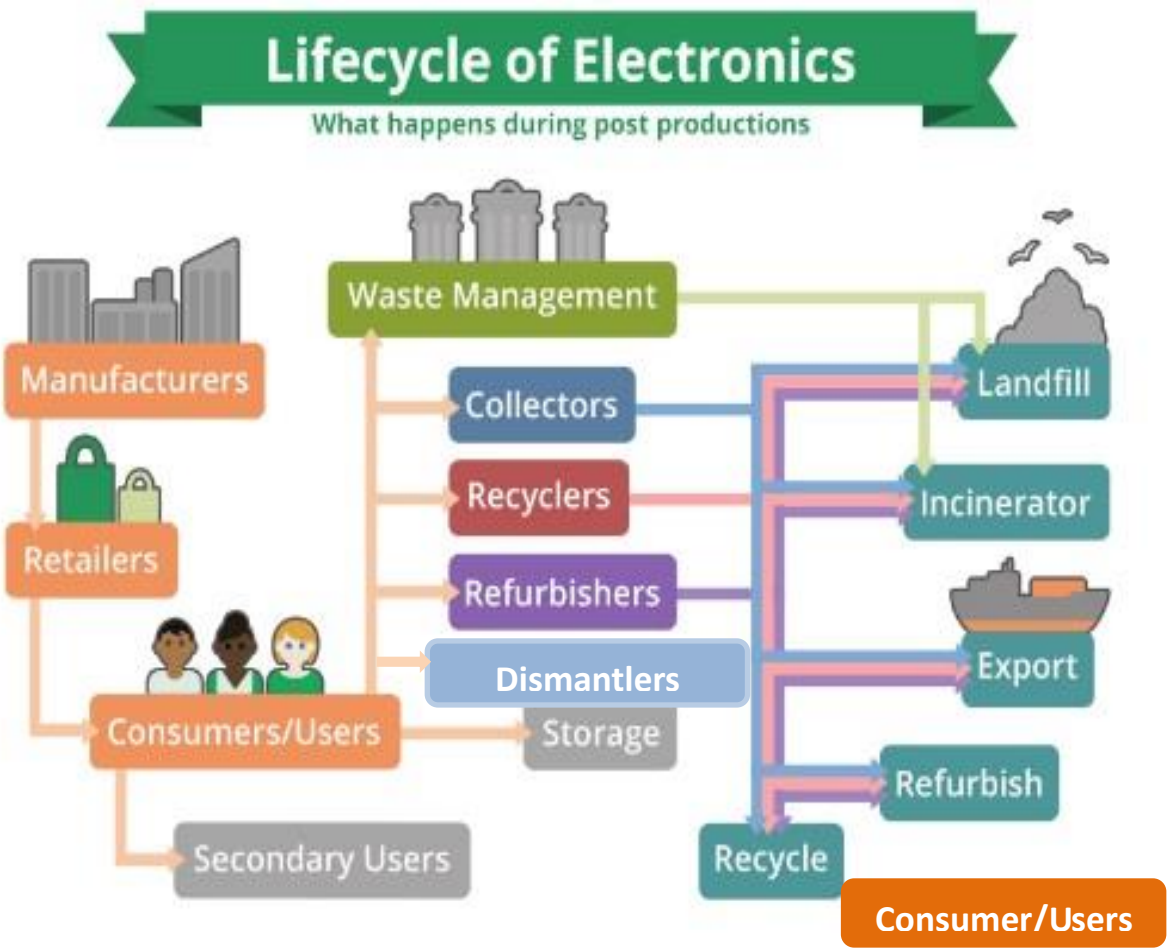


Figure 5: Lifecycle of Electronics
(Source: http://greatforest.com/sustainability101/uncategorized/e-waste-recycled-video/)

Main contributors to e-waste

Around 2 million tonnes of e-waste is generated in India in 2016 (Global E-waste monitor, 2017 The main sources of electronic waste in India are the government, public and private (industrial) sectors, which account for almost 70 per cent of total waste generation. The contribution of individual households is relatively small at about 15 per cent; the rest being contributed by manufacturers. Though individual households are not large contributors to waste generated by computers, they consume large quantities of consumer durables and are, therefore, potential creators of 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). In countries like China and India, though annual generation per capita is less than 1 kg, it is growing at an exponential rate. The increasing "market penetration" in developing countries, "replacement market" in developed countries and "high

obsolescence rate" make WEEE/E-waste one of the fastest growing waste streams. Main contributors of e-waste includes computer and its accessories, monitors, printers, keyboards, central processing units; typewriters, mobile phones and chargers, remotes, compact discs, headphones, batteries, LCD/Plasma TVs, air conditioners, refrigerators and other household appliances (Rajya Sabha Secretariat 2011).

Source:
https://collections.unu.edu/eserv/UNU:6341/Global-E-waste_Monitor_2017__electronic_single_pages_.pdf
WEEE Recycle & CSE. E-Waste Training Course for Policymakers and Regulators – Facilitator's Manual, http://greene.gov.in/wp-content/uploads/2019/08/2019082625.pdfRajya Sabha Secretariat 2011: E-waste in India. New Delhi. http://rajyasabha.nic.in/rsnew/publication_electronic/E-Waste_in_india.pdf

Amount of e-waste and recycling

The increased use of electrical and electronic equipment (EEE) and their high rate of obsolescence is leading to around 44.7 million tons of e-waste generation globally and only 20% was recycled through appropriate channel. From the developed countries around 75% to 80% of e-waste is shipped to countries in Asia and Africa for "recycling" and disposal where majority of imported e-waste is managed through informal unsafe recycling channels (Perkins et al., (2014): 287).

Around 2 million tonnes of e-waste is generated in India (Global E-waste Monitor) According to Central Pollution Control Board (CPCB) (2019) list of registered e-waste dismantler/recycler in the country as on 27-06-2019 the total recycling capacity is 782080.62MTA.
For example, around 170,000 tons of electronic waste is generated from scrapped television alone in India every year.If each ton has a value of INR 10,000 then the recycling industry turnover would be INR 170 Crores. The total market is worth INR 1700 Crores despite considering a conservative value of e-waste.

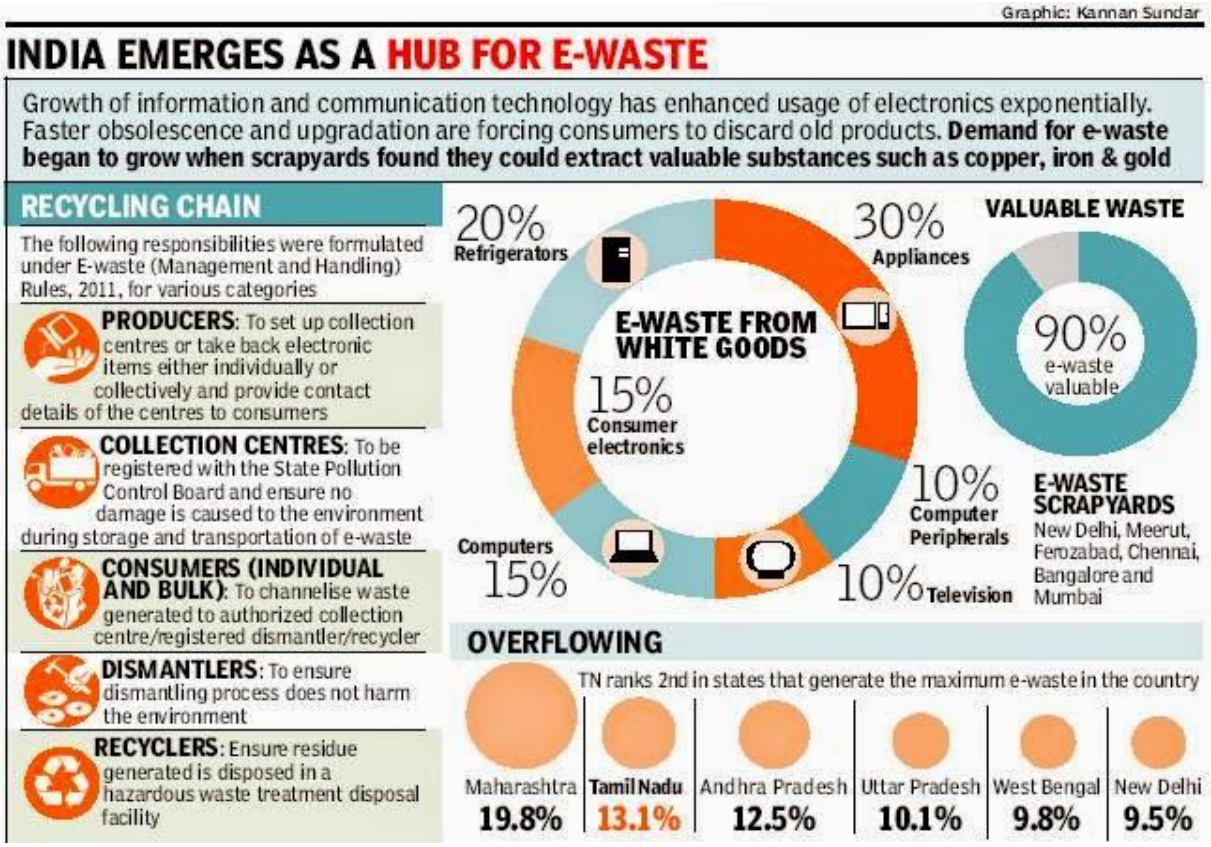


Figure 6: e-waste generation in India

The e-waste recycling sector revenue in 2015 was estimated at Euro 2.5 billion and is expected to grow to 3.5 billion by 2020 (Cucchiella et al., (2015)).

Source:
Central Pollution Control Board (CPCB) (2019), List of e-waste recyclers in India, https://cpcb.nic.in/uploads/Projects/E-Waste/List_of_E-waste_Recycler.pdf

Cucchiella, Federica, D'Adamo, Idiano, Koh, S.C. Lenny, Rosa, Paolo, (2015), Recycling of WEEEs: An economic assessment of present and future e-waste streams, Renewable and Sustainable Energy Reviews, Volume 51, November 2015, Pages. 263-272.

Figure 7: e-waste generation across the world

Composition of e-waste

The composition of e-waste is very diverse and contains products across different categories. A typical electronic and electrical item consists of more than 1000 different substances which can fall under hazardous and non-hazardous categories. The major constituents are ferrous 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.

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

Table 1: Pollutants and their occurrence in e-waste

Source:
Rajya Sabha Secretariat, 2011

How to dispose e-waste

As per the E-Waste (Management) Rules 2016 all e-waste should be recycled by authorized recyclers and dismantlers. In line with the principle of 'Extended Producer Responsibility' (EPR) the producers have to set up a scheme for collection of used/waste Electrical and Electronic Equipment from the Electrical and Electronic Equipment placed on the market earlier through dealers. In addition collection centres, Producer Responsibility Organisation, buy-back arrangement, exchange scheme, Deposit Refund Scheme, etc. should be implemented whether directly or through any authorised agency for channelising the items so collected to authorised recyclers. Consumers or bulk consumers of electrical and electronic equipment listed in Schedule I of the E-waste rules 2016[1] shall ensure that e-waste generated by them is channelised through collection centre or dealer of authorised producer or dismantler or recycler or through the designated take back service provider of the producer to authorised dismantler or recycler; (2) bulk consumers of electrical and electronic equipment listed in Schedule I shall maintain records of e-waste generated by them in Form-2 and make such records available for scrutiny by the concerned State Pollution Control Board; As responsible consumers we are expected to deposit the e-waste at authorized collection centres.

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.

1. Dismantling 2. Pulverization/ Hammering 3. Shredding 4. Density separation using water

[1] '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;

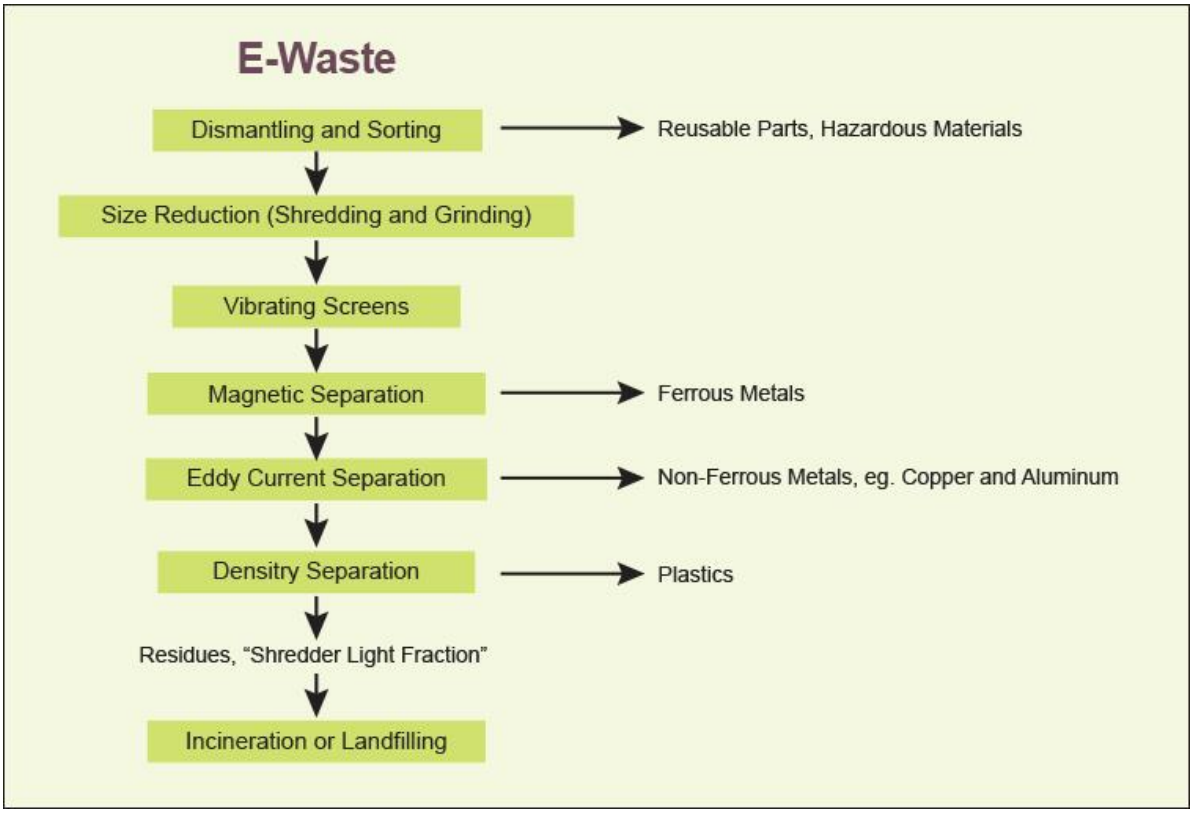


Figure 8: Treatment of e-waste

Source:

WEEE Recycle & CSE. E-Waste Training Course for Policymakers and Regulators – Facilitator's Manual
http://greene.gov.in/wp-content/uploads/2019/08/2019082625.pdf
Indian Ministry of Environment and Forests & Climate Change 2016. E-waste (Management) Rules, 2016.
https://cpcb.nic.in/displaypdf.php?id=RS1XYXN0ZS9FLVdhc3RlTV9SdWxlc18yMDE2LnBkZg==
https://cpcb.nic.in/uploads/Projects/E-Waste/e-waste_amendment_notification_06.04.2018.pdfCentral Pollution Control Board (CPCB)
http://cpcb.nic.in/

Table 2: Possible Hazardous substances in e-waste components (CPCB, 2008)

Hazardous Substance	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.
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.
PBB	Polyhalogenated derivatives which can cause pre and post natal complications and can lead girls to menarche at an early age. They can also cause acne.
PBDE	Leads to restriction in development of kids between the age of 1 and 6 years.

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 g into the ground water and release of toxic phosphor	Anemia, Renal Toxicity, Insominia
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 compound known as phthalates	Chlorinated plastic 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 form fires	Suppression of immune system damage to the liver nervous and reproductive systems

Table 3: Possible hazardous substances in WEEE/E-waste components

Source:
Indian Central Pollution Control Board 2008

Table 4:Component and possible hazardous content

Component	Possible Hazardous Content
Metal	
Motor/compressor	

Cooling	Ozone Depleting Substances (ODS)
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

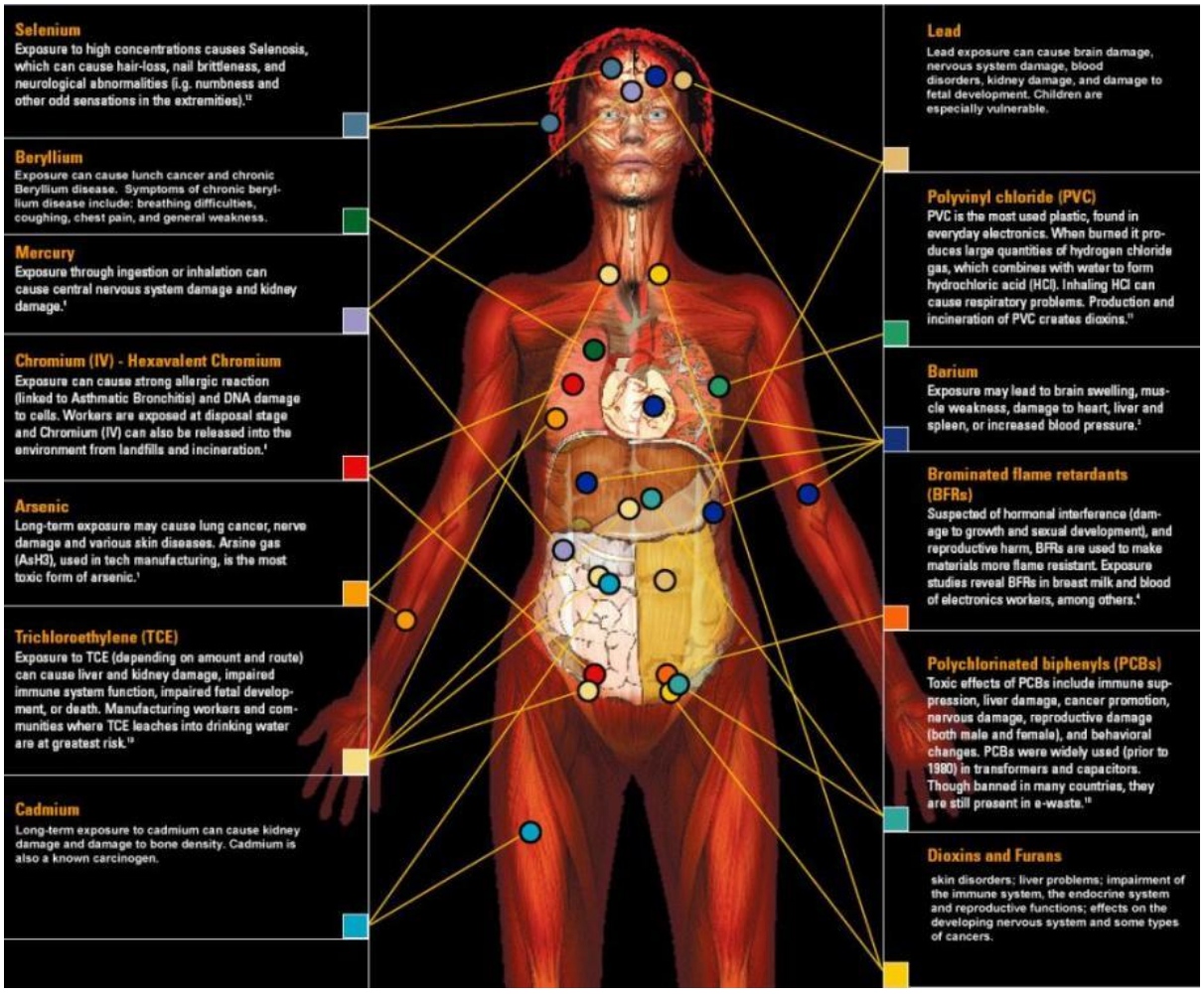


Figure 9: Adverse Impact of e-waste

Table 5: Recoverable quantities of elements in a TV (CSE Manual)

Elements	Percentage	ppm	Recoverable Weight of element (Kg)
Aluminum	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: Average weight and composition of WEEE of selected EEE commonly used

Appliances	Average weight(kg)	Iron(Fe) % weight	Non-Fe % metal weight	Glass % weight	Plastic % weight	Electronic component % weight	Others % weight
Refrigerators and freezers	48	64.4	6	1.4	13		15.1
Washing machine	40 to 47	59.8	4.6	2.6	1.5		31.5
PC	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 phones	0.08 to 0.1	8	20	10.6	59.6		1.8

Source:
UNEP E-waste Assessment manual Vol I (1) Data compiled from waste from electrical and electronic equipment (WEEE)

E-waste Management Rules and its requirement for e-waste disposal and recycling

The E-waste Management Rules specifies 'environmentally sound management of e-waste' that 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 hazardous substances contained in such waste. The rules are applicable on producers, manufacturers, dealers, consumer, bulk-consumer, refurbishers and recyclers. It includes the following provisions to help ensure proper recycling and disposal of e-waste:

Salient Features of the E-waste (Management) Rules, 2016 and its likely implication

E-Waste (Management & Handling Rules), 2011	E-Waste (Management Rules, 2016	Reasons/ and Likely implications
Title		

E-Waste (Management & Handling Rules), 2011	E-Waste (Management Rules, 2016	
Applicability		
Producer, Consumer or bulk consumer, collection centre, dismantler and recycler	Expanded to manufacturer, dealer, refurbisher and Producer Responsibility Organization (PRO)	To address leakage of e-waste to informal sector at all the stages of channelization.
Only to electrical and electronic equipment (EEE)	Extended to components, consumables, spares and parts to EEE in addition to equipment as listed in Schedule	Bulk of e-waste comprises of components, consumables, spares and parts of EEE which were not getting addressed in previous rules entailing to the scope of their channelization to informal sector.
	Compact Fluorescent Lamp (CFL) and other mercury containing lamp brought under the purview of rules.	Taking into account the lack of any regulation for management of CFL and other mercury containing lamp, CFL has been included in Schedule I which provide the list of EEE to which this rules is applicable.
Exemption		
Micro and Small industry sector as defined in Micro small and Medium Development Act, 2006	Micro enterprises as defined in the Micro, Small and Medium Enterprises Development Act, 2006	Exemption Continues for micro enterprises, however small enterprises, which have been referred as one of the major source of generation of e-waste, have been included in the rules for responsibility as manufacturer, **without burdening them with EPR responsibility as applicable to Producers.**
Collection Mechanism		
Collection centers can be set up by producer or by any person or agency or Association for the purpose of collecting e-waste.	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.	The rules Provide for setting up of individual collection centres which were not necessitated as part of EPR Authorization, thus giving leeway to

Separate authorization from SPCBs for setting up of such collection centres was necessary.	No separate authorization for such collection will be required, which will be indicated in the EPR Plan of Producers.	producers for not setting up such collection centres. Shift from collection centre to collection mechanism approach and removal of need of separate authorization will ensure effective collection simultaneously ensuring flexibility for Producers for implementation. This will check leakage of flow of e-waste to unauthorized players.
Extended Producer Responsibility (EPR)		
The Producers are required to obtain authorization from SPCBs/PCCs for implementing their Extended Producer Responsibility for effective channelization of E-waste to the registered dismantlers/recyclers	Single EPR Authorization for Producers is now being made CPCBs responsibility to ensure pan India implementation. Procedure for seeking the authorization and for effective implementation has now been elaborated with various kinds of flexibilities provisions.	Need for separate EPR authorization from each state lead to significant delays and thus failure in implementation of EPR There had been significant lack of initiatives from Producers wrt implementation of EPR and for capacity building and awareness initiative, though mandated in the rules due to lack of elaborate procedure for the same in the rules which has now been elaborated step-wise
Flexibility for ease of implementation of EPR		
No Provisions	Option has been given for setting up of PRO e-waste exchange, e-retailer, Deposit Refund Scheme as additional channel for implementation of EPR by Producers to ensure efficient channelization of e-waste	These are various non-mandatory options for ease of implementation of EPR
Target based approach for collection under EPR		
No such Provision	Collection and channelization of e-waste in Extended Producer Responsibility- Authorisation	Target based approach for implementation of EPR has been Adopted

	shall be in line with the targets prescribed in Schedule III of the Rules. The Phase wise collection Target for e-waste which can be either in number or weigh shall be 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.	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% to80%) and Netherlands (recycling rates 45% to 75%). As it may be noted in all these countries target is with reference to successful recycling rate, whereas in India we have just began with adoption of successful collection rate to begin with., Further, the minimum target has been 45-55% internationally. Whereas, in India in order to gain experience the target has been kept as collection rate of 30% of the total e-waste generated as per the EPR plan submitted by Producer themselves. In order to ascertain the annual quantity of waste generated, category wise average life and the weight shall be used and this will be applied tom sales figure of the producers to arrive at the quantity of

		e-waste generation. All the details will be prescribed in the CPCB guidelines.
Simplification of Permission		
Authorization for collection centre, Dismantler and Recyclers to obtain Authorization and Registration, separately. Separate EPR authorization by all the states.	No separate authorization for collection centre which shall be part of EPR now Registration/authorization for dismantling and recycling through one system i.e. Authorization instead of both registration and authorization Pan India EPR authorization by CPCB	Simplification of various permissions to avoid delays.
Economic Instrument for implementation of the rules		
No specific citation	Deposit Refund Scheme has been introduced as an additional economic instrument wherein the producer charges an additional amount As a deposit at the time of sale of the electrical and electronic equipment and returns it to the consumer along with interest when the end-of-life electrical and electronic equipment is returned.	As optional financial mechanism for effective implementation of EPR
E-waste Exchange		
No specific citation	The e-waste exchange as an option has been provided in the rules.	The e-waste exchange as an option has been provided in the rules as 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 organizations authorized under these rules.
Responsibilities of Manufacturer		
No Provision	To collect e-waste generated during the manufacture of any electrical and electronic equipment and channelize it for recycling or disposal and seek	To check the leakage to informal sector.

	authorization from SPCB.	
Responsibilities of dealers		
No Provision	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. Dealer or retailer or e-retailer shall refund the amount as per take back system or Deposit refund Scheme of the producer to the deposition of e-waste	This will provide flexibility to producer for channelization and ensure ease of implementation by consumers for depositing the e-waste at end of life.
Responsibilities of the Refurbisher		
No Provision	Collect e-waste generated during the process of refurbishing and channelise the waste to authorised dismantler or recycler through its collection centre and seek one time authorization from CPCB.	To check the leakage to informal sector.
Obligations for Bulk Consumer		
Bulk consumer means bulk users of electrical and electronic equipment such as Central Government or State Government Departments, public sector undertakings, banks, educational institutions, multinational organizations, international agencies, partnership and public or private companies that are registered under the Factories Act. 1948(63 of 1948) and the Companies Act, 2013 (18 of 2013) No provision on annual return	Bulk Consumer is being redefined by adding and health care facilities which have turnover of more than one crore or have more than twenty employees. They need to file annual returns.	To bring clarity in respect of definition and to put obligations on bulk consumers who are major generators and whose compliance was non satisfactory due to lack of any concrete obligation on reporting
Responsibility of State Government		
No Provision	The roles of the State Government has been also introduced in the Rules in order to ensure safety, health and skill development of the workers involved in the dismantling and recycling operations. These responsibilities are as given	Involvement of state government for effective implantation of the rules and simultaneously ensure welfare, safety and health of the workers involved in this e-waste

	below; (i) Department of Industry in State or any other government agency authorised in this regard y the State Government in to ensure earmarking or allocation of industrial space or shed for e-waste dismantling and recycling in the existing and upcoming industrial part, estate and industrial clusters; (ii) Department of Labour in the State or any other government agency authorised in this regard by the State Government need to ensure recognition and registration of workers involved in dismantling and recycling; assist formation of groups of such workers to facilitate setting up dismantling facilities; undertake industrial skill development activities for the workers involved in dismantling and recycling, and undertake annual monitoring and to ensure safety & health of workers involved in dismantling and recycling (iii) 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.	management sector.

Reduction of Hazardous Substances (RoHS) during manufacturing stage		
Every producer of electrical and electronic equipment and their components or consumables or parts or spares listed in Schedule I shall ensure that, new 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 biphenyl and Polybrominated diphenyl ethers and of 0.01% by weight in homogenous materials for cadmium.	The procedure for implementation of RoHS has been elaborated and made explicit Provision on Reduction of Hazardous Substances (RoHS) And related schedule II has been revised in line with existing EU regulatory framework which forms the basis of the provision. In case the products not comply with the RoHS provision, has been introduced to withdraw or recall the product from market and take corrective measures to bring the product into compliance.	For effective implementation In line with existing international best practices. Stringent compliance mechanism
Transportation of E-waste		
No provision	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;	To prevent leakage of e-waste to informal sector during transportation
Liability provision		
No provision	Liability for damages caused to the environment or third party due to improper management of e-waste including provision for levying financial penalty for violation of provisions of the Rules has also been introduced.	For effective implementation
Responsibility of Urban Local Bodies		
No specific citation	Urban Local Bodies (Municipal Committee/Council/Corporation) has been assign the duty to collect and channelized the	To bring clarity in the rules for effective implementation and prevent leakage to

	orphan products to authorized dismantler or recycler.	informal sector

Implementation of Extended Producer Responsibility' (EPR) that puts responsibility on any producer of electrical or electronic equipment, for their products beyond manufacturing until environmentally sound management of their end-of-life products. '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;

Setting up 'Producer Responsibility Organisation' has been mandated in the rules. This is 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;

Implementation of Deposit Refund 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;

Every producer of electrical and electronic equipment and their components or consumables or parts or spares 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.

Overall the rules ask for record keeping by all stakeholders except individual consumers who are expected to ensure that e-waste generated by them is channelized through safe recycling and disposal system as set up according to the rules.

Source:
Indian Ministry of Environment and Forests & Climate Change 2016. E-waste (Management) Rules, 2016.
https://cpcb.nic.in/displaypdf.php?id=RS1XYXN0ZS9FLVdhc3RlTV9SdWxlc18yMDE2LnBkZg==

Example of how this can work for a Television is:

1. TV manufacturer ensures that restriction regarding hazardous substances is complied with.In addition an authorized collection center and recycling plant has been identified for the product.

2. The consumer purchases the product under "Deposit Refund Scheme" and is told that he is supposed to return the TV after he or she thinks it is to be discarded at any of the authorized e-waste collection centers of the company.

3. Even if the user has purchased the TV before the DRS mechanism was established the manufacturer must take back the discarded TV through its collection center and ensure it is recycled and non-recyclable components are disposed in an environmentally safe manner.

4. Once the consumer returns the TV at the collection center he is paid back the deposit he made at the time of purchase.

5. From the collection center the TV is sent to the dismantler who can also be a recycler.

6. The dismantled components of the TV undergo primary, secondary and tertiary treatment processes to extract useful materials. That may include the following processes for CRT based TV:
   - Cathode ray tube (CRT) glass contains a high concentration of lead. This means it can't go back into the normal glass recovery process like glass bottles. CRT glass is typically crushed and cleaned. Some CRT glass is used in manufacturing new television and computer monitors, but

the move to LCD and plasma televisions means that new technologies and processes are being found to reuse this material.

- Circuit boards are shredded down to a fine powder and separated into plastics and precious metals. This material can be reformed into a range of products.
- Plastic casings are shredded and tested for their composition. Once identified, the plastics can be melted and extruded for use in new products.
- Scrap metals are typically melted down to form new metal-based components.

7. The recycled plastics, metals and other substances are either sent for reuse to the industry or the components that cannot be reused or recycled are disposed in safe disposal sites.

Source:
Indian Ministry of Environment and Forests & Climate Change 2015. E-waste (Management) Rules, 2015.
http://www.indiaenvironmentportal.org.in/files/file/notified%20ewaste%20rule%202015.pdf

Setting up a collection center for e-waste:

As per the e-waste management 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.

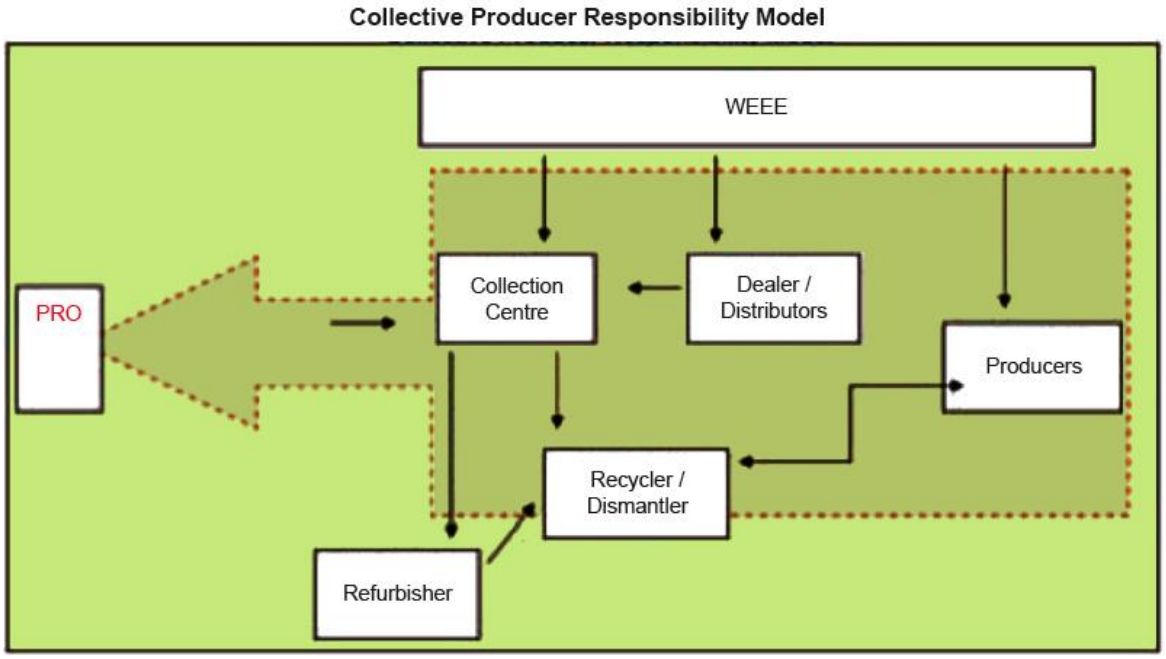


Figure 10: Collective Producer Responsibility Organisation (PRO) Model representation with role of collection center

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.

Occupational Health and Safety (OHS) issues around improper handling of e-waste

E-waste contains a wide range of hazardous compounds that may be released during improper handling thereby becoming a threat to humans and the environment. In addition, in some processes used, new hazardous compounds, such as dioxins, may be formed as the original e-waste components are degraded. Most risks arise during the uncontrolled e-waste recycling activities using rudimentary methods. These include manual disassembly and sorting; heating and acid leaching of printed circuit boards (PC-boards); shredding, melting and extrusion of plastics; open burning of plastic coated wires and other components; and sweeping and collection of toners from toner cartridges. These activities are mostly carried out directly on the ground in open air or in poorly ventilated workshops, and involve minimal emission control systems and personal protection for the workers.

Humans and the environment in the areas where this is carried out may therefore be highly exposed to the emissions generated. The recycling workers and the local residents are particularly exposed via dust generated during dismantling and shredding processes, and fumes and smoke generated during acid digestion processes and various high temperature processes, such as open burning and heating, melting, and extrusion processes. The environment is mainly contaminated from the open burning processes and through leakage from dumped residue of various recycling activities, e.g. stripped cathode ray tubes (CRTs) and PC-boards, spent acids from the digestion processes and residual ashes. On the whole, lead seems to be particularly problematic among the metals, and dioxins (chlorinated and brominated) and polybrominated diphenyl ethers (PBDEs) among the organic compounds. These compounds are all very toxic and may potentially be emitted in large amounts during rudimentary e-waste recycling activities. Lead and PBDEs because they both are highly abundant in e-waste, and dioxins because the formation conditions many times are ideal in the processes used. As a consequence, extremely high levels (in some cases the highest ever measured) of these compounds have been measured in environmental as well as human samples collected in areas where uncontrolled e-waste recycling is taking place. Risks also arise when e-waste is treated as general municipal solid waste. During incineration, a wide variety of hazardous compounds may be emitted to the atmosphere via the smoke and exhaust gases, both in gaseous form and bound to particles.

The compounds emitted may be those that were present in the original waste, but probably more important are those compounds that may be formed during the incineration processes, e.g. PCDD/Fs and PBDD/Fs. This is because the e-waste, being a complex fuel, may function as precursors for many different compounds in thermal processes. In fact, the conditions for dioxin formation are many times ideal when e-waste is incinerated, which is partly due to the presence of PVC-plastics and BFRs as dioxin precursors and partly due to the presence of copper and antimony as very potent catalysts in transformation reactions. In modern incineration facilities the emission of these and other compounds may be minimized by process optimization and flue gas treatment systems. However,during landfilling, hazardous compounds may leak to the surrounding environments, including nearby surface water and groundwater reservoirs, and also evaporate to the atmosphere. Leakage may occur for most compounds in the waste due to the long time span involved, but of particular concern are the leakage of lead and various other metals, as well as PBDEs and phthalate plasticizers. Evaporation mainly occurs for volatile compounds, of which mercury and its methylated derivatives are of most concern. The extent of leakage and evaporation from a landfill depends on the properties of the contaminants in question, but also on the design of the landfill (i.e. if it is open or sealed), the properties of the material being stored (e.g. type of waste, if it has been pre-treated in some way etc.), and on various environmental factors such as the ambient temperature and pH and humic content in the infiltrating water (SEPA, (2011)).

Source:

Swedish Environmental Protection Agency, (2011), Recycling and disposal of electronic waste Health hazards and environmental impacts, Report 6417.

e)Carbon Footprint

The total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide (CO_2). In other words: When you drive a car, the engine burns fuel which creates a certain amount of CO_2, depending on its fuel consumption and the driving distance. (CO_2 is the chemical symbol for carbon dioxide). When you heat your house with oil, gas or coal, then you also generate CO_2. Even if you heat your house with electricity, the generation of the electrical power may also have emitted a certain amount of CO_2. When you buy food and goods, the production of the food and goods also emitted some quantities of CO_2 (TFC (2016)).

Source:
Time for Change (TFC), (2016), Definition of Carbon Footprint, http://timeforchange.org/what-is-a-carbon-footprint-definition
Fee Online Tool to calculate Carbon Footprint: http://www.nature.org/greenliving/carboncalculator/

5. Session Plans:

E-Waste Course: Training of Trainers

This course has used Donna E. Walker's 'Learning Cycle' to design each of the sessions. Each step of the Walker's cycle serves a specific purpose thus ensuring that the learning effectiveness is maximized. The details of the five steps of the Walker's Cycle are explained below:

1. **Mind Jog:** This step helps to start the session on a positive note and arouse curiosity about the issue the session relates to. Mind jogs need to be short and crisp, and lead into the topic.

2. **Personal Connection:** This step helps to bring out the 'what's in it for me' connection and prepares the participants for absorbing new knowledge. The exercises used at this stage try to make the session relevant to learner's real world 'as is'.

3. **Information Exchange:** The focus of this stage is to build new knowledge, facilitate exchange of information between and among the participants and deduce some key concepts through discussion and presentation to supplement participants' information. In this stage, the facilitators allow the participants to come up with concepts instead of downloading it for them and allow extensive peer discussion and learning. The facilitators here need to concentrate on refining and building on participants' inputs.

4. **Information Application:** The purpose of this stage is to build confidence in the participants about new knowledge, support them to apply the key concepts learnt to realistic scenarios (thereby reconfirming the learning of the previous stages), and to facilitate a multi-perspective view. This stage also seeks to add fresh insights into the concepts and apply the skills to real life situations without

taking real risks. For this course, we have tried to ensure that the activities are drawn from the participants' background and experiences and enough complexity has been built into it in order to get a variety of responses.

5. Real World Connection: The activities in this stage seek to elicit personal learning and satisfy the participants that new knowledge will lead to a better performance. The design of this stage enables participants to connect personal learning to learning from the session, as the facilitator helps them set up clear performance oriented goals, which are also specific, measurable and realistic. This way both the facilitators and the participants get a chance to informally assess how effective the participants' learning has been.

Session 1: What is E-Waste?

Purpose

The primary function of this session is to introduce the participants to the methodology that would be used in facilitating the course

This session aims to give an overview of the entire E-waste Course.This session will introduce the participants to the 4 core thematics of the E-waste course , which will equip the participants to develop an enhanced understanding on the subject of electronic waste; enable the trainers to reflect upon themselves and identify their current lifestyle choices that is generating more e-waste; inform participants about the regulatory frameworks for management of electronic waste in India and finally help participants to learn the methods , skills and techniques of facilitation that will make them a Greene Champion .

Specifically , it will build an understanding of the participants on electronicwaste: Definition of electronic waste, its generation in India and across the world.

Session Objectives

At the end of the session participants will be able to:

- Define electronic waste
- Explain the composition of electronic waste
- Recall the categories of Electronic and electrical equipment's
- Analyze the e-waste situation across the globe
- Name the states /cities in India that generate maximum electronic waste

Summary Session Plan

Flow Step	Key Idea/Description	Methodology/ Tools	Duration
Mind Jog 	Making connections with the term Electronic waste	Activity: Word Association	10 mins

Personal Connect 	Connecting personal experiences with Electronic waste	Individual reflection Group work *E-waste participant Awareness workbook*	20 mins
Information Exchange 	Identifying the core themes of the E-waste course 1) Electronic waste and its hazards 2)Sustainable consumption and production 3) E-waste Regulatory framework 4) Facilitation skills .	Case study Analysis Quiz on E-waste Film Analysis Powerpoint Presentation *E-waste participant Awareness Workbook; School Case Study; Films ; Powerpoint slides* Link to the website www.greene.gov.in Link to the manual *http://greene.gov.in/wp-content/uploads/2018/01/Students.pdf*	40 mins
Information Application 	Applying the learnings to create prototype awareness projects on electronic waste	Group work Presentations	40 mins
Real World Connect 	Leading the electronic waste awareness for mindset change	Game: Make a Chain *E-waste participant Awareness Workbook*	10 minutes

HOW TO RUN THE SESSION?

Mind Jog  Slide 1.1 Making connections with the word Electronic waste	**Ask** The participants to make a big circle **SAY** Now we will play a game . Throw a plastic ball to any one of the participant and ask her/him to state the first word that s/he associates with electronic waste **Facilitator Note** *Note down the word on the board* Ask her/him to throw the ball to another player, and ask the catcher to share another term associated with electronic waste. **SAY** This is how the activity will go on and let it continue for a while . Ensure that the ball is passed very quickly from one participant to another, and that each participant gets a chance to make a word association.

	Facilitator Note: Sum up the various words on e-waste that come up through this game.
Personal Connect  Slide 1.2 What is your current understanding of E-waste? Slide 1.3 What is your aspiration as a Greene champion?	**SAY:** Lets do an activity . You have to reflect on two questions individually and write the responses: The questions are: “What is your current understanding of electronic waste?” “What is your aspiration as a Greene champion?” You have 5 minutes to complete this activity. **SAY:** Now, let’s get into five groups. We will do a group activity. The process for the group activity is explained below: - Sit in a circle . - Each participant gets a chance to speak about their current understanding and aspiration for 30 seconds . - The sharing is followed by capturing the discussions on the chart paper provided to you . - Once the group activity is completed . We will have group presentations - You have 10 mins to complete the group activity **After the group activity is completed** **INSTRUCT:** Now we will have group presentations . One member from each group will share their groups’ discussion. Other group members can support the presenter. **Facilitator note**: *As the groups are sharing, capture what they are saying on a chart or white board* **EXPLAIN:** All of us have a basic understanding of electronic waste. Also as participants attending this workshop we have an aspiration to gain new knowledge and skills so that we can engage other persons in our community on this important issue . Therefore, through this course we will work on addressing the learning expectations and aspirations of all participants to take the E-waste awareness forward in their networks.
Information Exchange	**CASE STUDY ANALYSIS:**http://greene.gov.in/wp-content/uploads/2018/01/Students.pdf **INSTRUCT**: Get into 5 groups.

Power point slides 1.4Definition of e-waste 1.5Composition of E-waste 1.6 Categories of Electronic and electrical equipment's 1.7E-waste generation across the world 1.8E-waste generation in India **Quiz** Which country generates maximum E-waste? Which state in India generates maximum e-waste? Which city in India generates maximum e-waste?	Each group is given a case study Read the case study in your group with participants reading the part of different characters . Facilitator Note : If the group is a mixed Hindi/English group, run in one Hindi group and one English group. Analyze the case study with the help of the following questions : - What is the Challenge in the case study ? - What are the actions taken? - What are your learnings from the case study? - What are the different themes which the case study brings out? Prepare a presentation based on the questions You have 20 mins to complete this activity . How was the film? What was your learning from the film? **After 20 mins ,** **INSTRUCT:** Now we will have group presentations . One member from each group will share their groups' discussion. Other group members can support the presenter. **EXPLAIN:** The case studyhighlights challenges and also possible solutions of e-waste management in the school setting . In addition it also highlights the different themes which an e-waste facilitator needs to understand inorder to facilitate workshops with adolescent groups in their networks . The facilitator reiterates the four themes and says that all are critical to become a Greene Champion. During the course of the next 2 days we will be referring to the case study to highlight different themes: • Theme 1 – Electronic waste and its hazards • Theme 2 – Sustainable consumption and production • Theme 3 –E-waste regulatory framework in India • Theme 4 – Facilitation skills for a Greene Champion In this session we are discussing the first theme i.e. Understanding E-waste . The School Case study Analysis is followed by E waste Quiz and a film screening : Mass Awareness campaign https://www.youtube.com/watch?time_continue=32&v=vQbiNGfX3OQ How was the film? What are your learnings from the film? The session is closed with the Presentation slides **EXPLAIN:** Electronic waste is one of the fastest growing waste streams in the country and has assumed gigantic proportions. The discarded and end of life electronics products ranging from computers , equipment

	used in information and communication technology (ICT), home appliances , audio and video products and all of their peripherals are popularly known as electronic waste.
Information Application 	**SAY** Now we will apply the learnings from the case study presentations and films in the previous session to develop prototype awareness projects for our schools **INSTRUCT** - Make 5 small groups. - Each group has to develop an awareness project for their school - The projects could be either in the form of workshop or any creative medium such as theatre , roleplay, film screenings. Games, poster etc that can be used to build the awareness of the target students on the issue of electronic waste. **SAY** - Now we will have the presentations by each group - The presentations will be followed by the feedback by 1or 2 group members and the facilitators . - Post the presentation each group will incorporate the feedback and the suggestions and finalize their projects to be implemented in their schools **EXPLAIN** These are just indicative projects to build awareness in your school . You can discuss with your teachers and principal and come up with more interesting ideas to address the issue of e-waste .
Real World Connect 	**INSTRUCT** Make a big circle to play a game called Make a chain. Ask for one volunteer from the group . Explain the Rules of the game : The volunteer will try tochase the other participants of the game and attempt to catch them. If a player gets touched or caught they need to hold hands with the "volunteer" and the chase goes on until everyone is caught. **ASK** How was the game ? What was your learning from the game? **EXPLAIN:** While we are all here to learn about the issue of E-waste and bring awareness in our networks . However , it will not be easy when we go out from this workshop to make people aware about the issue of e-waste . Initially we will face resistance from them as it requires mindset shift about their lifestyle choices , actions and behaviours. Just like in this game , people outside will avoid you and would not like to learn but we need to be persistent to engage with them and make all possible efforts to spread knowledge and awareness in our networks on the environmental and health hazards of electronic waste.

Session 1 Summary

The information technology has revolutionized the way we live work andcommunicate bringing countless benefits to all of us. However, with these benefits it has also brought in a new stream of waste called the electronic waste. E-waste consists of all waste from electronic and electrical appliances which have reached their end of life period or are no longer fit for their original intended use and are destined for recovery , recycling and disposal. It includes computers and its accessories monitors , printers , keyboards , central processing units ; typewriters , mobile phones and chargers , remotes , compact discs , headphones , batteries , LCD/plasma TVs air conditioners , refrigerators and other household appliances

Session 1 Transition Note:

In the last session, we discussed about the e-waste through a case study. In this session we will dive deeper into the issue and understand the harmful effects of e-waste on environment and human health and also learn about actions which can help us prevent the hazards resulting from these substances.

Session 2: Hazardous substances in electronic waste and its effects on environment and human health

Purpose

This session explains the harmful effects of e-waste. The focus will be on understanding the hazardous substances found in e-waste and the risks associated with them on human health and environment.

Session Objectives

Upon completion of this session , participants will be able to:

- List the hazardous substances found in e-waste
- Explain the risks associated with hazardous substances on human health and environment

Summary Session Plan

Flow Step	Description Key Idea	Methodology/Tools	Duration
Mind Jog 	Familiarization with toxic substances and their hazards	Game	10 minutes
Personal Connect 	Connecting personal experiences with Toxic substances and hazards	Individual Reflections + Group work *E-waste participant Awareness workbook*	20minutes
Information Exchange 	Understanding the toxic substances in electronic waste and their impact on health and environment .	Case study analysis Film analysis Power Point presentation *E-waste participant Awareness Workbook; School Case Study; Films ; Powerpoint slides*	40mins
Information Application 	Applying the learnings to create a poster highlighting the impact of e–waste on health and environment	Group Work	40 mins
Real World Connect 	Committing to taking responsible actions while disposing e-waste	Reflection and sharing *E-waste participant Awareness Workbook*	10minutes

HOW TO RUN THE SESSION?

MIND JOG Slide with instructions and questions 	SAY We will do an activity. Spread 25-30 photographs depicting the harmful effects of e-waste on health and environment INSTRUCT This activity has to be done individually. Please pick up one photograph You have to respond to 2 questions - Why have you selected this photo? - What story does this photo tell you?
PERSONAL CONNECT 	INSTRUCT Keep the photo with you . Get into 5 groups . Each member has to share his/her response to the above 2 questions in the group EXPLAIN: Each one of us has joined this programme to become a Greene Champion and have stories to share from their personal experiences about the harmful effects of e-waste on humans and environment. In this session we'll look at the harmful effects of e-waste on humans and environment more deeply……
INFORMATION EXCHANGE	A) Case study Analysis: Read aloud the RELEVANT SECTION from the case study with participants reading the part of different characters + individual recording after each section. If the group is a mixed

 School Case study Film on sustainable project by GIZ Slide 2.1 Composition of electronic waste Slide 2.2Negative impacts of e-waste on air , water and soil Slide 2.3 Hazardous substances in e-waste	Hindi/English group, run in one Hindi group and one English group. Excerpt from the case study **Shahid:***Were you guys discussing about buying a new TV dad?* **Iqbal:***No, it was about electronic waste and what happens after we dispose off our old electronic products.* **Shahid:***Yeah me and Dilip have learnt a lot from uncle on this as well.* **Iqbal:***Wow. You never told me anything about that son*. **Shahid:***Hardly get to spend time with you dad other than our math's sessions every weekend.* **Iqbal:***Yeah true. So what are you doing with the learnings***Shahid:***As part of the Green club, of which I am a member as you know, me and Dilip are preparing a presentation***Iqbal:***On e-waste?* **Shahid:***Yes dad, and how we should try and dispose off our ewaste.* **Iqbal:***How to dispose off e-waste? Is it so important that one needs to learn to dispose off something which is waste?***Shahid:***Yes dad.* ***E-waste has a lot of hazardous substances which are a health hazard for humans as well as cause grave pollution to the environment.*** *It is very important to it is disposed off in a proper manner so that these risks can be mitigated.* **Iqbal:***But how does it become a health hazard son. I still don't understand.*

	Shahid:*You see dad, in Buradabad, there are a lot of people who work in waste.* ***They take all the material and try and extract metals from e-waste by using acid baths which cause a great deal of pollution. This is a health hazard for them as well as causes environmental pollution.*** **B) Film Analysis** SAY Let's watch a film anddo a film analysis Film screening : User Experience https://www.youtube.com/watch?time_continue=17&v=y7xhqSCgu5g (Hindi) https://www.youtube.com/watch?v=3qDF_mMkUDc (English) ASK How was the film? What are your learnings from the film? The facilitator sums up the discussion by sharing the impacts of e-waste with the participants **EXPLAIN** The ill-effects of e-waste could be on soil through leaching of hazardous contents from land-fills ; in water due to contamination of rivers, well and other water sources ; in air due to emission of gases and burning of e-waste. . Therefore it is important to dispose and recycle the waste using scientific methods. However, 95 percent of the ewaste is managed in the informal sector. The workers employed in the informal sector adopt rudimentary methods to dismantle and extract the precious metals under dangerous conditions without any safeguards and get exposed to the toxic gases and emissions released during the process of recovery and extraction . The hazardous elements of the highest order are Lead, Titanium, Mercury , Cadmium, Chromium, Beryllium and Arsenic .
INFORMATION APPLICATION 	**INSTRUCT** Make 4-5 small groups Each group prepares an advertisement, skit or a social media campaign in their small groups in order to generate a discussion with adolescents on e-waste and its harmful effects. This is followed by group presentations.
REAL WORLD CONNECT 	. Write 5 actions you will undertake to minimize the impacts of e-waste on health and environment

Summary session 2

The E-waste because of its complex composition comprising of hazardous substances is non-biodegradable and therefore characterized as a red category waste which is a threat to human health and environment , when disposed and managed by rudimentary methods in the informal sector. Some of the hazardous substances present in the EEE are lead, mercury, cadmium , Chromium , Arsenic , Beryllium etc. In India more than 95% of the E-waste is being managed in the informal sector by unskilled workers who are working in dangerous conditions without any safety measures that result in environmental and health hazards via inhalation of gases during recycling, contact of the skin of the workers with hazardous substances and contact during acid treatment used in recovery processes..

Transition Note: Session 2

In the previous session, we discussed the harmful effects of e-waste on health and environment. In this session, we will talk about the e-waste policies and rules in India, responsibilities of different stakeholders and challenges in policy implementation.

Session 3: What are the E-waste Rules 2016?

Purpose

This session seeks to build an understanding of the participants about the E-waste Rules 2016. The session also helps participants identify the responsibilities of different stakeholders for effective implementation of the rules.

Session Objectives

Upon completion of this topic, participants will be able to:

Explain the need for e-waste rules
List down the stakeholders and their responsibilities
Identify the challenges in implementing the Rules

Summary Session Plan

Flow Step	Description	Methodology/ Tools	Duration
Mind Jog 	Experiencing how all of us have a role to play in managing e-waste	Game : Drape a shape	10 minutes
Personal Connect 	Reflecting on our responsibility as a consumer	Individual reflection *E-waste participant Awareness workbook*	20 minutes
Information Exchange 	Understanding the E-waste rules 2016 and actions that can be undertaken to manage e-waste in my school.	Film analysis E-waste presentation *E-waste participant Awareness Workbook; School Case Study; Films ; Powerpoint slides*	40min
Information Application 	Developing plan a to set up an E-waste collection point in school	Group work	40 min
Real World Connect 	Writing actions that I will undertake to follow the rules .	*E-waste participant Awareness Workbook;*	10 mins

HOW TO RUN THE SESSION

MIND JOG 	**STATE:** Before we begin our session let's play a game **Divide the participants in to 3-4 groups** **Share that all of the groups have to do things you ask them to, and that they will be judged according to which group acts first and best.** **Give them the following instructions** • Stand in the form of an alphabet A • Stand in the form of number 7 • Make a moving train • Form a line in order of age **Repeat the instruction 5-6 times** ASKthe participants what factors played a role in determining the end result. How was the game? What was your learning from the game Note : It will be seen that the participants use different ways to make the formations . However the group where all the members contribute and take responsibility will be fast and will complete the task with less confusion.
	EXPLAIN: • Just like contribution of all the participants was critical to the completion of the tasks in the game , similarly the management of e-waste requires the contribution of all the stakeholders in the e-waste value chain to manage e-waste. In this session we will try to understand the importance of e waste rules in managing ewaste and the responsibility of the different stakeholders.
PERSONAL CONNECT 	**Before we go into the details of the rules, let us understand our own responsibility as a consumer:** ASK : What do you think is your responsibility as a consumer to contribute towards e-waste management ?
INFORMATION E XCHANGE  Film Presentation Slide 3.1E-waste management	SAY We will watch a film to understand the process of E-waste management in our country Film screening : Digital E-waste Management https://www.youtube.com/watch?time_continue=6&v=c83EQXaQ1-4 How was the film? What are your learnings from the film? After the film screening INSTRUCT

scenarios Slide 3.2 E-waste Rules 2016Slide 3.3 Stakeholder definitions Slide 3.4 Stakeholder responsibilities Slide 3.5 Collection centre Slide 3.6 Extended producer responsibility	Divide in 4-5 groups. The groups then discuss the challenge, response , action taken and the learning from the film . Post that the facilitator makes a power point presentation E-waste Rules http://greene.gov.in/wp-content/uploads/2018/01/EWM-Rules-2016-english-23.03.2016.pdf Explain : Since e-waste constitutes various hazardous substances its management is a big challenge. In the Indian context more than 90 percent of the ewaste is being managed in the informal sector and therefore there is critical need for laws to regulate such illegal activities that harm our health and environment. The E-waste s managed by 4 methods: 1) dumping in the landfills2) burning of the e-waste items 3) Re-using of the electronic items 4) re-use of electronic items. In India municipal bodies are primarily responsible for managing waste including E-waste.Three laws regulate e-waste 1) the environment protection act , 1986; the hazardous and other wastes(Management and transboundary movement) Rules 2016; 3) The E-waste management Rules , 2016. The E-waste management Rules , 2016 enacted on October 2017 is a comprehensive set of guidelines that strengthened its predecessors. It provides a comprehensive regulatory framework to segregate , collect and manage e-waste.

INFORMATION APPLICATION 	**INSTRUCT:** Divide in 5 groups Each group will take on a role of a stakeholder (Consumer , producer , Bulk consumer , informal sector, NGO worker. The task is to come up with a plan for the effective implementation of E-waste rules enforcement in their city . Process will include - Each group is assigned a stakeholder role - Group to write their responsibilities for the stakeholder role assigned to them - Write actions they can undertake to fulfill their responsibility This is followed by intergroup debate and discussion about the possible challenges and a plan to address the same**.**

REAL WORLD CONNECT 	Facilitate a discussion around : Do you think that you have a role to play in the enforcement of E-waste Rules 2016? What actions can you undertake to follow the rules ?

Summary session 3

India is bound by the international regulations for e-waste including Basel , Rotterdam and Stockholm. In addition to this the Government has set its own E-waste management rules 2016 that holds the various stakeholders in the E-waste value chain responsible for the scientific disposal of E-waste . Extended producer responsibility is a clause that has been added in the newly formulated E-waste rules . This holds the producer responsible for the entire lifecycle of the electronic and electrical item.

Session 3

Transition Note:

In the last three sessions we have learnt about the concept of e-waste, harmful effects and also polices and rules governing the sector in India to address and manage the e-waste problem in the country. In this session, we will discuss sustainable consumption and lifestyles of health and sustainability.

Session 4: Sustainable consumption and Lifestyles of Health and Sustainability (LOHAS)

Purpose

This session seeks to give an introduction into Sustainable consumption and Lifestyles of Health and Sustainability (LOHAS).

Session Objectives

Upon completion of this topic, participants will be able to:

- Explain sustainable consumption and Lifestyles of Health and Sustainability
- Explain the concept of circular economy and the principles of 3Rs
- To apply strategies to mitigate e-waste in personal life

Summary Session Plan

Flow Step	Description	Methodology/ Tools	Duration
Mind Jog 	Linking personal experiences of consumption and buying behavior with e-waste	Quiz	10 minutes
Personal Connect 	Reflecting on lifestyle choices that have positive or negative impacts on the environment	Role play for lifestyle choices	20 mins
Information Exchange 	Defining sustainable consumption and Lifestyles of Health and Sustainability (LOHAS)	Film on Sustainable consumption and Production	40 mins

Information Application 	Learning about the strategies to mitigate e-waste with changes in my lifestyle choices	Individual reflection matrix My current life style choices and my future life style choices	40 mins
Real World Connect 	My commitment for a healthier environment	Pledge	10 mins

HOW TO RUN THE SESSION?

MIND JOG 	**INSTRUCT:** Now we are going to play a quiz , about your favorite gadgets that you use on a daily basis such as TV , Refrigerator , mobile phones , washing machine etc Quiz What is the average life span of a phone ? What is the average life span of a laptop? What is the average life span of a feature phone? What is the average life span of a washing machine? What is the average life span of a television? What is the average life span of a refrigerator? What is the average life span of an Air conditioner ? **Explain the rules of the game:** - Every participant will play this game individually - When I will ask the question each person will write the response in their Workbook. - After a minute 1 will take a poll of the response - I will announce the correct answer - I will announce the winner for each question - Start with the first question - Play the quiz for 10 mins **ASK:** **What was this quiz about?** **What is the learning from the quiz?** **EXPLAIN:** Just like human beings have an average life span ,our favorite gadgets too have an average life span. However, we keep changing our EEE much before their average life . The generation of E-waste is directly related to our consumption pattern . therefore we need to buy responsibly.
PERSONAL CONNECT 	**SAY** We are going to play an interesting activity called Dumb charades. **Explain the rules of the activity:** I have chits with statements written on each of them them. Each person comes and picks up the chit.

	The person has to dramatically perform what is written on the chit . The person is not allowed to speak or give any verbal cue. The rest of the group has to guess what was written on the chit. The statements are: - When I carry water with me, it's in a reusable (not just recyclable) water bottle. - If no one else is in the room, I turn off the lights as I leave. - When shopping, I bring and use my own bags. - I turn off the water while brushing my teeth. - I don't drink beverages from disposable cups. - I walk, bike, carpool, or ride the bus to work or school. - I keep electronic devices (e.g., computers, toasters, printers, chargers, etc.) unplugged when not in use. - I only print documents when I absolutely need to - I shut off my computer completely when not in use. - I take short showers (less than 10 minutes long). - I eat a plant-based (rather than meat-based) diet. ASK How was the activity? What did you learn from this activity? Explain : There are varied lifestyle choices we make on a daily basis which have either a positive or negative impact on our environment. LOHAS is a concept that promotes the idea of sustainable lifestyles .LOHAS consumers seek green and sustainable products and lifestyle that support the principle of reduce, reuse and recycle in their day to day life and purchase decisions . For example the LOHAS consumers buy responsibly and only when there is a need , this small but impactful decision have far reaching positive effects on our heath and sustainability.

INFORMATION EXCHANGE  Slide 4.1 What are sustainable development goals ? Slide 4.2 What is sustainable consumption and production ? Slide 4.3 What is Circular economy , principles of 3Rs, LOHAS ? Slide 4.4 What is carbon footprint?	**A) Film Analysis**https://www.youtube.com/watch?v=jpf7lyxgy5I&t=166 sion (Sustainable Consumption) https://www.youtube.com/watch?v=8q7_aV8eLUE(Carbon footprint) sustainable consumption and production . Followed by analysis and discussion **B) Case Study Analysis** Read aloud the RELEVANT SECTION of the case study with participants reading the part of different characters + individual recording after each section. If the group is a mixed Hindi/English group, run in one Hindi group and one English group. **Excerpt from the Case study** **Damodar:** *I will give you an example. You see all these flat screen TV's these days. Just 10 years ago, we used to watch TV on a CRT monitor. But slowly as the flat screen LCD, LED and Plasma screen TVs came around we switched to them.* **Iqbal:** *Yes we did. But then the picture quality of these TVs is far better than the CRT TVs. Isn't it?* **Damodar:** *Agreed. You see what I am trying to say is that if the CRT would have gone bust and then one would purchase a new one, then it would be termed as a need. But just replacing a working TV with something which offers better technology is something which I would refer to as a lifestyle purchase.* **Iqbal:** *Ok I get your point. But one gets value for an old TV as well and that is watched by someone who purchases it second hand. Isn't it?* **Damodar:** *Agreed. But you see every product has a lifecycle, especially electronic products. Some electronic products have a higher life cycle, like a TV, refrigerator or air conditioner, while some have a smaller one like mobile phones, laptops and computers. But it is important to bear in mind that all of these are made up of resources which are finite. Hence we must always try and use these products responsibly.* **Iqbal***: This is very interesting Damodar. I never thought about such things in such minute detail. But how did you come across this knowledge.*
INFORMATION APPLICATION 	SAY: We will do a group activity on lifestyle choices You have 5 sets of choices . For each choice there are 2 options : Option and Option B. In your groups you need to think and explain the impact of the option you have chosen. Set 1 Option A: Local Apple Option B: Washington Apple Set 2 Option A: Disposing garbage bag to the kachrawala Option B: Segregating and composting wet waste

	Set 3 Option A Washing hair with shikakai Option B Washing hair with imported branded shampoo Set 4 Option A Buying a seasonal local vegetable that you may not find too tasty Option B Buying an exotic vegetable (like broccoli or avocado) that is yummy but expensive Set 5 Option A Taking a walk to your friends home and spending time with him or her Option B Sending a whatsapp messages or chatting with the friend from home - Ask each group to make its presentation - Encourage the members of the other group to question and add their inputs /insights into each presentation - Facilitate a discussion with the groups on what would happen in the future if the life style choices mentioned continue - Ask the groups whether they think that these choices are impacting sustainable development Explain : India has traditionally been an agrarian society that has adopted sustainable life style be of clothing, food and dietary habits or something as simple as the choice of transport . These choice generated miniscule waste which had o adverse impact on the environment . However with the growth of the information technology in the early 90s there has been an alarming increase in the consumption pattern of the Indian middle class. This is partly because of the disposable incomes which has resulted in increased consumption of cars , computers AC , mobile phones, microwaves and credit cards. No doubt they have provided us with comforts they have led to accumulation of huge piles of waste and increased our carbon footprint.
REAL WORLD APPLICATION 	SAY Make a list of 10 things you can do to reduce your carbon foot print

Summary Session 4

The generation of e-waste is directly related to our consumption patterns. The more we consume the more e-we generate. Circular economy focusses on reducing consumption, re-using the EEE by increasing longevity of the products and finally recycle the products for material extraction and creation of new resources. LOHAS contributes to the concept of circular economy as LOHAS consumers adopt lifestyles and make decisions that are sustainable and contribute towards community health, environment sustainability and social justice. LOHAS consumers promote that work on renewable energy , solar power, organic foods, eco-tourism, natural cleaning products and yoga thus decreasing our carbon footprint .

Transition Note:

Thus far the course has focused on building the understanding the participants on the concept of e-waste, impact of e-waste on health and environment, sustainable consumption and lifestyles of health and sustainability. Going forward, this session will enable participants to develop facilitation skills required to become a Greene Champion.

Session 5:What are the skills required to become a Greene champion ?

Purpose

This session seeks to equip the participants with Facilitation skills that will help themto facilitate engaging sessions with their target audiences

Session Objectives

Upon completion of this topic, participants will be able to:

- Explain the IGNITE Model of facilitation
- Demonstration of the facilitation skills

Summary Session Plan

Flow Step	Description	Methodology/ Tools	Duration

Mind Jog 	Understanding the role of a facilitator	Game:Hot and Cold *E-waste participant awareness workbook*	10 mins
Personal Connect 	Learning from my training experience Remember the best training you have attended in the past 6 months which was interesting as well as effective ? What made it so interesting and effective?	Reflection *E-waste participant awareness workbook*	20 mins
Information Exchange 	Understanding the IGNITE model of facilitation	Treasure Hunt Color coded chits for the following words: Inspiring, Group atmosphere, Not controlling , Involving participants , Time optimization, effective training *E-waste participant workbook,*	40 mins
Information Application 	Demonstrating facilitation skills for E-waste sessions	Practice sessions	40 min
Real World Connect 	Learning to give feedback to each other	Feedback template	10 mins

HOW TO RUN THE SESSION?

MIND JOG 	**ASK:** - A participant to volunteer. - Ask the volunteer to give his / her favorite object available with him/ her. - Take the volunteer out of the room. - The group is asked to choose a place in the room to hide the object. - The volunteer enters back the room and needs to figure out / find the object. The group assists the volunteer with verbal clues. - If the volunteer is not at all close to the item as he searches, group says, “Cold,” but as the volunteer gets closer to the hidden item, Group responds, “Getting warmer…” ; “Hot”. - When he she is very close to the item, group says, “You’re hottest!”. The objective is to help the volunteer find the object/ item. ASK What was happening in the game? What is your learning from the game ? Get few responses Explain The role of the facilitator is similar to what role you all were playing to help the volunteer. You were trying to guide the volunteer to find the item . Similarly in training programmes the role of the facilitator is to guide the participants such that they are able to maximise their learning outcomes.
PERSONAL CONNECT 	SAY - Remember the best training you have attended in the past 6 months which was interesting as well as effective ? - What made it so interesting and effective? - Write the responses : games , activities , inspiring teacher etc. there are various ingredients to a good or an effective training programme. Now all of us have come here to become trainers and we would in this session learn skills and techniques that will enable us to become top class facilitators , who will be able to engage the target groups .

INFORMATION EXCHANGE Slide 5.1 What is IGNITE Model ? What are the skills of a facilitator ? 	*SAY* *Lets play a game – Treasure Hunt* *SAY* - We are going to play a game called treasure hunt. - There are few chits which are hidden in this room with words written on them . You have to find those chits . - There are few words that are single words and complete in themselves and then there are others which are combination words . The combination words are written on similar color chits . - Your time starts now……. After the participants have found all the chits The facilitator asks them to arrange the chits on a table SAYS Now let us look at each of these words one by one . Lets start with Inspiring – What do you understand by the word inspiring ? How do you think a facilitator can inspire the participants ? Get few responses , write on the board. What do you understand by the word Group atmosphere ? What all facilitators need to do for creating a good group atmosphere? Get few responses , write on the board. What do you understand by the word Not controlling ? How can we assess that a facilitator is working in a not controlling manner? Get few responses , write on the board. What do you understand by the word involving participants? What can a facilitator do to elicit the involvement of the participants? Get few responses , write on the board. What do you understand by the word time optimisation? What can a facilitator do in order to ensure that time is being utilized efficiently? Get few responses , write on the board. What do you understand by the word effective learning ? What can a facilitator do to elicit the involvement of the participants? Get few responses , write on the board. EXPLAIN When we look at the first alphabet of each of the words below . we get the word called IGNITE. INSPIRING GROUP ATMOSPHERE NOT CONTROLLING INVOLVING PARTICIPANTS TIME EEFCTIVE LEARNING

	EXPLAIN IGNITE means spark . The role of the facilitator is to ignite the learning in the participants. This happens only when the facilitator is able to follow the entire IGNITE model. This model helps in engaging the participants on the issue of E-waste and initiate the process of change in the target audience .
INFORMATION APPLICATION 	Ask Participants to choose a partner. With your partner develop a demo –session that you can facilitate in your school Develop a design for the session using the walkers cycle You will facilitate the session the pairs The pairs will be assessed by the audience on the basis of IGNITE parameters.
REAL WORLD APPLICATION 	Participants will develop their self -learning plans on the feedback received from the group to become a Greene Champion .

Summary Session 5

The Walkers cycle and the IGNITE Model complement each other Therefore for an effective training progrmme , the design needs to be robust and take into account all the steps of the Walkers' cycle. Once the design is engaging, the facilitation will be excellent and it will help in achieving the desired learning outcomes for any E-waste session or intervention you plan to implement. Learning facilitation skills is an ongoing process and you become better at it with practice. While IGNITE is the core model of facilitation, other skills that enable you to become excellent facilitator are Listening , responding and questioning skills.

Transition Note:

Thus far the course has focused on building the understanding the participants on the concept of e-waste, impact of e-waste on health and environment, sustainable consumption and lifestyles of health and sustainability. Going forward, this session will focus on helping the participants design their Greene Action Project.

Session 6: What's my Greene action project?

Purpose

The purpose of the Greene action project is to provide an opportunity to the participants to apply the learnings from the E-waste course to the school setting. A successful action project will build the confidence and capacities of the participants to build awareness on the E-waste issue . The action project could be designed and implemented within the school environment.

Session Objectives

Through this action project , the participants will be able to:

- Articulate the long term and immediate PSMART objectives of Greene Action Project
- Examine the potential strategies, enabling factors, for fulfilling the project objectives
- Pre-empt challenges and develop a realistic plan of action to achieve the goals
- Analyze their project requirement and personal areas of improvement to identify their individual learning goal

Summary Session Plan

Flow Step	Description	Methodology/ Tools	Duration
Mind Jog 	Important to set realistic goals, in alignment with our abilities	Activity: Ball throw	10 minutes
Personal Connect 	Imagining success	Colored photos collected from various magazines, newspapers or the internet	20mins
Information Exchange 	Setting PSMART Objectives	Discussion E-waste awareness Participant workbook	40 mins

Information Application 	Developing aGreene Action Project plan for your school	Greene Action Project plan template	40 min
Real World Connect 	Researching and collecting interesting Greene Action project ideas for learning and exchange	Internet	10 mins

MIND JOG 	**ASK:** All participants are divided into 2 groups and stand in a straight-line. One ball will be given to both the groups and the first person in the line will throw the ball to the one in the back without looking behind. The 2nd person will have to catch it and throw it to the person behind and so on. This has to be done in a way that the ball is not dropped. The participants are given 5 minutes to complete this. **Say:** You have 5 minutes to do this and place yourself accordingly and as per your estimation **Say** It is for us to realize our true potential and set realistic expectation and set for ourselves a stretched target – why? Because we want fun by pushing ourselves, expand our capacity; test our skills and also not making a superficial or tick in the box kind of change. At the same time it will be fool hardy to give ourselves such a stretch that we don't even have the energy to start given the end or goal is so far off that it seems impossible
PERSONAL CONNECT 	**Do:** Lay and spread out the photographs around a table in the room. Ask participants to take rounds of the circle and see the photographs **Say:** Find out the photograph/s you can best relate to as you imagine success with your project. Once everybody has decided ask them to pick the photographs. In case you do not find your photograph keep it in your mind and then later you can ask the person to give it you. **Ask:** Share why you have chosen the photograph.

	Guide the discussion towards how they are feeling about the group right now and how does this discussion fit into their action projects **Say:** How are you feeling? How did it feel to imagine success? It is very important for us to build a vision of the change we want to see through the E-waste awareness programme . You need not have worked out every little detail but a symbol like this photograph is one of the many good views to keep you inspired and motivated to move in the right direction.
INFORMATION EXCHANGE What is PSMART objecti ve? 	Is it important to have clear goals or objectives for our work? Why? Take a few responses? **Say** • Gives a direction to the learning efforts • Provides a plan for the course • Provides a means to check if the requirements of the course have been met **Do:** Write on Board P-SMART and explain good objectives have all these characteristics, they are PSAMART, i.e. Performance Oriented, Specific, Measurable, Achievable, Relevant, Time bound. **Say:** Ask students to look at their purpose and articulate PSMART objectives for their Greene Action Projects. **Do:** Hand over a copy of the action project Template to each participant and explain them the items and ask them to fill up: • The Project Idea • The Ultimate Goal and • Objectives for next two months (PSMART) After 20-25 minutes of reflection and writing, each participant can share the same with the person sitting next to them , the partner will give them feedback on whether their objective is P-SMART or not. **Ask:** Did this exercise help in developing clarity in your mind? Ask some people to share their objectives in big group. **Say:** Now we shall move on to the next step – Next we will look at how we can know if we are moving towards the goals we have set. How can we measure our success? Let us look at the template and co create one for our overall understanding. Go through the template, discuss in groups and create a set of questions. Share the questions. **Do:** Engage with the questions and note them on the board in the form of the template. Take an e.g. out of some or one of the issues participants have

	come up with and co create a template along with all the participants on the board.
INFORMATION APPLICATION 	INSTRUCT Develop a Greene Action Project plan for your school
REAL WORLD CONNECT 	Participantsto undertake a research and collate interesting school projects on E-waste . Share it with their school principal and teachers that can be implemented in their schools as well.

6. Additional Awareness Materials and Sources of Information/ References:

For students:

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Resource Consumption (what is the rate of resource consumption? Any specifics with respect to e-waste? What are the estimates of resources that we consume in electronic substances that are left on earth?)

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http://www.greenpeace.org/international/Global/international/publications/toxics/2014/Green%20Gadgets.pdf

UNEP, International Panel for Resource Management: Assessing the Environmental Impacts of Consumption and Production Priority Products and Materials
http://www.unep.org/resourcepanel/Portals/24102/PDFs/PriorityProductsAndMaterials_Report.pdf

Article I Energy consumption growth rate of China's electronic manufacturing industry gradually decline
http://www.readore.com/en/Newsdetail.asp?Newsid=118

Manufacturing resource productivity; June 2012 | by Stephan Mohr, Ken Somers, Steven Swartz, and Helga Vanthournout
http://www.mckinsey.com/insights/sustainability/manufacturing_resource_productivity

Article, What is the world's Scarcest Material; By Rachel Nuwer, 18 March 2014
http://www.bbc.com/future/story/20140314-the-worlds-scarcest-material

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LOHAS and how to draw a personal action plan on LOHAS

CONSUMERS & INDIVIDUAL ACTION IN THE LOHAS SPACE: A GLOBAL PERSPECTIVE
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Green Marketing from Wikipedia
https://en.wikipedia.org/wiki/Green_marketing#LOHAS
European Commission report on Sustainable lifestyles baseline: SUSTAINABLE LIFESTYLES: TODAY'S FACTS & TOMORROW'S TRENDS
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Secondary Resources (Amount of secondary resources which are tapped, secondary resources which can be tapped from e-waste, recycling of e-waste and the amount of secondary resources that have been tapped till date)

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Output Australia | October 2011| Page 9; Secondary copper processing – a more sustainable solution
http://www.outotec.com/imagevaultfiles/id_567/cf_2/secondary_copper_processing.pdf

UNEP Report on Sustainable Innovation and Technology Transfer Industrial Sector Studies: RECYCLING – FROM E-WASTE TO RESOURCES
http://www.unep.org/pdf/Recycling_From_e-waste_to_resources.pdf

How do we set up a collection center? Space, legal framework, licenses, clearances, etc)

Implementation of E-Waste Rules 2011 Guidelines by MoEF and CPCB:
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https://www.carbonfund.org/reduce

http://www.footprintnetwork.org/en/index.php/GFN/page/carbon_footprint/

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Annexure 1

[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;

(5) ensure that the e-waste thus generated is safely transported to authorised collection centres or dismantlers or recyclers;
(6) 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;
(7) maintain records of the e-waste handled in Form-2 and such records should be available for scrutiny by the appropriate authority.

9. Responsibilities of consumer or bulk consumer. – (1) consumers or bulk consumers of electrical and electronic equipment listed in Schedule I shall ensure that e-waste generated by them is channelised through collection centre or dealer of authorised producer or dismantler or recycler or through the designated take back service provider of the producer to authorised dismantler or recycler;
(2) bulk consumers of electrical and electronic equipment listed in Schedule I shall maintain records of e-waste generated by them in Form-2 and make such records available for scrutiny by the concerned State Pollution Control Board;
(3) consumers or bulk consumers of electrical and electronic equipment listed in Schedule I shall ensure that such end-of-life electrical and electronic equipment are not admixed with e-waste containing radioactive material as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and rules made there under;
(4) bulk consumers of electrical and electronic equipment listed in Schedule I shall 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. In case of the bulk consumer with multiple offices in a State, one annual return combining information from all the offices shall be filed to the concerned State Pollution Control Board on or before the 30th day of June following the financial year to which that return relates

10. Responsibilities of the dismantler. - (1)ensure that the facility and dismantling processes are in accordance with the standards or guidelines prescribed by Central Pollution Control Board from time to time;
(2) obtain authorisation from the concerned State Pollution Control Board in accordance with the procedure under 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 dismantling processes do not have any adverse effect on the health and the environment;
(5) ensure that dismantled e-waste are segregated and sent to the authorised recycling facilities for recovery of materials;
(6) ensure that non-recyclable or non-recoverable components are sent to authorised treatment storage and disposal facilities;
(7) maintain record of e-waste collected, dismantled 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;
(8) file a return 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;
(9) not process any e-waste for recovery or refining of materials, unless he is authorised with concerned State Pollution Control Board as a recycler for refining and recovery of materials;
(10) operation without Authorisation by any dismantler, as defined in this rule, shall be considered as causing damage to 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:

(i) 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;
(ii) 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;

(vi) 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;

(vii) 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 PblnSn-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.

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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: _____

Note:-

(1) * The authorisation for e-waste may be obtained along with authorisation for hazardous waste under the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, if applicable.

(2) Wherever necessary, use additional sheets to give requisite and necessary details.

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) and 13 (4)(v)]

FORM FOR MAINTAINING RECORDS OF E-WASTE HANDLED OR GENERATED

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)

<table>
<tr><td>1.</td><td>Name and Address of the unit</td><td colspan="3"></td></tr>
<tr><td>2.</td><td>Contact person with designation, Tel./Fax</td><td colspan="3"></td></tr>
<tr><td>3.</td><td>Date of Commissioning</td><td colspan="3"></td></tr>
<tr><td>4.</td><td>No.of workers (including contract labour)</td><td colspan="3"></td></tr>
<tr><td>5.</td><td>Consents Validity</td><td colspan="3">a. Water (Prevention and Control of Pollution) Act, 1974;
Valid up to _____
b. Air (Prevention and Control of Pollution) Act, 1981;
Valid up to_____</td></tr>
<tr><td>6.</td><td>Validity of current authorisation if any</td><td colspan="3">e-waste (Management & Handling) Rules, 2011;
Valid up to _____</td></tr>
<tr><td>7.</td><td>Dismantling or Recycling Process</td><td colspan="3">Please attach complete details</td></tr>
<tr><td rowspan="3">8.</td><td rowspan="3">Installed capacity in MT/year</td><td>Products</td><td colspan="2">Installed capacity (MTA)</td></tr>
<tr><td></td><td colspan="2"></td></tr>
<tr><td></td><td colspan="2"></td></tr>
<tr><td rowspan="4">9.</td><td rowspan="4">E-waste processed during last three years</td><td>Year</td><td>Product</td><td>Quantity</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td rowspan="2">10.</td><td>Waste Management:</td><td colspan="3"></td></tr>
<tr><td>a. Waste generation in processing e-waste</td><td colspan="3">Please provide details material wise</td></tr>
</table>

	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 which passed the order, against which appeal is being made : (certified copy of the order be attached to appeal is)
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……

Date.....

Place.....

Bishwanath Sinha Joint Secretary to Government of India

(F No. 12-6/2013-HSMD)

****

Annexure-II

Implementation Guidelines for E-Waste (Management) Rules, 2016

Central Pollution Control Board, Delhi

INDEX

1.0 Introduction

E- Waste (Management & Handling) Rules, 2011 were notified in 2011 and had come into force since 1st May, 2012. In order to ensure effective implementation of E-Waste Rules and to clearly delineated the role of producers in EPR, MoEF & CC, Government of India in supersession of E-Waste (Management and Handling) Rules, 2011 has notified the E-Waste (Management) Rules, 2016 vide G.S.R. 338(E) dated 23.03.2016 which will be effective from 01-10-2016. These rules are applicable to every producer, consumer or bulk consumer, collection centre, dismantler and recycler of e-waste involved in the manufacture, sale, purchase and processing of electrical and electronic equipment or components specified in schedule – I of these Rules.

Two categories of electrical and electronic equipment namely (i) IT and Telecommunication Equipment and (ii.) Consumer Electricals and Electronics such as TVs, Washing Machines, Refrigerators Air Conditioners including fluorescent and other mercury containing lamps are covered under these Rules. The main feature, of these rules, is Extended Producer Responsibility (EPR).

Target based approach for implementation of EPR has been adopted in the **E-Waste (Management) Rules, 2016,** which stipulate phase wise collection target to producers for the collection of e-waste, either in number or weight, which shall be 30% of the estimated quantity of waste generation 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 E-Waste (Management) Rules, 2016 mandate CPCB to prepare guidelines on implementation of E-Waste Rules, which includes specific guidelines for extended producer responsibility, channelisation, collection centres, storage, transportation, environmentally sound dismantling and recycling, refurbishment, and random sampling of EEE for testing of RoHS parameters. In this document all the above guidelines have been compiled except guidelines for random sampling of EEE for testing of RoHS parameters. These guidelines are given in separate sections of this document.

Guidelines for Implementing Extended Producer Responsibility

Extended Producer Responsibility (EPR) is the responsibility of every producer of electrical and electronic equipment (EEE) for channelisation of e-waste to an authorised dismantler / recycler to ensure environmentally sound management of such waste. EPR authorisation is mandatory and has to be obtained by all the producers including importers, e-retailers/on-line sellers/e-bay etc. of EEE covered in E-Waste (Management) Rules, 2016. A producer can implement its EPR either through take-back system or by setting up collection centres or both for channelisation of e-waste/end of life products to authorised dismantlers/recyclers. The producers are required to have arrangements with authorised dismantlers/recyclers either individually or collectively or through a Producer Responsibility Organisation (PRO) or E- Waste Exchange system as spelt in their EPR Plan which is approved/authorised by Central Pollution Control Board (CPCB). Selling or placing of EEE in the market by any producer without EPR Authorisation shall be considered as violation of the Rules and causing damage to the environment, which shall attract provisions under E (P) Act, 1986.

Extended Producer Responsibility Plan (EPR- Plan)

EPR Plan is an implementation plan of the producer where the producer gives its overall scheme to fulfil its Extended Producer Responsibility for achieving targets and details out the mechanism for collection and channelisation of e-waste generated by the producer.

The EPR plan requires estimating the quantity of E-waste generated from their end-of-life products, outlining a scheme for collection and channelization of their end-of-life products or products with same EEE code to authorised dismantlers/recyclers, estimated budget for implementing EPR, outline the scheme of creating awareness, declaration on ROHS compliance and submission of documents in this regard. Every producer should make an application seeking EPR authorisation in Form-1 of the E-Waste (M) Rules, 2016 addressed to the Member Secretary, Central Pollution Control Board. Form-1 should contain the relevant information pertaining to collection and

channelization of their end-of-life products as detailed in sections 2.1.1 to 2.1.7. The Producers has liberty to revise their EPR Plan from time to time with information to CPCB. In such cases the EPR authorisation need amendments.

Estimation of E-Waste Generation - E-waste generated by producer for a specific EEE category code is to be estimated on the basis of quantity (number or weight) of EEE placed in the market in the previous years and taking into consideration the average life of the equipment. Such estimate should be carried out using the following method;

The generation of e-waste from end of life products:

E-waste generation (weight or number) in the financial year 'x – y' = Sales in the financial year '(x-z) - (y-z)'

where, 'x – y' = financial year in which generation is estimated, and z= average life span of EEE (Examples are given at **Annexure - I**)

Average life of the EEE to be used in the above formula is given below:

Sr. No.	**Categories of electrical and electronic equipment**	**EEE Code**	**Average Life**
i.	**Information technology and telecommunication equipment**		
	Centralized data processing:	ITEW1	
	Mainframe		10 Years
	Minicomputer		5 Years
	Personal Computing: Personal Computers (Central Processing Unit with input and output devices)	ITEW2	6 Years
	Personal Computing: Laptop Computers(Central Processing Unit with input and output devices)	ITEW3	5 Years
	Personal Computing: Notebook Computers	ITEW4	5 Years
	Personal Computing: Notepad Computers	ITEW5	5 Years
	Printers including cartridges	ITEW6	10 Years
	Copying equipment	ITEW7	8 Years
	Electrical and electronic typewriters	ITEW8	5 Years
	User terminals and systems	ITEW9	6 Years
	Facsimile	ITEW10	10 Years
	Telex	ITEW11	5 Years
	Telephones	ITEW12	9 Years
	Pay telephones	ITEW13	9 Years
	Cordless telephones	ITEW14	9 Years
	Cellular telephones	ITEW15	

	Feature phones		7 Years
	Smart phones		5 Years
	Answering systems	ITEW16	5 Years
ii.	**Consumer electrical and electronics:**		

Sr. No.	**Categories of electrical and electronic equipment**	**EEE Code**	**Average Life**
	Television sets (including sets based on (Liquid Crystal Display and Light Emitting Diode technology)	CEEW1	9 Years
	Refrigerator	CEEW2	10 Years
	Washing Machine	CCEW3	9 Years
	Air-conditioners excluding centralized air conditioning plants	CCEW4	10 Years
	Fluorescent and other Mercury containing lamps	CEEW5	2 Years

Estimation of Target for Collection – the target for collection of E-Waste shall be based on estimated generation calculated for each EEE code for a specific financial year as specified above. E-Waste collection target for the financial year 2016 – 2017 would be 15% of the estimated E-waste generation, and for the year 2017 – 2018, the collection target would be 30%. These targets would increase to 40 % for next 2 financial years between 2018 – 2020, 50% for the financial years between 2020 - 2022 and 70% of the estimated E-waste generation for the financial years 2022 – 2023 onwards. Here it may be observed that collection targets would be applicable depending on life of the product given in above table and accordingly, if a producer enters the business in the year 2016 - 2017 for item code ITEW7(copying equipment), the collection targets for which would be applicable from the year 2021-22 at 50% collection target.

Details of Extended Producer Responsibility Plan – Producers should submit their own EPR plans appended to Form-1 for seeking EPR authorization. Producers may submit multiple options and schemes for channelization of E-Waste and such scheme should be described with a brief write-up along with a schematic flow chart/diagram of E-waste movement. The options and schemes for E-Waste channelization may comprise the following;

- Details of scheme/incentive for returning of e-waste by consumers /bulk consumers whether through dealers or buy-back arrangements or take-back systems or exchange scheme for channelization of e-waste.
- If producer is opting to manage its EPR responsibility through PRO, then details of

PRO's organisational structure and system of collection and channelisation to the authorised dismantlers/recyclers of e-waste.

- If e-waste exchange is part of channelisation then the details thereof.
- If producer is opting for 'deposit refund scheme' (DRS) or exchange scheme for collection and channelisation of e- waste, then the details of mode of refund of the deposited amount taken from the consumer or bulk consumer at the time of sale has to be specified along with interest that becomes due at the prevalent rate for the period of the deposit at the time of take-back of the end-of life products.
- Producers of item code: CEEW5 (fluorescent and other mercury containing lamp) may provide list of waste deposition centre or collection points financed by them as per their obligation under rule 17 (1) of the Solid Waste Management Rules 2016 for channelizing such wastes to recyclers or TSDFs.

Collection and Storage plan - Information pertaining to collection and storage should be appended to Form-1. It should be ensured that collection and storage of E-waste is managed as per the guidelines for 'collection and storage of e-waste' as given in section 3.0 of this document.

Channelization Plan - Form-1 should provide information pertaining to channelization. The following points should be considered in planning a system for E-Waste channelisation;

- make assessment of potential collection of e-waste, area or region wise.
- take help of any professional agency like Producer Responsibility Organisation (PRO) and e-waste exchange.
- identify authorised dismantlers/recyclers for channelisation of quantum of e-waste assessed above. Assess the capacity and capability of each identified authorised dismantlers/recyclers to ensure environmentally sound management of e-waste channelised to them.

Collection Centres – Producers shall specify details of their own collections centres or the collection centres with which they have agreement. Following details on collection centres should be provided in Form-1 if the collection centres are part of their channelisation;

- details of collection centres such as address and name(s) of the entity (producer, group of producers, refurbisher, recyclers or dismantlers) who are operating the collection

centres in tabular form.

- The number of collection centres should be proportionate and justifiable with the estimated generation for channelization of e-waste. These collections centres or collection points should have facilities as specified in section 4.0 of this document.

Dismantlers & Recyclers – Details such as name, location, processing capacity and contact details of the authorised dismantling /recycling facilities, which are part of channelisation of E-waste of the producer should be provided in a separate table to Form-1. The details provided above should be commensurate and justifiable with the quantum of e-waste estimated as per section 2.1.2 of this document.

Treatment, Storage, Disposal Facilities (TSDFs) – In case there are no recyclers available for recycling of end-of-life EEE item code: CEEW5 (fluorescent and other mercury containing lamps), then the producers should provide list of Treatment Storage and Disposal Facilities with whom they have agreement.

Documents required with Form-1

Every producer of EEE listed in Schedule-I has to apply in Form-1 address to the Member Secretary, CPCB for seeking EPR Authorisation within a period of ninety (90) days starting from 01/10/2016. In case of renewal of EPR Authorisation, the application to CPCB has to be made before one hundred and twenty (120) days of its expiry. The following documents are required to be submitted along with Form-1:

- Documents related to EPR plan as envisaged in sections 2.1.
- Details of proposed awareness programmes and allied initiatives.
- Estimated budget earmarked for Extended Producer Responsibility (EPR)
- Copies of agreement document with dealers, collection centres, dismantlers, recyclers, treatment, storage and disposal facilities (TSDFs) etc.
- Self-declaration for compliance of RoHS as per the format given at Annexure – II.
- The technical documents (supplier declaration- description of product, document for materials, parts, and/or sub-assemblies and analytical test result) as an evidence that the reduction of hazardous substance (RoHS) provisions are complied by the product based on standard EN 50581 of EU as at Annexure - III

- Copy of the permissions/licences from the relevant ministry/department for marketing various products or for doing the business as given below:
    i. TIN details
    ii. PAN details
    iii. Incorporation certificate
    iv. Copy IEC in case of importers
- Copy of authorisation issued by the SPCBs/PCCs earlier under E-Waste (Management & Handling) Rules, 2011 in case of those producers who are operating in the country prior to 01-10-2016.

Guidelines for Collection and Storage of E-Waste

- After assessing their requirement of collection of e-waste, producers may device a collection mechanism which may include take-back through dealers, collection centres or directly through authorised dismantlers/recyclers.
- For collection of e-waste producer may take help of any professional agency like Producer Responsibility Organisation (PRO)/e-waste exchange. Producer may manage a system directly for collection of e-waste by involving relevant stakeholders such as consumer, bulk consumer, informal sector, resident associations, retailers and dealers, etc.
- Producers may also have an arrangement of collection of e-waste from individual consumers and bulk consumers as well.
- The producers may publicize their collection system which may include details of their collection points, bins and collection vans linked to collection centres, take-back system, deposit refund scheme, e-waste exchange, retailers/dealers and PRO etc. for making collection system effective and workable.
- If take - back system is being provided, then it should be accessible to any citizen located anywhere in the country and may be provided through retailers/dealers or through service centres.
- The producers may provide consumer/ bulk consumer following details of take-back system:
    (i) Link of their web site where information pertaining to take-back system is available
    (ii) Toll free number to be available during working hours (10 A.M. to 6 P.M.) for consumers / bulk consumers.
    (iii) Phone number/mobile numbers of grievance redressal in case, toll free number is not working
    (iv) Details of their dealers, retailers, collection points/bins/pick up vans linked to

collection centres for depositing of e-waste by the consumer/bulk consumers if they are part of the take-back system

(v) Details of any incentive scheme for consumers / bulk consumers for returning of e-waste

(vi) Details of authorised dismantlers/recyclers who can take-back e-waste on behalf of the producer if dismantlers/recyclers are part of take-back system

- Producers may maintain data base of consumers while selling EEE so that consumers/ bulk consumers can be approached for collection of e-waste / end of life products.

- Every Producer, collection centre, dealer, dismantler, recycler and refurbisher may store the e-waste for a period not exceeding one hundred and eighty (180) days and shall maintain a record of collection, sale, transfer and storage of wastes and make these records available for inspection. The period of storage of one hundred and eighty (180) days may be extended by the concerned SPCBs/PCCs up to three hundred and sixty-five (365) days in case the e-waste needs to be specifically stored for research development of a process for its recycling or reuse.
- Storage of end of life products may be done in a manner which does not lead to breakage of these products and safe to workers handling such products.
- During storage of e-waste care may be taken:
  (i) To avoid damage to refrigerators and air-conditioner so as to prevent release of refrigerant gases such as CFC, HFS, HCFC etc. and to prevent spillage of oils (mineral or synthetic oil) and other emissions.
  (ii) To avoid damage to Cathode Ray Tube
  (iii) To avoid damage to fluorescent and other mercury containing lamps
  (iv) To avoid damage to equipment containing asbestos or ceramic fibres to avoid release of asbestos or ceramic fibres in the environment.
- After collection of fluorescent and other mercury containing lamps, it should be sent only to a recycler or to a TSDF in case no recycler is available.
- Loading, transportation, unloading and storage of E-Waste / end of life products should be carried out in such a way that its end use such as re-use after refurbishing or recycling or recovery is unaffected.
- The storage area should have fire protection system in place.

Guidelines for Collection Centre

- Collection centre or collection points are part of E-waste channelisation, and can be

established by producers, refurbishers, dismantlers and recyclers. Collection Centre may collect and store e-waste, on behalf of producer / dismantler / recycler /refurbisher and transfer the same to authorised dismantlers / recyclers.

- Only those collection centres may operate which are specified in EPR-Authorisation of the producers including the collection centres established by dismantlers / recyclers / refurbishers and having agreement with Producers.
- If the collection centres are operating on behalf of many producers, then all such producers should provide this information in their EPR application.
- Collection centres have to collect e-waste on behalf of producers including those arising from orphaned products. Collection centres established by producers can be managed by their PRO or dismantler and recycler having agreement with producers.
- The collection points/bins can be at designated places where e-waste can be collected from residential areas, office complexes, commercial complexes, retail outlets, customer care stores, educational and research institutions, resident welfare associations (RWAs). These collection points have to be part of producer's collection and channelisation plan.
- Mobile collection vans can be used for door to door collection of e-waste from institutions/ individuals/small enterprises and such vans shall be linked to collection centres, and if provided by producers, shall be part of their EPR Plan.
- Material from collection centres should be send only to the authorised dismantlers and Recyclers except in case of used Fluorescent and other mercury containing lamps, which can be sent to TSDF in case recyclers are not available.

Facilities at Collection Centres

- Collection Centre should have weighing equipment for weighing each delivery received by it and maintain a record in this regard.
- Loading, transportation and unloading, storage of end of life product should be carried out in such a way that there should not be any damage to health, environment and to the product itself particularly care should be taken for Cathode Ray Tubes (CRT), LCD/LED/Plasma TV, Refrigerator, Air Conditioners and fluorescent and other mercury containing lamps so as to avoid breakage.

- Cathode Ray Tubes (CRT), LCD / LED / Plasma TV and fluorescent and other mercury containing lamps should be stored either in containers or stored in stable manner to avoid damage or breakage.
- The storage capacity of any collection centre should commensurate with volume of

operations (weight and numbers) and category of E-waste. Space needed for storage of different category of e-waste is given below:

(i)	ITEW1 to ITEW6	- 4.0 m^3/tonne
(ii)	Monitors (CRT)	- 5.0 m^3/tonne
(iii)	ITEW7 to ITEW10	- 5.0 m^3/tonne
(iv)	ITEW11 to ITEW14	- 3.0 m^3/tonne
(v)	ITEW15	- 1.0 m^3/tonne
(vi)	ITEW16	- 3.0 m^3/tonne
(vii)	CEEW1	- 6.5 m^3/tonne
(viii)	CEEW2	- 10.0 m^3/tonne
(ix)	CEEW3	- 7.5 m^3/tonne
(x)	CEEW4	- 6.0 m^3/tonne
(xi)	CEEW5	- 1.0 m3/tonne

- Collection Centre should store e-waste product category wise.
- Collection Centre should maintain the records of E-Waste collected and account the same to respective producers.
- The collection centre where refrigerator and air conditioners are also stored should have adequate facilities for managing leakage of compressor oils, coolant/refrigerant gases such as CFCs/HCFCs and mercury from end of life fluorescent and other mercury containing lamp etc. Spills involving broken Fluorescent lamps, Oils spills should first be contained to prevent spread of the material to other areas. This may involve the use of dry sand, proprietary booms / absorbent pads, stabilizing chemicals etc. for subsequent transfer of hazardous waste to TSDFs.
- Covered shed/spaces have to be used for storage of E-Waste.
- Collection Centre should necessarily have adequate fire-fighting arrangement, escape route, for emergency exit.

Guidelines for Transportation of E-Waste

- The sender of E-Waste, that may be a producer, manufacturer, recyclers, dismantler, bulk-consumer, refurbisher and collection centre should identify transporter or make arrangements for a transporting e-waste in such a manner that environmental consequences of hazards associated with its transport could be kept at minimum.
- Transport of E-Waste should be carried out as per the manifest system as per the provisions made in rule 19 of the E-Waste (M) Rules, 2016 and the transporter will be required to carry

a document (three copies) as per form 6 of the rules provided by the sender. The responsibility of safe transportation of E-waste shall be with the sender of E-Waste.

- Fluorescent and other mercury containing lamps may be transported to TSDF in the cases where no recyclers of CFL are available
- The manufacturers and recyclers while transporting waste generated from manufacturing or recycling destined for final disposal to a treatment, storage and disposal facility will follow the provisions under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

Guidelines for Environmentally Sound Dismantling of E-Waste

Dismantler

- Any person or organisation or registered society or a designated agency or a company or an association can engage in dismantling of e-waste into their components by obtaining authorisation from the respective SPCBs/PCCs. Dismantlers may set up their collection centre, details of which shall be entered in their authorisation. These collection centres shall not require separate authorisation.
- A dismantler shall be connected to either Producers or PRO or e-waste exchange or take-back system or authorised recycler.
- A dismantler has to obtain consent to establish from SPCBs/PCCs under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981
- A dismantler has to obtain consent to operate from SPCBs/PCCs under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981
- A dismantler has to obtain authorisation from SPCBs/PCCs under E Waste (Management) Rules, 2016, provided that any person authorised/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/registration.
- A dismantler should have weigh bridge and other appropriate weighing equipment for weighing each delivery received by it and maintain a record in this regard.
- The unloading of e-waste/end of life products should be carried out in such a way that there should not be any damage to health, environment and to the product itself. Unloading of Cathode Ray Tubes (CRT), LCD / LED / Plasma TV, refrigerator, air conditioners and

fluorescent and other mercury containing lamps should be carried out under supervision in such a way to avoid breakage.

- A dismantler should have facilities for destroying or permanently deleting data stored in the memory of end of life products (Hard Disk, Telephones, Mobile phones) either through hammering or through data eraser.

Dismantling Process

Dismantling operation is essentially manual operation for segregating various components/ parts and sending them to respective users/ recyclers.Directly usable components can be sent only to an authorised refurbisher. The other parts can be sent to recyclers having valid CTO / authorised e- waste recyclers depending upon the nature of the part. For example, steel or aluminium part which contains no hazardous constituents can be sent to respective recyclers. Other parts which may contain hazardous constituents have to be sent to authorised e-waste recyclers.

- Dismantlers may perform the following operations
  - (i) De-dusting
  - (ii) Manual dismantling

- Dismantling operation shall comprise of physical separation and segregation after opening the electrical and electronic equipment into the component by manual operations.
- Dismantler may use screwdrivers, wrenches, pliers, wire cutters, tongs and hammers etc. for dismantling. The dismantled components should be sent to authorised e-waste recyclers or recyclers having valid consent to operate (CTO).
- Manual dismantling operations should be carried out over the dismantling table with space de-dusting system so as to maintain desirable work zone air quality as per the factories Act as amended from time to time. The de dusting system should consist of suction hoods over dismantling table connected with a cyclone, bag filter and venting through a chimney of three-meter height above roof level.
- Collection boxes should be placed near dismantling table for keeping the dismantled components.
- The workers involved in dismantling operation should have appropriate equipment such as screwdrivers, wrenches, pliers, wire cutters, tongs and hammers etc. for dismantling the e-waste.
- During dismantling operations, the workers should use proper personal protective equipment

such as goggles, masks, gloves, helmet and gumboot etc.

- The following dismantled items and components must be removed from end of life products and stored in a safe manner for transportation to recyclers:
    (i) Batteries
    (ii) Printed Circuit Boards (PCBs) of EEE
    (iii) Toner cartridges
    (iv) Plastic
    (v) External Electrical Cables
- Volume/Size reduction may be carried out after dismantling operations for the parts like steel/aluminium/plastic, for ease of transportation. Dismantled and segregated plastic from e-waste shall only be given to registered plastic recyclers having registration under Plastic Waste (Management) Rules, 2016.
- During the volume/size reduction of dismantled steel/aluminium/plastic parts, the dismantlers should have arrangement for dust and noise controls. These operations should be under acoustic enclosure for noise reduction.
- Dismantlers shall not carry out shredding / crushing / fine grinding/wet grinding/ enrichment operations and gravity/ magnetic/density/eddy current separation of printing circuit board or the components attached with the circuit board.
- Dismantlers shall not be permitted for dismantling of fluorescent and other mercury containing lamps, CRT / LCD / Plasma TV.
- Dismantlers shall not be permitted for chemical leaching or heating process or melting the material.
- In case of dismantling refrigerators and air conditioners, only skilled manpower having required tools and personal protective equipment (PPEs) must be deployed to manually separate compressors. Prior to dismantling the compressors, adequate facilities should be provided for collection of coolant/refrigerant gases and compressor oil.
- Dismantled circuit boards, capacitors, batteries, capacitors containing PCBs (Polychlorinated biphenyls) or PCTs (Polychlorinated terphenyls) etc. shall not be stored in open.
- Dismantlers should have adequate facilities for managing leakage of compressor oils, coolant/refrigerant gases such as CFCs/HCFCs and mercury from end of life fluorescent and other mercury containing lamp etc. Spills involving broken Fluorescent lamps, Oils spills should first be contained to prevent spread of the material to other areas. This may involve the use of dry sand, proprietary booms / absorbent pads, stabilizing chemicals etc. for subsequent transfer to hazardous waste TSDFs.
- The premise for dismantling operation should fulfil the following requirements:
    a) Water proof roofing and impermeable surfaces.

b) Storage space for dissembled spare parts.

c) Separate containers for storage of batteries, capacitors containing PCBs (Polychlorinated biphenyls) or PCTs (Polychlorinated terphenyls)

Space requirement for Dismantlers

A dismantler needs space for storage of electrical and electronic equipment up to 180 days, for process of dismantling and volume reduction and space for storage of dismantled and segregated material and free space for movement and office/ administration and other utilities. It is estimated that a minimum of 300 square meter area for a dismantling capacity of 1T/day is required for storage of raw material, segregated material, dismantling operations and office/ administration & other utilities.

Guidelines for Environmentally Sound Recycling of E-Waste

Recycler

- As per these rules any person who is engaged in recycling and reprocessing of waste electrical and electronic equipment or assemblies or their component is a recycler. Recyclers may set up their collection centres, details of which shall be entered in their authorisation. These collection centres shall not require separate authorisation. Recyclers can obtain raw material such as waste electrical and electronic assemblies or components or used components from producers/PRO/e-waste exchange/dismantlers and consumers / bulk consumers.
- The Product of recyclers has to be sent or sold to users or other recyclers having valid CTO from SPCBs/PCCs. Any hazardous waste generated during the recycling processing will be sent to TSDF'
- A recycler should be part of producer's channelisation system.
- A recycler has to obtain consent to establish from SPCBs/PCCs under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981
- A recycler has to obtain consent to operate from SPCBs/PCCs under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981
- A recycler has to obtain authorisation from SPCBs/PCCs under E Waste (Management) Rules, 2016, provided that any person authorised/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/registration.

- A recycler should have weigh bridge and other appropriate weighing equipment for weighing each delivery received by it and maintain a record in this regard.
- The unloading of end of life product should be carried out in such a way that there should not be any damage to health, environment and to the product itself. Unloading of Cathode Ray Tubes (CRT), LCD/LED/Plasma TV, Refrigerator, Air Conditioners and fluorescent and other mercury containing lamps should be carried out under supervision in such a way to avoid breakage.
- A recycler should have facilities for destroying or permanently deleting data stored in the memory of end of life products (Hard Disk, Telephones, Mobile phones) either through shredding or grinding or through data eraser.

Recycling Process

- The functions of the recyclers include dismantling along with recovery operation. There shall be no restriction on degree of operations that can be permitted for recyclers provided they have requisite facilities. The following processes should be employed by recyclers:
  - (i) Manual / semi- automatic / automatic dismantling operations
  - (ii) Shredding / crushing / fine grinding/wet grinding/ enrichment operations, gravity/ magnetic/density/eddy current separation
  - (iii) Pyro metallurgical operations - Smelting furnace
  - (iv) Hydro metallurgical operations
  - (v) Electro-metallurgical operations
  - (vi) Chemical leaching
  - (vii) CRT/LCD/Plasma processing
  - (viii) Toner cartridge recycling
  - (ix) Melting, casting, moulding operations (for metals and plastics)
- A recycling facility may accept e-waste and even those electrical and electronic assemblies or components not listed in Schedule- I for recycling, provided that they do not contain any radioactive materials and same shall be declared while taking the authorisation from concerned SPCBs/PCCs;
- The recycling facilities shall comply with the requirements as specified for dismantlers in the guidelines for dismantling in section 6.0.
- A recycling facility shall install adequate wastewater treatment facilities for process wastewater and air pollution control equipment (off gas treatment, wet/alkaline/packed bed

scrubber and carbon filters) depending on type of operations undertaken.

- De dusting equipment such as suction hood shall be installed where manual dismantling is carried out.
- Fume hoods connected with bag dust collectors followed wet (chemical) scrubbers and carbon filters shall be installed for control of fugitive emissions from furnaces or reactor.
- Noise control arrangement for equipment like crusher, grinder and shredder needs to be provided.
- The discharges from the facility shall comply with general standards under E (P) Act, 1986 for discharge of wastewater. Discharge standard are at Annexure IV
- In case of air emissions, the unit shall comply with emission norms prescribed under Air (Prevention and Control of Pollution) Act, 1981. In case of furnace, a minimum stack height of 30 meter shall be installed depending on emission rate of SO2. Emission Standards are at Annexure V.
- The workers involved in recycling operations shall use proper personal protective equipment such as goggles, masks, gloves, helmet and gumboot etc.
- Adequate facilities for onsite collection and storage of bag filter residues, floor cleaning dust and other hazardous material shall be provided and sent to secure landfill by obtaining membership of TSDF.
- The CRT / LCD / Plasma TV should be processed only at a recycler's facility.
- For recycling of CRT monitor and TVs care should be taken to contain release of harmful substances. The steps for processing of CRT are as below:

  (i) CRT monitors and TVs should be manually removed from plastic/ wooden casing. The CRT should be split into funnel and panel glass using different splitting technology such as Ni-Chrome hot wire cutting, Diamond wire method or Diamond saw separation in a closed chamber under low vacuum conditions (650 mm of Hg).

  (ii) The funnel section is then lifted off from the panel glass section and the internal metal gasket is removed for facilitating the removal of internal phosphor coating.

  (iii) The internal phosphor coating from the inner side of panel glass is removed by using an abrasive wire brush with suction arrangement under low pressure as given above at (i). The extracted air is cleaned through high efficiency bag-filter system and collected in appropriate labelled containers and then disposed at an authorised TSDF.

  (iv) Manual shredding, cutting, and segregation operations for CRTs should be carried out in low vacuum (650 mm of Hg) chambers where the dust is extracted through cyclones, bag filters, ID fan and a suitable chimney.

  (v) Segregated CRTs can also be shredded in mechanical/automatic shredding machines

connected with dust control systems. The mixed shredded glass is separated into leaded glass and glass cullet using electro-magnetic field or by density separation.

- For LCD and Plasma TV a recycler should have sealed vacuum dismantling platform for dismantling of LCD / Plasma panels. The LCD / Plasma TV should be dismantled piece by piece, starting with the removal of the plastic backing shell, printed circuit boards, aluminium or steel frame, screen, PET plastics, LCD Panel and backlight. The metal frame, wire, other metallic material and plastic backing cabinet may be sent to recyclers with valid CTO. Printed Circuit Board and LCD panel may be recycled or in case recycling facility is not available then sent to respective authorised recycling facility.
- The user of the products obtained in the recycler facility should be identified and an agreement may be entered with them for selling of the products obtained in these recycling facilities. This is for tracking the product of recycling, to ascertain where the products are going.
- Recovery of resource and particularly of precious metals present in the e-waste should be given importance.
- For fluorescent and other mercury containing lamp recycling, the unit shall have at least following systems:

  (i) Mechanical feeding system.
  (ii) Mercury spill collection system.
  (iii) Lamp Crushing System, under vacuum, for separation of mercury-contaminated phosphor powder & mercury vapors from other crushed components, so as not to cause release of any pollutant, including mercury vapor.
  (iv) System for segregation of mercury vapour from the phosphor powder through a distillation system for separation & recovery of mercury.
  (v) Air pollution control system (APCS) which shall include HEPA (High Efficiency Particulate Arrestor) filter system or activated carbon filter system or any other equivalent efficient system for separation/ removal of mercury vapor from mercury-contaminated phosphor powder'
  (vi) Arrangement for disposal of mercury contaminated filter pads to TSDF.
  (vii) On line mercury monitoring system, to have check on emission of mercury, which has to be in compliance to the consented norms.

- The fluorescent and other mercury containing lamp recycling unit shall have following obligations:

  (i) The emission outlet shall comply with the norms for mercury prescribed in the consent document. The norm for mercury emission is 0.2 mg/m^3 (Normal) as prescribed under

E (P) Act, 1986 for mercury emission from other category of industries.

(ii) For discharge of effluent the limit for mercury as (Hg) should be less than equal to 0.01mg /liter as prescribed under E (P) Act, 1986.

(iii) The unit shall have trained / skilled manpower to handle hazardous substances such as mercury mixed phosphor in respect of treatment/recycling.

(iv) The unit shall dispose all the unrecoverable wastes from the treatment site, to a TSDF

(v) The unit shall maintain record of used fluorescent and other mercury containing lamp collected & recycled, recovery of mercury and other components. It shall, also, maintain the records pertaining to the generation, storage, transport and disposal of the wastes generated in the process.

(vi) The unit shall take up ambient air quality monitoring, particularly, in reference to mercury levels with a frequency of once in a month through a recognized laboratory, for third party verification.

Space requirement for Recyclers

As a general rule a recycler of capacity of 1 Ton per day shall require a minimum of 500 square meters area. Authorisation to recyclers may be preferred if they have minimum operational capacity of 5 MT/day with an area of about 2500 square meter.

Guidelines for Refurbisher

- Refurbishment means repairing of used electrical and electronic equipment and it should be carried out in such a way that there should not be any damage to health and environment.
- A refurbisher has to obtain consent to establish 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) from the concerned State Pollution Control Board/Pollution Control Committee.
- A refurbisher has to obtain certificate of registration and proof of installed capacity from District Industries Centre or any other government agency authorised in this regard;
- A refurbisher has to obtain one-time authorization from concerned State Pollution Control Board/Pollution Control Committee.
- A refurbisher should have system to manage leakage of coolant/refrigerant gases and compressor oils from used electrical and electronic equipment during refurbishing operations.
- The refurbishing area should be ventilated and have proper dust control equipment.
- De-dusting system over refurbishment tables should be provided
- Any e-waste generated during refurbishment should be collected separately and sent to

collection centre /authorised recycler. In case of refurbisher not having own collection centre, the e-waste so generated may be channelized to an authorised recycler.

- The premise for refurbishing should fulfil the following requirements:

  (i) Water proof roofing and impermeable surfaces

  (ii) As a general rule a refurbisher of capacity of 1 Ton per day shall require a minimum of 150 square meters' area for refurbishing, temporary storage of e waste generated and space for refurbished EEE

- If refurbisher opts to sell refurbished EEE then he is required to seek EPR authorisation from CPCB. In no circumstances, the refurbisher shall sell any refurbished EEE without having EPR authorization.

Guidelines for Consumers and Bulk Consumers

Consumers:

- The Consumers should channelised their e-waste through collection centre or dealer of authorised producer or dismantler or recycler or through the designated take back service provider of the producer to authorised dismantler/recycler.
- The consumer should not throw e-waste in municipal bins.
- The consumers shall ensure that they do not throw end of life fluorescent and other mercury containing lamp in the municipal bin but hands them over (in a properly packed form) to take back system / collection and channelisation system of producer or to a collection centre of an authorised recycler who is part of producer channelisation system.
- The end of life intact fluorescent and other mercury containing lamp may be stored either in the same boxes in which new lamps are brought or other boxes of similar size. They should be sorted upright. The due precaution may be taken while packing more than one used lamp, so as not to cause the possibility of breakage during the storage and transpiration.

Bulk Consumers:

- The bulk consumers may ensure that e waste generated by them is handed over only to producer take back system or to authorised dismantler/recycler who is part of producers take back/channelisation system.
- The bulk consumers should ensure that used lamps are not disposed in the municipal bin but handed over (in a properly packed form) to take back system / collection and channelisation system of producer or to a collection centre of an authorised recycler who is part of producer channelisation system.
- The bulk consumers must create special type of disposal bins (suitable for the purpose) at site for depositing the end of life intact fluorescent and other mercury containing lamp only.

The management of the institute may issue necessary instructions, to ensure this, to staff and workers handling such lamps.

- The end of life intact fluorescent and other mercury containing lamp, as collected above, may be stored either in the same boxes in which new lamps are brought or other boxes of similar size. They should be stored upright. The due precaution may be taken while packing more than one used lamps, so as not to cause the possibility of breakage during the storage and transportation.

ABBREVIATIONS

BFR	-	Brominated Flame Retardant
CCC	-	Common Collection Centre
CFC	-	Chloro Fluro Carbon
CFL	-	Compact Fluorescent Lamp
CPCB	-	Central Pollution Control Board
CRT	-	Cathode Ray Tube
CTE	-	Consent to Establish
CTO	-	Consent to Operate
DRS	-	Deposit Refund Scheme
EEE	-	Electrical Electronic Equipment
EoL	-	End of Life
EPR	-	Extended Producer Responsibility
EST	-	Environmentally Sound Technology
HCFC	-	Hydro Chloro Fluro Carbon
HW (M)	-	Hazardous Waste (Management)
IT& TE	-	Information Technology & Telecommunication
Equipment IEC	-	Importer/ Exporter Code
LCD	-	Liquid Crystal Display
LED	-	Light Emitting Diode
MoEF& CC	-	Ministry of Environment, Forest and Climate
Change MT	-	Metric Ton
NGOs	-	Non-Governmental Organisation
PAN	-	Permanent Account Number
PCB	-	Printed Circuit Board
PCBs	-	Polychlorinated Biphenyls
PCC	-	Pollution Control Committees
PCTs	-	Polychlorinated Terphenyls
PRO	-	Producer Responsibility Organization
PWB	-	Printed Wire Board
RoHS	-	Reduction of Hazardous Substances
RWAs	-	Resident Welfare Associations

SPCB	-	State Pollution Control Board
TIN	-	Taxpayer Identification Number
TSDF	-	Treatment, Storage & Disposal Facility
TV	-	Television

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5. UNU-IAS E-Waste Statics, Guidelines on classification, reporting and indicators
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Annexure - I

Example for Calculation of E-waste Generation

E-waste generation (weight or number) in the financial year '*x – y*'

= Sales in the financial year '(x-z) - (y-z)'

'x – y' = financial year in which generation estimated, z= average life span of EEE)

For example

For financial year 2016 -17,

x - y = 2016 -17 (April 2016 to March 2017)

If EEE, for which generation is to be estimated, is **ITEW 15**

means cellular phones that is either smart phone or feature phones then

z= 5 years or z = 7 years as from the table in chapter 2.1

1. The estimated generation of end of life **ITEW 15 – smart phone** in the FY 2016-17

= Sales in the (FY year 2016-5 – 2017-5)

= Sales in the financial year 2011-12

or

2. The estimated generation of end of life **ITEW 15 – feature phone** in the FY 2016-17

= Sales in the (FY year 2016-7 – 2017-7) either in terms of weight or number

= Sales in the financial year 2009-10 in terms of weight or number

- Therefore, generation of end of life of **smart phone in the FY 2016-17** = Sales in the financial year 2011 – 12 either in terms of weight or number
- Similarly, generation of end of life of **feature phone =** Sales in the financial year 2009-2010 either in terms of weight or number

3. Also during financial year 2016 -17 the collection target is to be for the period October, 2016 to March 2017 (six months) so generation calculation should also be on pro-rata basis and accordingly target may be estimated

4. For financial year 2017 - 18 and subsequent financial year, the generation of end of life should be calculated as given in the example above.

Annexure – II

Date:

Self-Declaration Form
(As per E-Waste (Management) Rules, 2016)

Producer Details:

S.No.	Required Information	Details
1.	Company Name with Complete Address from where business/sale in the entire country is being managed:	
2.	Name of Authorised Person Email: Telephone: Fax: Mobile Number: Complete Postal Address:	
3.	Brand name (if any):	

Self-Declaration for Compliance of
Reduction in the use of Hazardous Substances (RoHS)
(As per E-Waste (Management) Rules, 2016)

We_____being the Producer as per E-Waste (Management) Rules, 2016, hereby declare that all the EEE, being offered for sale in the country by our company and covered in the Schedule – I of the E-Waste (Management) Rules, 2016 and listed at enclosure - A comply with the sub rule (1) of the Rule16 of the above said Rule.

Authorizing Signatory (Name/Signature/Seal)

Date:

Enclosed: Enclosure A

Enclosure – A

S. No.	Product Category & Code* (as per Schedule I of E-Waste (M) Rules, 2016	Product name**	Model No.**	Weight of Product (kgs) or Numbers	Date of placing on Market (In case of import, date of entry in The country)	Compliance with RoHS Yes/No/ Partial	RoHS Information provided on product information booklet Yes/No	In case Product is imported from other country, name of the country where product is manufactured

**Add additional rows for products and models

Authorizing Signatory (Name/Signature/Seal)

Date:

Annexure – III

Technical Documents for RoHS(EN 50581 of EU)

1. General description of the product
2. Documents for materials, parts and/or sub-assemblies
3. Supplier declarations (covering specific material, part and/or sub-assembly, or a specific range of materials, part and/or sub-assemblies) and/or contractual agreement, such as:

    (i) Supplier declarations, confirming that the restricted substance content of the material, part, or sub-assembly is within the permitted levels and identifying any exemptions that have been applied
    (ii) Signed contracts confirming that the producer's specification for the maximum content of restricted substances in a material, part, or sub-assembly is fulfilled.

4. Material Declarations:

    (i) Material declarations providing information on specific substance content and identifying any exemptions that have been applied.

and/or

5. Analytical test results:

    (i) Analytical test results using the methods described or referenced in EN 62321

Annexure – IV

GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTIONTS: - EFFULENTS

S.No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for irrigation	Marine coastal areas
1	2			3	4
		(a)	(b)	(c)	(d)
1.	Colour and odour	Not desirable	---	Not desirable	Not desirable
2.	Suspended solids mg/l, Max.	100	600	200	(a) For process waste water- 100 (b) For cooling water effluent 10 percent above total suspended matter or influent.
3.	Particulate size of suspended solids	Shall pass 850 Micron IS Sieve	--	--	(a) Floatable solids, Max. 3 mm. Settle able solids, Max. 850 microns.
4.	pH Value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5.	Temperature	Shall not exceed 5°C above the receiving water temperature	---	---	Shall not exceed 5°C above the receiving water temperature
6.	Oil and grease mg/l Max.	10	20	10	20
7.	Total residual chlorine mg/l Max	1.0	---	--	1.0
8.	Ammonical nitrogen (as N), mg/l Max.	50	50	--	50
9.	Total Kjeldahl Nitrogen (as NH_3) mg/l, Max.	100	--	--	100
10.	Free ammonia (as NH_3) mg/l, Max.	5.0	--	--	5.0
11.	Biochemical Oxygen demand [1][3 days at 27°C] mg/l max.	30	350	100	100
12.	Chemical Oxygen Demand, mg/l, Max.	250	--	--	250
13.	Arsenic (as As), mg/l, Max.	0.2	0.2	0.2	0.2
14.	Mercury (as Hg), mg/l, Max.	0.01	0.01	--	0.01

S.No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for irrigation	Marine coastal areas
1	2			3	4
		(a)	(b)	(c)	(d)
15.	Lead (as Pb) mg/l, max.	0.1	1.0	--	2.0
16.	Cadmium (as Cd) mg/l, Max.	2.0	1.0	--	2.0
17.	Hexavalent chromium (as Cr+6), mg/l max.	0.1	2.0	--	1.0
18.	Total Chromium (as Cr.) mg/l, max.	2.0	2.0	--	2.0
19.	Copper (as Cu) mg/l, Max.	3.0	3.0	--	3.0
20.	Zinc (As Zn.) mg/l, Max.	5.0	15	--	15
21.	Selenium (as Se.) mg/l Max.	0.05	0.05	--	0.05
22.	Nickel (as Ni) mg/l, Max.	3.0	3.0	--	5.0
23.	Cyanide (as CN) mg/l Max.	0.2	2.0	0.2	0.2
24.	Fluoride (as F) mg/l Max.	2.0	15	--	15
25.	Dissolved phosphates (as P), mg/l Max.	5.0	--	--	--
26.	Sulphide (as S) mg/l Max.	2.0	--	--	5.0
27.	Phenolic compounds (as C_6H_5OH) mg/l, Max.	1.0	5.0	--	5.0
28.	Radioactive Materials:				
	(a) Alpha emitter micro curie/ml.	10^{-7}	10^{-7}	10^{-8}	10^{-7}
	(b) Beta emitter micro curie/ml.	10^{-6}	10^{-6}	10^{-7}	10^{-6}
29.	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90%survival of fish after 96 hours in 100%effluent	90%survival of fish after 96 hours in 100% effluent
30.	Manganese (as Mn)	2 mg/l	2 mg/l	--	2 mg/l
31.	Iron (as Fe)	3 mg/l	3 mg/l	--	3 mg/l
32.	Vanadium (as V)	0.2 mg/l	0.2 mg/l	--	0.2 mg/l

S.No.	Parameter	Standards			
		Inland surface water	Public Sewers	Land for irrigation	Marine coastal areas
1	2			3	4
		(a)	(b)	(c)	(d)
33.	Nitrate Nitrogen	10 mg/l	--	--	20 mg/l

Annexure – V

NATIONAL AMBIENT AIR QUALITY STANDARDS

Sl. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), µg/m^3	Annual *	50	20	- Improved West and Geake
	-	24 hours**	80	80	- Ultraviolet Fluorescence
		-			
2	Nitrogen Dioxide (NO_2), µg/m^3	Annual *	40	30	- Modified Jacob & Hochheiser (Na- arsenite)
		24 hours**	80	80	- Chemiluminescence
3	Particulate Matter (size less than 10 µg/m_3) or PM_{10} µg/m^3	Annual *	60	60	- Gravimetric - TOEM
		24 hours**	100	100	- Beta Attenuation
4	Particulate Matter (size less than 2.5µm) or $PM_{2.5}$ µg/m^3	Annual *	40	40	- Gravimetric - TOEM
		24 hours**	60	60	- Beta attenuation
5	Ozone (O_3) µg/m^3	8 hours * *	100	100	- UV photometric - Chemiluminescence
		1 Hour**	180	180	- Chemical Method
6	Lead (Pb) µg/m^3	Annual *	0.50	0.50	- AAs/ICP method after sampling on EPM 2000 or equivalent filter paper
		24 hours**	1.0	1.0	- ED-XRF using Teflon filter
7	Carbon Monoxide (CO) mg/m^3	8 hours**	02	02	- Non Dispersive Infra-Red(NDIR) Spectroscopy
		1 hour**	04	04	
8	Ammonia (NH_3) µg/m^3	Annual *	100	100	- Chemiluminescence - Indophenol blue method
		24 hours**	400	400	
9	Benzene (C_6H_6) µg/m^3	Annual *	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo (a) Pyrene (Bap)- Particulate phase only, ng/m^3	Annual *	01	01	- Solvent extraction followed by HPCL/GC analysis
11	Arsenic (As), ng/m^3	Annual *	06	06	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m^3	Annual *	20	20	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

***Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.**

**** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.**

Note. – Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

List of Abbreviations

MeitY: Ministry of Electronics and Information Technology
MAIT: Manufacturers Association for Information Technology
LOHAS: Lifestyles for Health and Sustainability
e-waste: Electronic Waste
RWAs: Resident Welfare Associations
EPR: Extended Producer Responsibility
PPP: Purchasing Power Parity
TV: Television
CRT: Cathode Ray Tube
LCD: Liquid Crystal Display
LED: Light Emitting Diode
CPCB: Central Pollution Control Board
PVC: Polyvinyl Chloride
PCBs: Polychlorinated Biphenyls
TSDF: Treatment, Storage and Disposal Facility
BFR: Brominated Flame Retardants
PBB: Polybrominated Biphenyls
PBDE: Polybrominated Diphenyl Ethers
ATM: Automated Teller Machine
WEEE: Waste Electrical and Electronic Equipment
CFC: Chlorofluorocarbon
HCFC: Hydrochlorofluorocarbons
HFC: Hydroflourocarbon
HC: Hydrocarbon
UNEP: United Nations Environment Programme
DRS: Deposit Refund Scheme
PRO: Producer Responsibility Organisation
OHS: Occupational Health and Safety
PCDD/Fs: Polychlorinated dibenzo-p-dioxins
PBDD/Fs: Polybrominated dibenzo-p-dioxins
CO2: Carbon Dioxide
IEC: Information, Education and Communication

About this Manual

Under the Digital India Mission, the Ministry of Electronics and Information Technology (MeitY) has initiated a project "*Awareness Programme on Environmental Hazards of Electronic waste".* The programme aims to enhance awareness on the growing challenges and opportunities provided by e-waste.

This manual, for students, is a part of a series of training materials prepared for all the relevant stakeholders involved in e-waste management in India. Through this programme and by publication of awareness materials, MeitY aims to develop standardized content for reaching out to the relevant stakeholders.

The focus group of this particular manual are students, a critical and vibrant community of change agents in society. This manual intends to present the subject of e-waste and its multiple facets in a manner that engages students in experiential learning about e-waste. The manual uses state of the art methodological approaches such as Harvard Case Methodology and Walker Learning Cycle to enable students not only learn but also act – as responsible consumers and communicators for environmental change.

The manual uses different methods to achieve the change objective including the Donna E. Walker's 'Learning Cycle' that has five steps including Mind Jog, Personal Connection, Information Exchange, Information Application and Real World Connection. This method takes into account that different learners have different learning abilities and at least one of the steps of the cycle would be able to transfer the learning effectively.

In addition it uses Harvard case method that involves presenting a case to students where they associate themselves with a role as they read through the situation and identify the problem. The next step is to perform the necessary analysis to determine the cause and possible solutions to the problem. The manual provides essential information and situations that form cases that can be discussed with the students by the trainer.

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