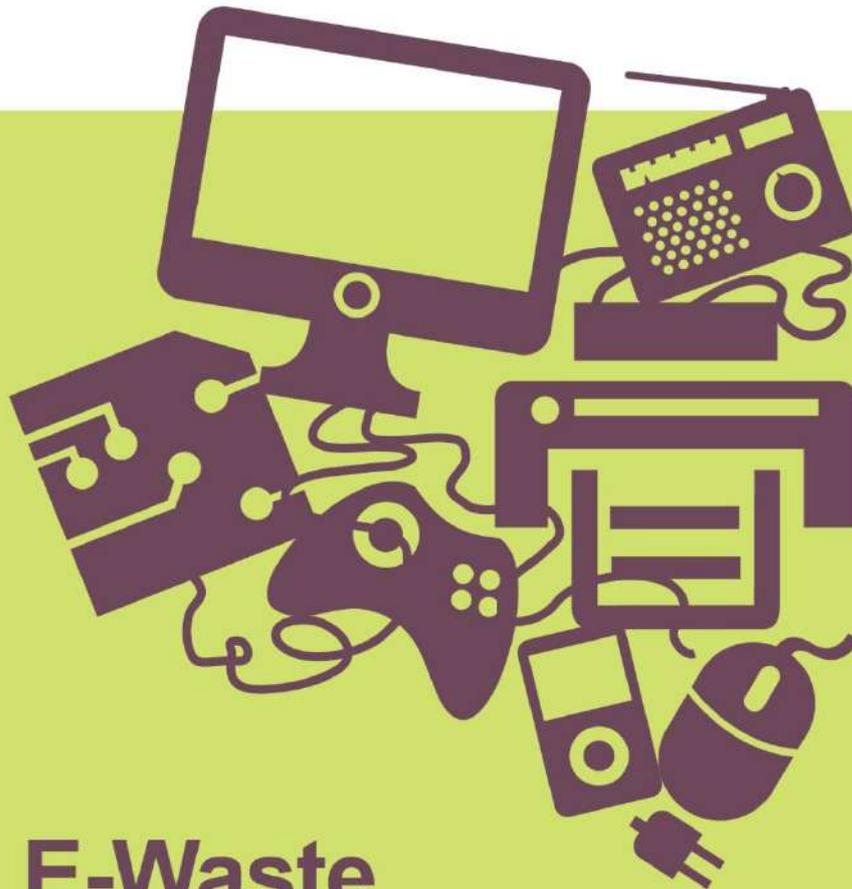




सत्यमेव जयते  
Ministry of Electronics  
and Information Technology  
Government of India



# E-Waste Awareness for Bulk Consumers



# Manual for Training of Trainers

(2016)

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# Imprint

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# 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, 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 will be covered. The activities will 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 would also be framed for schools/colleges. Effort would be made to prepare the content in local language.

This project will also stress 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 that 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 channelisation 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 also aims to enhance its reach to more 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 act** as a tool for enhancing the understanding of the trainers who would be involved in conducting the training for bulk consumers 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 bulk consumers.

**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 bulk consumers 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 bulk consumers. 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 bulk consumers.

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

The training provided will increase knowledge amongst bulk consumers 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 bulk consumers 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 bulk consumers 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 bulk consumers 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 bulk consumers 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.

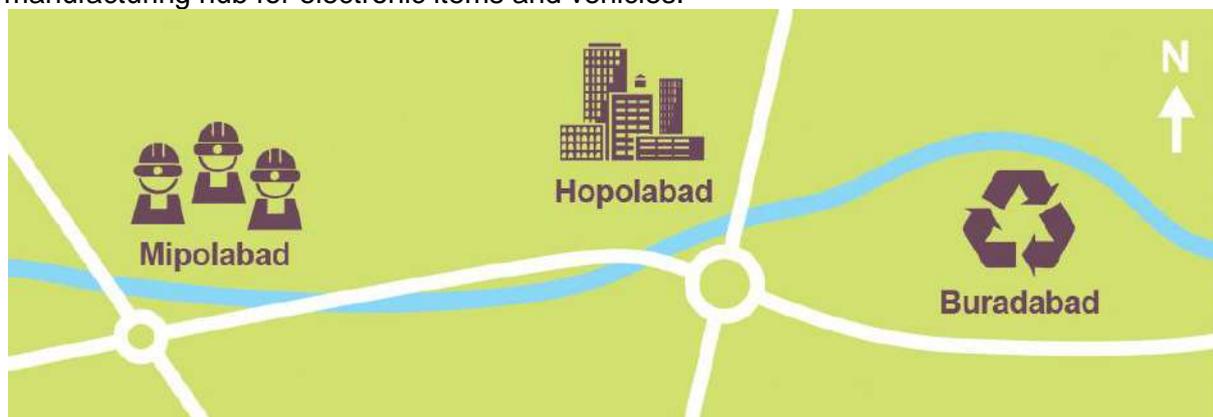
Component 2 is on the learning cycle which has been adopted from the finest techniques available for experiential learning today. The sessions help to unpack the subject at hand and enable to gain a better understanding of solutions in order to solve the problem. It also ensures that engagement is built 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 bulk consumers who purchase electronic products for their companies. One of the companies is state owned while the other is privately owned.

This fictitious conversation is based in the city of Hopolabad. The city of Hopolabad is a business hub of the country and has thriving businesses in the manufacturing and service sectors. Mipolabad is a mining hub situated to the west of Hopolabad and Buradabad is a recycling hub which is located to its east. 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 10 lakh 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:

**Shankar:** A procurement manager at Mipolabad Mining Company which is a government owned behemoth. Shankar has a fondness for collecting items made out of waste and is a recycling champion. He has lead several initiatives to build capacity within the organisation and in the cities of Hopolabad and Buradabad.

**Prakash:** A procurement manager in one of the largest IT company in Hopolabad. His organisation has more than 3000 employees and are major exporters of software around the

world. He is grappling with the new e-waste rules which have been notified since he has to dispose off old computers and laptops. The company has purchased new ones recently due to upgrades in software and licensing requirements. He is presently trying to speak to experts and attend conferences and workshops so that he can learn about the issue and offer the best possible solution to the management at the company.

**Sarvesh:** He is the CEO of the IT company which Prakash works for in Hopolabad. After the notification of the rules, he has tasked Sarvesh with finding the best possible solutions from experts.

### About the conversation:

**This conversation** has 3 acts to it. ACT 1 is the conversation at a conference which is being attended by Shankar and Prakash. The conference is on the topic of extended producer responsibility of those who are manufacturers of electronics and of those who produce electronic waste. Shankar is one of the speakers at the conference and shares with the audience the steps that his company has taken to comply with the rules. Prakash speaks to Shankar during lunch to understand the steps that his company can take so that he can address the problem of e-waste in his organisation.

**The second part** of the conversation, Prakash comes back to Sarvesh with a plan to tackle the problem of e-waste management in the organisation. Sarvesh then asks him to prepare a plan and present it to some experts by organising a workshop so that they can comment on the same. He also asks Shankar to invite manufacturers and recyclers to this workshop so that there is consensus within the respective stakeholders on this issue.

**The third part** of the conversation, Shankar organises the workshop on e-waste management and present his company's plan to tackle the issue. Experts, manufacturers and recyclers comment on the plan to make it robust so that it complies with the rules.

## ACT I

*Shankar and Prakash meet up at a conference in Hopolabad which is discussing the issues on extended producer responsibility in the e-waste sector. During lunch they strike up a conversation after Shankar has demonstrated during the just concluded session how his company has set up systems which have lead to better e-waste management and in compliance with the rules.*

It is 1.30 pm and Shankar meets Prakash over lunch at the conference.

**Prakash:** *Hi Shankar, I am Prakash from Hopolabad Software. I was very keenly following your presentation.*

**Shankar:** *I hope you found something useful in the same.*

**Prakash:** *Of course, I did. In fact if you have a few minutes, I would like to ask you about your journey in setting up these systems and processes in your organisation.*

**Shankar:** *Of course, I will be happy to share our experience with you.*

**Prakash:** *So tell me. When did you start thinking about having a process set in place for e-waste disposal?*

**Shankar:** *You see, in 2012 when the e-waste rules were first published, I went through the same and realised the importance that this subject, the increasing quantities of e-waste being generated in India, the likely adverse impact it may have on environment and health, if*

safe disposal practices are not implemented. I also chanced upon some research regarding the materials which go into manufacturing of electronics. It was only then that I decided that as one of the largest government organisations in the city, we ought to do something to show the way.

**Prakash:** Was this decision driven by environment concerns or compliance to the rules?

**Shankar:** In fact both. You see compliance with the rules was the starting point but once I got to know about the environment issues that are related to better e-waste management, I took it upon myself to ensure that we disposed off our e-waste properly.

**Prakash:** What kind of systemic changes you brought about in your organisation?

**Shankar:** You see to start with, we collected a whole lot of data.

**Prakash:** What kind of data?

**Shankar:** We first collated data on all the electronic items which we had procured over the last 5 years. Once we had done this inventorization exercise, we then chose to focus on the procurement which we had to do to either replace electronic items which were not functioning properly or fresh procurement which had to be done keeping in mind the growth projections of the company for the coming year.

**Prakash:** How did this data help you?

**Shankar:** Once we got to know the total amount of procurement that had to be done in the year, we focussed on defining the procurement contracts in a manner that would comply with the e-waste rules.

**Prakash:** But how did you manage to link procurement with e-waste disposal?

**Shankar:** You see like in any large organisation, we procure in bulk quantities, and hence manage to get service contracts embedded in purchase contracts with the suppliers. This helps us to ensure that the items we procure are in sound working condition till they reach end of life, or have expired the duration of the service contract.

**Prakash:** But after that the supplier himself takes away the items or we tender for disposal of the waste items and get rid of them.

**Shankar:** Yes, we used to do something like that. But now we have made some changes to comply with the rules.

**Prakash:** Ok, and what are these changes?

**Shankar:** We have included in the contracts that the supplier has to ensure that all the items that he takes back from us which have reached end of life, he will ensure that these are handed over to a proper recycler. The recycler has to be authorised by our pollution control board and is supposed to provide a certificate for our records of proper dismantling and recycling of the electronic items.

**Prakash:** Well, we just tender for the sale of these items which have reached end of life and whosoever bids the highest takes them away.

**Shankar:** Yes, that was the norm and in some cases still is. But its not complying with the rules. What you need to do is to ensure that these items go back to a proper recycler. Environmentally, it is important because the unauthorized recyclers dismantle and recycle your products in ways which leads to environment pollution. This not only has impacts on our health but the material recovery that happens from these items is less than what should be.

**Prakash:** But isn't it their livelihood as well.

**Shankar:** It is, but there is nothing stopping them from becoming authorized to carry on with their trade. You see, we live in a world which has finite resources and we need to ensure that our coming generations and also lay their hands on the same so that they are able to grow as well. If we keep losing materials and not recovering them properly, then we might leave nothing for them.

**Prakash:** I agree. I have read about crude oil and the fact that we might finish the reserves for petroleum in the next 50 years. But I think you will also agree that not many people are thinking about resources from the point of conserving them and using them optimally.

**Shankar:** You know that was the second step as part of our process. We even encouraged employees to dispose off their electronics in a manner that was environmentally sound. We have tied up with NGOs to ensure that they conduct e-waste collection drives in our offices

and whatever is collected is channelised to the formal recyclers. This helps us to create some social impact as well.

**Prakash:** That's great. I never thought of it in that manner.

**Shankar:** You see in large organisations, departments work in silos which is why we never think of solving problems which have a larger social and environment impact holistically.

**Prakash:** But how did you get so many departments in your organisation on board.

**Shankar:** You see, I organised a workshop of all departmental heads and requested a couple of experts to guide us on setting up these processes in systems. This helps to create awareness in the organisation on the issue. The department heads then took it upon themselves to ensure that employees in their respective work streams were made aware about the issue at hand and that is how we created this change.

**Prakash:** But how did you ensure that the external agencies were complying with the rules.

**Shankar:** We have contracts and conduct due diligence at regular intervals. These include onsite inspections with suppliers and their recyclers. We also speak to their employees to ensure that they are aware of the rules and regulations so that compliance is taking place at all levels.

**Prakash:** This has been a really informative discussion. Can I please have your business card so that I can write to you in case there are any queries that I may have?

**Shankar:** Yes, sure.

Shankar and Prakash exchange business cards and enter the conference hall for the start of the next session

(ACT I completed)

## ACT II

*Prakash has prepared a plan with help from Shankar and will present the same to Sarvesh.*

**Prakash:** Good afternoon Sarvesh! Can we start the presentation?

**Sarvesh:** Yes Prakash. Since the time you told me about this issue I have done some reading on the same as well. I think this will be really interesting. Please go ahead.

**Prakash:** You see the organisation procures electronics in bulk every year depending upon the request for replacement as well as the projected growth of the company and the addition of new employees.

**Sarvesh:** True. I guess everyone works in the same manner.

**Prakash:** Yes, but we have never bothered to ensure that all the material which has reached end of life or is being replaced for other purposes is disposed off in an environmentally sound manner.

**Sarvesh:** Yes, I agree.

**Prakash:** So what we should do is to ensure that we take the environment impact into consideration of improper disposal of e-waste and incorporate a policy in our organisation which will ensure that we comply with the rules as well.

**Sarvesh:** I hope it is not too complicated.

**Prakash:** No it is not. In fact, I have consulted a few experts on the matter as well as with the procurement chief at Global IT, which is the largest government IT organisation in Hopolabad.

**Sarvesh:** That's great. I am sure this will be interesting. Please go ahead.

**Prakash:** You see, what we have been doing till date is procuring items from manufacturers or their authorised suppliers. Having used these items till a point where they are not useful to us anymore, we have been disposing them off to the highest bidder through an open tender process.

**Sarvesh:** But that is common practice. Isn't it?

**Prakash:** Yes, but it is not environmentally sound. In order to ensure that we are disposing them in an environmentally sound manner, we should dispose it off to the authorised recycler so that he can recycle the e-waste properly while complying with the rules.

**Sarvesh:** Yes, I read about the rules and the responsibilities that we have as bulk consumers.

**Prakash:** In fact information on those recyclers who have been authorised for proper handling and management of e-waste is available on the website of the central pollution control board.

**Sarvesh:** Ok. So does that mean that from now onwards we will have to give away our e-waste to only these recyclers and not to anyone else who comes and bids in an open tender process that we follow.

**Prakash:** Yes but there are other ways to manage this as well. We need to ensure that there are guidelines which we draw up in these tenders which ensures that all the items which we dispose off are recycled in a manner which is environmentally sound and complies with the rules. In most cases, we can exchange these items for news ones from our existing suppliers, but we need to ensure that all contracts will specifically mention that the old items which have been replaced will be sent across to authorised recyclers only and we need to be provided with evidence that the items have been properly recycled in compliance with the standards that have been set in the e-waste rules.

**Sarvesh:** What about items which we purchased afresh and not under any exchange?

**Prakash:** In that case, these items will be under service contract and post the expiry of the contract we directly dispose it off to an authorised recycler

**Sarvesh:** What is the entire logic behind disposing off in this manner?

**Prakash:** You see, the electronic items which we use, contain hazardous materials as well along with plastics, metals and even rare earths. The recycling process that is followed by the informal sector is not adept at dealing with the hazardous materials in end of life electronic products. This leads to pollution of the environment and creates health hazards for people working in this sector as well as those who are residents of areas where this work takes place. A case in point is Buradabad in our neighbourhood.

**Sarvesh:** But why isn't the government doing anything in this regard?

**Prakash:** You see the new e-waste rules actually are meant to ensure that we as bulk consumers and hence disposers of e-waste are able to guide the material back through proper channels so that they have an incentive to formalise in order to gain access to materials.

**Sarvesh:** That's a good step that way.

**Prakash:** It is also important that we are able to check the process that is followed at the end of the recycler to be able to understand that the material that we are disposing is properly recycled and the material is recovered to the maximum extent possible. We need to ensure that we include conditions like visitation rights to their facilities so that we can monitor that the e-waste is being recycled in an environmentally sound manner, the material that is recovered is channelled through proper sources and we get a certificate for the material that we have disposed stating that it has been recycled as per the norms laid down by the central pollution control board.

**Sarvesh:** Doesn't that increase our work a great deal?

**Prakash:** It does in the first phase but we need to ensure that we have guidelines set for our organisation regarding proper disposal of e-waste. Once this is done, we shall be monitoring the process which will only breed efficiency within our organisation as well.

**Sarvesh:** What other support will you need from the organisation?

**Prakash:** I would like to organise a workshop with all departmental heads including you if possible so that I am able to guide everyone regarding the steps which we wish to take in order to set up this process. I will also be inviting a couple of experts who will be able to advise on what we can do in order to ensure that we are complying with the rules.

**Sarvesh:** Please send me an email regarding the same and I will have it communicated to all departmental heads as something where their attendance is mandatory.

**Prakash:** Thank you Sarvesh.

(ACT II completed)

## ACT III

*Prakash has organised a workshop with departmental heads of his organisation. He has roped in Shankar to play the role of an expert who has knowledge of proper e-waste disposal having set up the process in his organisation.*

**Prakash:** *Good morning everyone. Let me introduce you to Mr Shankar who is the procurement head at Global IT which has set up processes for proper e-waste disposal. We are also in the process to draft guidelines for our organisation and today we have invited him to help us understand the key issues and guide us further keeping in mind the compliance to the rules of e-waste handling and management. I will now make a presentation on e-waste and the affects of its improper disposal. Post that we can take questions from all of you which can be answered by Shankar and myself.*

(Prakash makes a 15 minute presentation on the subject)

**Sarvesh:** *Thank you for the presentation Prakash. I am sure all of us here have been enlightened on the subject. My question is, what are the agencies which will support us in ensuring that we are able to manage our e-waste properly?*

**Shankar:** *Thank you Sarvesh. That is a very important question. You see there is a lifecycle for an electronic product. It starts from mining of the metals, manufacturing of the material till it is sold through different channels to different kinds of consumers. Post its usefulness to the consumer, it is then disposed off. At the disposal stage there are different kinds of actors like a local kabadiwala who dismantles the product and then sells whatever he can't handle or a proper authorised recycler who takes away the disposed material and uses proper means and methods to recycle the material in an environmentally sound manner. The pollution control board monitors a lot of these activities and we need to ensure that we follow the guidelines that are set by them and the environment ministry in order to comply with the rules. Further more, we can ensure that at stages of procurement and rules we have contracts which ensure that compliance of rules is adhered to by the agencies who we are procuring from or disposing to.*

**Sarvesh:** *How do we sensitize employees to ensure that they adhere to the rules as well since they are also consumers of electronic items*

**Shankar:** *In fact this meeting of departmental heads is a stepping stone for the same. Each one of you use electronic products in your respective departments. You can organise small workshops or training sessions on this subject. In my organisation, this lead to employees coming back to us and asking us on how to dispose electronic products from their households since no recycler would come to take a single product. We set up collection drives in partnership with a NGO with the condition that the products would be channelised to an authorised recycler. This also helped to garner support for the social cause that the NGO upheld.*

**Sarvesh:** *What are the key aspects that we need to consider while disposal of items?*

**Shankar:** *You see all electrical and electronic items have different compositions. Some contain hazardous materials as well. In order to ensure that these are not mixed, you should have a defined space for collection of products which have reached end of life and will be disposed. This inventorization has to be duly recorded so that you are ensure that hazardous items are not mixed with non hazardous ones. Second, you must ensure that you have checked all certifications of agencies you are dealing with and monitor their activities so that you are absolutely sure of the compliances which need to be met as per the rules.*

**Sarvesh:** *Thank you Shankar and Prakash for organising this workshop and guiding us. We will certainly set up our processes for e-waste disposal in this manner and ensure that employees are also sensitized about these issues.*

(ACT III completed)

*Shankar has now set up a process for e-waste disposal and has tied up with agencies which follow the rules for proper disposal of e-waste. Over the last 3 months, employees have contributed 500 kgs of e-waste in a drive that was organised with a NGO.*

## 4. References:

a) What is e-waste, its impact and generation status in India?

### Electronic waste or e-waste:

'e-waste' means waste electrical and electronic equipment whole or in part or rejects from their manufacturing, refurbishment and repair process which are intended to be discarded as waste.

#### 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>

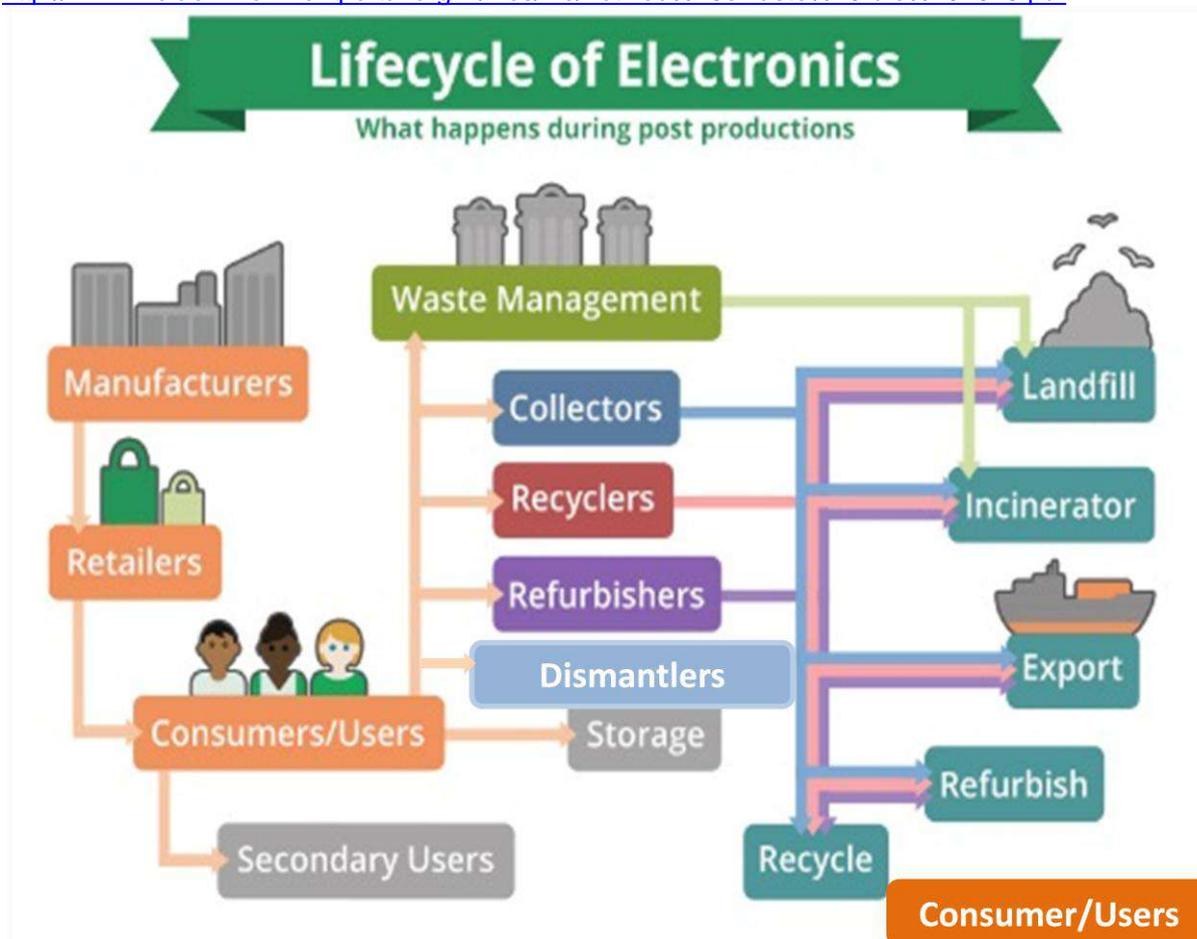


Figure 1: Lifecycle of electronics

#### Source:

<http://greatforest.com/sustainability101/uncategorized/e-waste-recycled-video/>

Around 1.7 million tonnes of e-waste is generated in India per year (Baldé, (2015)). 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 pace. The increasing "market penetration" in developing countries, "replacement market" in developed countries and "high obsolescence rate" make WEEE/E-waste one of the fastest waste streams. Main contributors of e-waste includes It 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:

Baldé, C.P., Wang, F., Kuehr, R., Huisman, J. (2015), The global e-waste monitor – 2014, United Nations University, IAS – SCYCLE, Bonn, Germany, <http://i.unu.edu/media/ias.unu.edu-en/news/7916/Global-E-waste-Monitor-2014-small.pdf>

WEEE Recycle & CSE. E-Waste Training Course for Policymakers and Regulators – Facilitator's Manual, <http://www.igep.in/live/hrdpmp/hrdpmaster/igep/content/e54413/e54441/e62968/WEEERecycleCSEmanual.pdf>

Rajya Sabha Secretariat 2011: E-waste in India. New Delhi. [http://rajyasabha.nic.in/rsnew/publication\\_electronic/E-Waste\\_in\\_india.pdf](http://rajyasabha.nic.in/rsnew/publication_electronic/E-Waste_in_india.pdf)

## 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, aluminium and precious metals like silver, gold, platinum, palladium etc.

Pollutant/ Element	Occurrence
<b>Arsenic</b>	Semiconductors, diodes, microwaves, LEDs (light emitting diodes), solar cells
<b>Barium</b>	Electron tubes, filler for plastic and rubber, lubricant additives
<b>Brominated flame –proofing agent</b>	Casing, circuit boards (plastic), cables and PVC cables
<b>Cadmium</b>	Batteries, pigments solder, alloys, circuit boards, computer batteries, monitor cathode ray tubes (CRTs)
<b>Chrome</b>	Dyes/pigments, switches, solar
<b>Cobalt</b>	Insulators
<b>Copper</b>	Conducted in cables, copper ribbons, coils, circuitry, pigment
<b>Lead</b>	Lead rechargeable batteries, solar, transistors, lithium batteries PVC(polyvinyl chloride ) Stabilizers, lasers,

	LEDs, thermoelectric elements, circuit boards
<b>Liquid crystal</b>	Displays
<b>Lithium</b>	Mobile telephones, photographic equipment, video equipment (batteries)
<b>Mercury</b>	Components in copper machines and steam irons; batteries in clocks and pocket calculators, switches, LCDs
<b>Nickel</b>	Alloys, batteries, relays, semiconductors, pigments
<b>PCBs (Polychlorinated biphenyls)</b>	Transformers, capacitors, softening agent for paint, glue plastic
<b>Selenium</b>	Photoelectric cells, pigments, photocopiers, fax machine
<b>Silver</b>	Capacitors, switches (contacts), batteries, resistors
<b>Zinc</b>	Steel, brass, alloys, disposable and rechargeable batteries, luminous substances.

**Table 1: Pollutants and their occurrence in e-waste**

**Source:**

Rajya Sabha Secretariat, 2011

**Table 2: Hazards substances in e-waste (CPCB, 2008)**

<b>Hazardous Substance</b>	<b>Danger</b>
<b>Lead</b>	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 from microchips release lead as powder and fumes.
<b>Plastic</b>	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.
<b>Chromium</b>	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.
<b>Mercury</b>	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.
<b>Beryllium</b>	Found in switch boards and printed circuit boards. It is carcinogenic and causes lung diseases.
<b>Cadmium</b>	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.
<b>Acid</b>	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.

<b>PBB</b>	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.
<b>PBDE</b>	Leads to restriction in development of kids between the age of 1 and 6 years.

**Table 3: Possible Hazardous substances in e-waste components (CPCB, 2008)**

<b>E-Waste Source</b>	<b>E-Waste Component</b>	<b>Environmental Hazard</b>	<b>Effects on Human</b>
<b>CRTs (used in TVs, Monitors, ATM, Video Camera, etc), Batteries, PVC cables, Paints</b>	Lead, barium & other heavy metals	These metals leaching into the ground water and release of toxic phosphor	Anemia, Renal Toxicity, Insomnia
<b>Batteries, Housing &amp; Medical equipment</b>	Mercury	Air emissions as well as discharge into rivers of glass dust	Renal Toxicity, Muscle Tumors, Mental retardation cerebral palsy
<b>Plastics from printers, keyboards, monitors etc</b>	Plasticizer bisphenol-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
<b>PVC &amp; Polymer, Paints, Printing inks, electrical transformers &amp; Capacitors</b>	Polychlorinated Biphenyls (PCBs)	Include extreme pollution from production, toxic chemical exposure during use, hazards from fires	Suppression of immune system damage to the liver nervous and reproductive systems

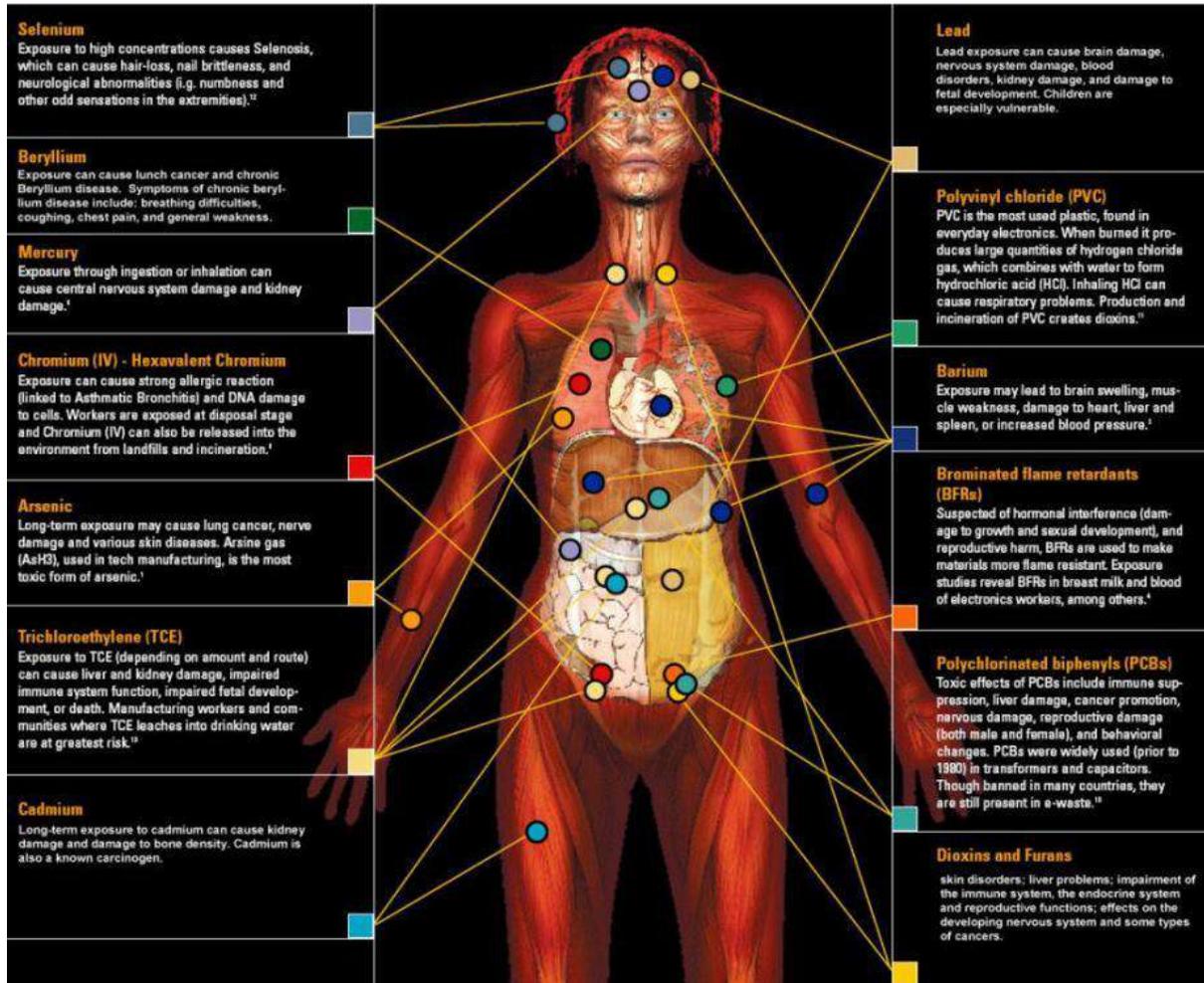


Figure 2: Adverse Impact of e-waste

Source:

[http://www.capewaste.co.za/why\\_recycle\\_ewaste.html](http://www.capewaste.co.za/why_recycle_ewaste.html)

Exposure to e-waste may lead to changes in thyroid function, changes in cellular expression and function, adverse neonatal outcomes, changes in temperament and behaviour, and decreased lung function. Boys aged 8–9 years living in an e-waste recycling town had a lower forced vital capacity than did those living in a control town. Significant negative correlations between blood chromium concentrations and forced vital capacity in children aged 11 and 13 years were also reported. Findings from most studies showed increases in spontaneous abortions, stillbirths, and premature births, and reduced birth weights and birth lengths associated with exposure to e-waste. People living in e-waste recycling towns or working in e-waste recycling had evidence of greater DNA damage than did those living in control towns.

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	

<b>CRT</b>	Lead, antimony, mercury, phosphors
<b>LCD</b>	Mercury
<b>Rubber</b>	Phthalate plasticizer, BFR
<b>Winning/electrical</b>	Phthalate plasticizer, lead , BFR
<b>Concrete</b>	
<b>Transformer</b>	
<b>Circuit Board</b>	Lead Beryllium , antimony, BFR
<b>Fluorescent Lamp</b>	Mercury, Phosphorus, Flame retardants
<b>Incandescent Lamp</b>	
<b>Heating element</b>	
<b>Thermostat</b>	Mercury
<b>BFR – containing plastic</b>	BFRs
<b>Batteries</b>	Lead, lithium, Cadmium, Mercury
<b>CFC, HCFC , HFC , HC</b>	Ozone depleting substances
<b>External electric cables</b>	BFRs, plasticizers
<b>Electrolyte capacitors (over L/D 25mm)</b>	Glycol, other unknown substances

## b) What are the Building blocks of a policy on e-waste disposal?

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

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

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

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

‘Producer Responsibility Organisation’ means a professional organisation authorised or financed collectively or individually by producers, which can take the responsibility for collection and channelisation of e-waste generated from the ‘end-of-life’ of their products to ensure environmentally sound management of such e-waste;

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

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

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

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

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

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

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

1. Does the organization or individual has authorization from the CPCB or SPCB for collecting, dismantling or recycling the e-waste.
2. Does it has safe working conditions, tools and equipment to ensure safe treatment and disposal of e-waste.

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

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

### g) LOHAS:

LOHAS is 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 homewares, domestic rainwater tanks, sustainable timbers, 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 the 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 is costing more than the computer with high percentage of harmful material and on use of recycled plastics.

For tackling 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 process 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](http://www.lohas.se/wp-content/uploads/2015/07/Understanding-the-LOHAS-Consumer-11_LOHAS_Whole_Foods_Version.pdf)

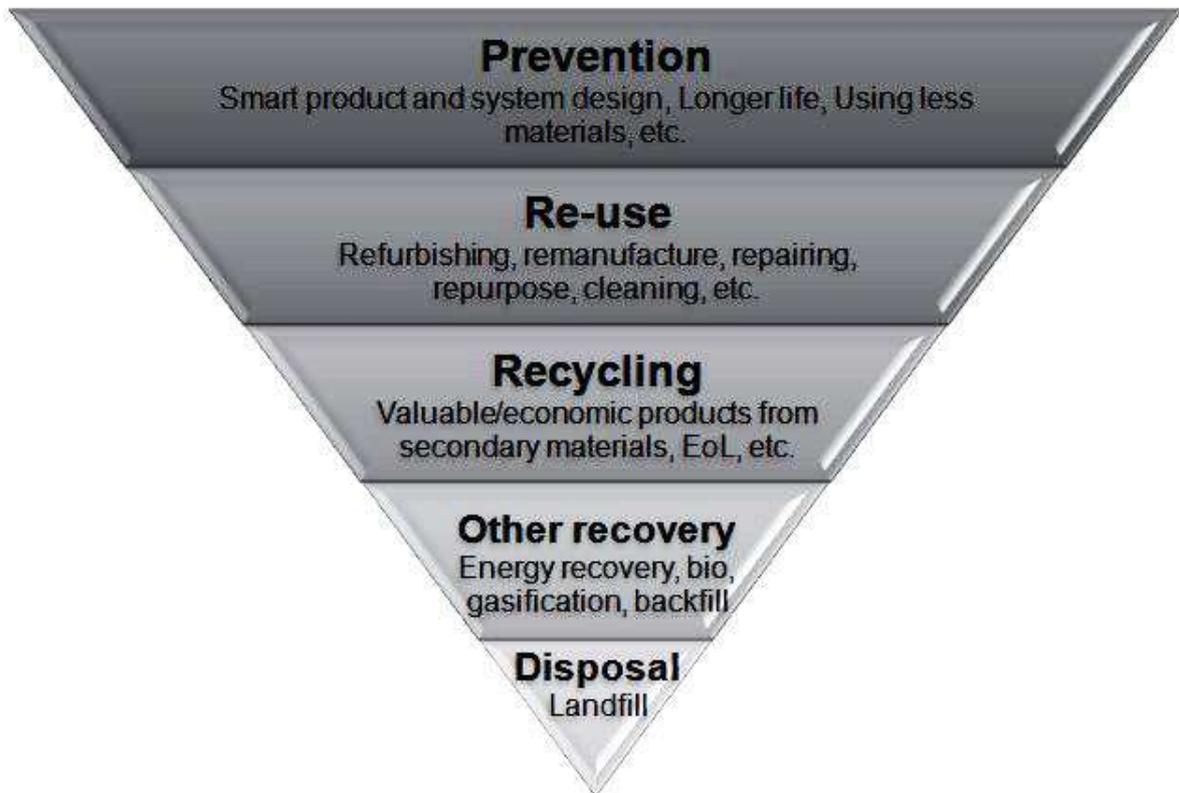
Ellen Macarthur Foundation, (2015), Concept of circular economy, <http://www.ellenmacarthurfoundation.org/circular-economy/overview/concept>

## 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 first computer made with plastics from recycled old electronics.

## Dell's Closed-loop Recycling Process

Dell becomes the first to offer a computer made via the UL Environment certified closed-loop process with the launch of the OptiPlex 3030 All-in-One. By using plastics collected through our existing takeback and recycling programs to build new systems, we are helping drive a circular economy for the IT industry.

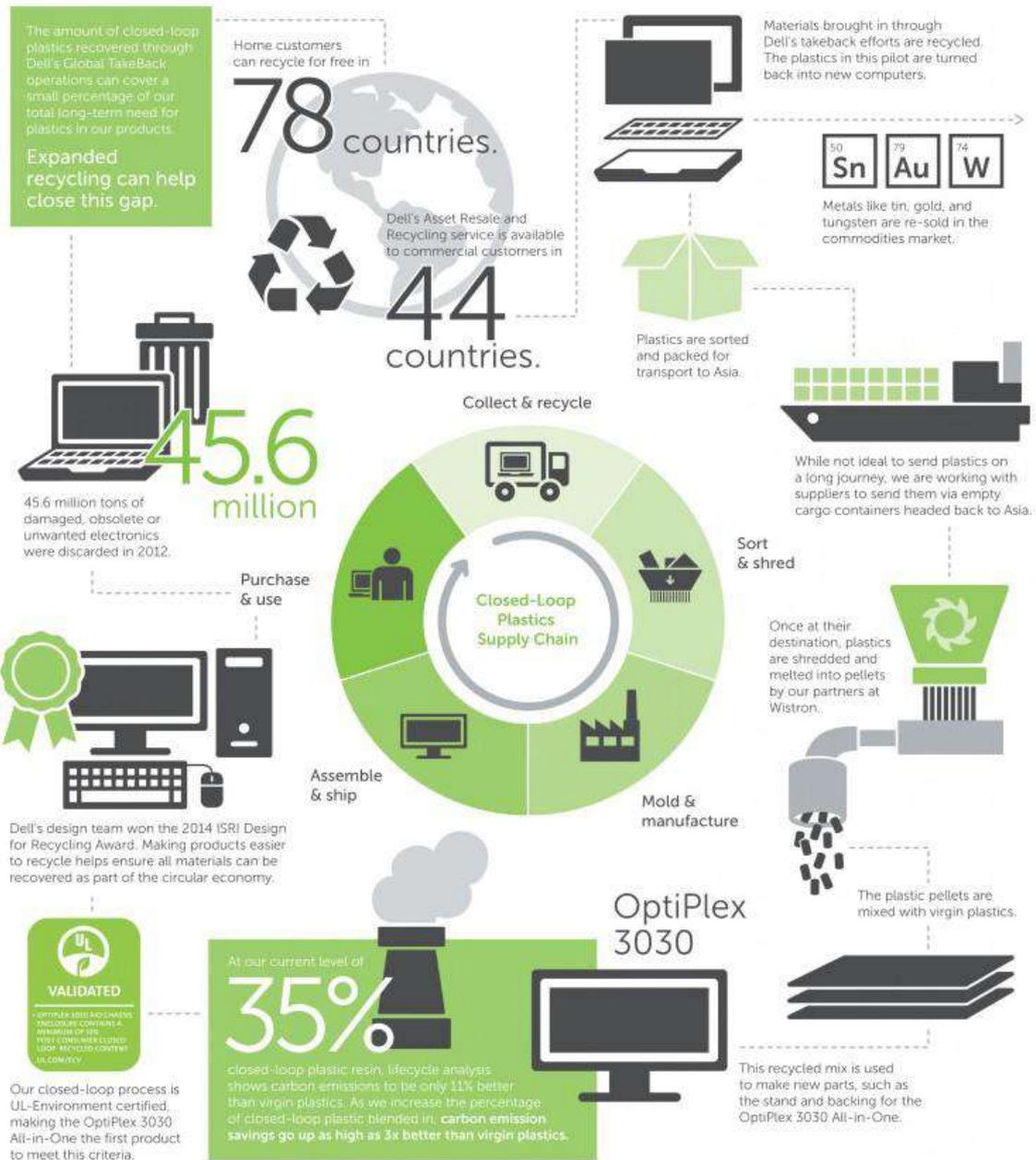


Figure 4: Closed loop recycling process

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/>

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

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

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

### Setting up a collection center for e-waste:

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

### Responsibilities of Collection Centers include:

- (1) Ensure that the facilities are in accordance with the standards or guidelines prescribed by the Central Pollution Control Board from time to time;
- (2) The e-waste collected by them is stored in a secured manner till it is sent to registered dismantler or recycler as the case may be;
- (3) Ensure that no damage is caused to the environment during storage and transportation of e-waste;

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

## 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 41.8 million tons of e-waste generation globally that is growing at an annual growth rate of 4 to 5 per cent per year (Baldé, (2015):24-25). 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 1.7 million tonnes of e-waste is generated in India (Baldé, (2015):42)). According to Central Pollution Control Board (CPCB) (2015) list of registered e-waste dismantler/recycler in the country as on 27-11-2014 the total recycling capacity is 349154.6 MTA, this is only 20% of the estimated e-waste generation in India and therefore non-compliance to the rules is expected.

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.

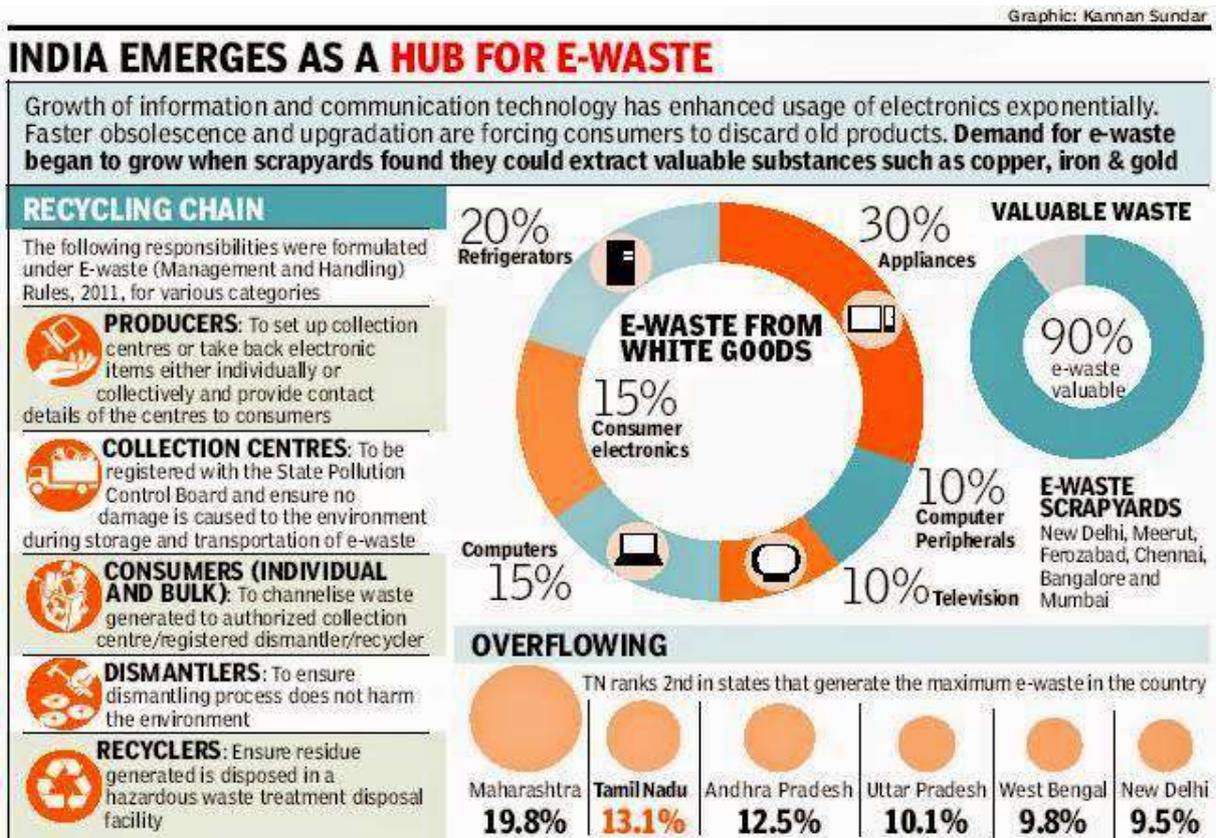


Figure 5: e-waste generation in India

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) (2015), List of e-waste recyclers in India, [http://cpcb.nic.in/Ewaste\\_Registration\\_List.pdf](http://cpcb.nic.in/Ewaste_Registration_List.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.

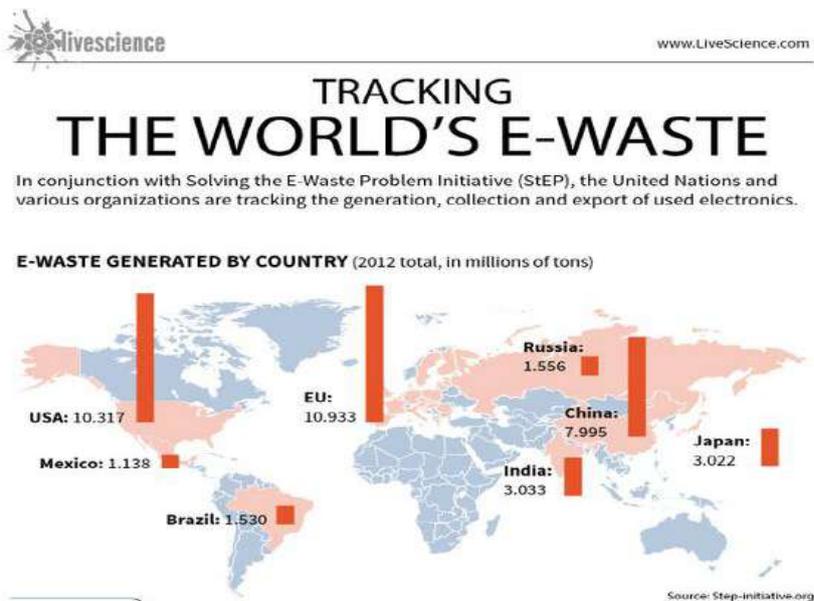
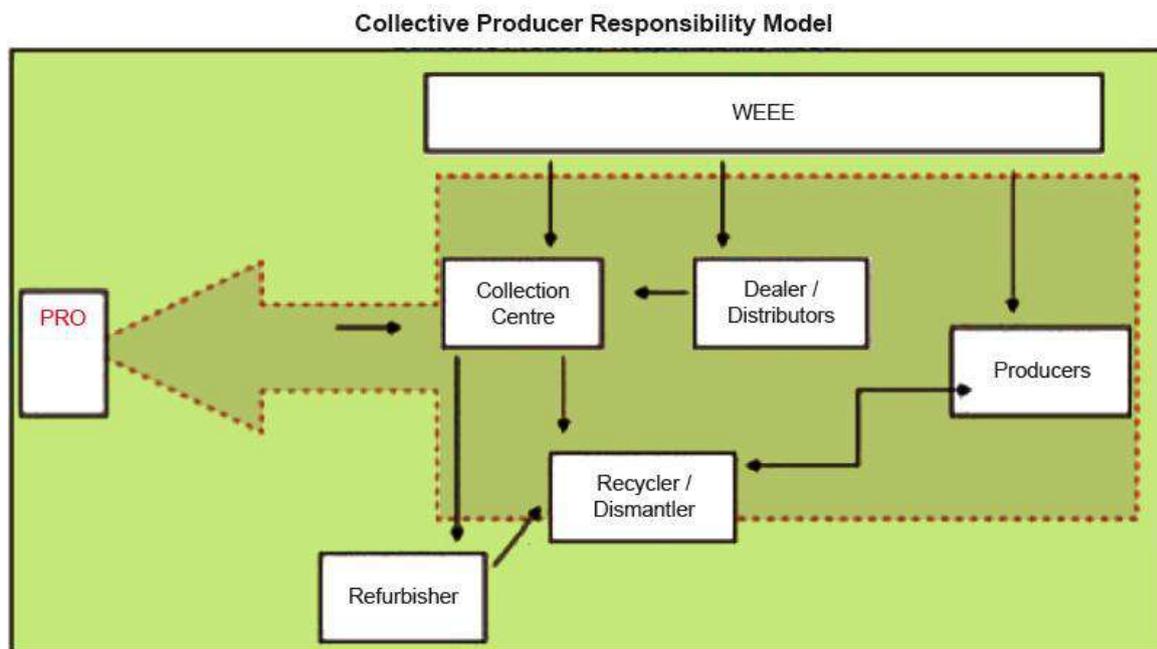


Figure 6: e-waste generation across the world

## Setting up a collection center for e-waste:

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



**Figure 7: Collective Producer Responsibility 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.

**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

**Figure 8: Form for amount of e-waste generated in a year**

**FORM 2***[See rules 4(4), 5(4), 8(5), 9(2), 12(2)(v)]***/ GENERATED****Quantity in Metric Tonnes (MT) or Kilograms (Kg) per year**

1.	Name & Address: Producer /Collection Centre/Dismantler/ Recycler/ Bulk consumer *		
2.	Date of Issue of Authorisation* Registration *		
3.	Validity of Authorisation* /Registration*		
4.	Types & Quantity of e- waste handled/ generated	Category	Quantity
		Item Description	
5.	Types & Quantity of e-waste stored	Category	Quantity
		Item Description	
6.	Types & Quantity of e-waste sent to authorised collection centre/ registered dismantler or recycler	Category	Quantity
		Item Description	
7.	Types & Quantity of e-waste transported*  Name, address and contact details of the destination	Category	Quantity
		Quantity	
8.	Types & Quantity of e-waste refurbished*  Name, address and contact details of the destination of refurbished materials	Category	Quantity
		Item Description	
9.	Types & Quantity of e-waste dismantled*  Name, address and contact details of the destination	Category	Quantity
		Item Description	
10.	Types & Quantity of e-waste recycled*  Types & Quantity of	Category	Quantity
		Item Description	

**Figure 9: Form for quantity of e-waste generated in a year**

**FORM 3**

[See rules 4(2)(5), 5(5), 7(4), 8(4), 9(4), 10(7), 11(5), 14(9)]

**FORM FOR FILING ANNUAL RETURNS**

[To be submitted by producer/collection centre/manufacturer/dealers/ refurbishers/Micro and Small Enterprises/ dismantler/recycler by 30<sup>th</sup> June following to the financial year to which that return relates].

**Quantity in Metric Tonnes (MT) or Kilograms (Kg)per year**

1	Name and address of the producer/ collection centre/ manufacturer/ dealer/ refurbishers/dismantler/recycler		
2	Name of the authorised person and complete address with telephone and fax numbers and e-mail address		
3	Total quantity e-waste sold/purchased/ sent for processing during the year for each category of electrical and electronic equipment listed in the Schedule I (Attach list)		
	Details of the above	TYPE	QUANTITY
3 (A)*	<b>DEALERS:</b> Quantity of e-waste sold/purchased/sent to:		
3(B)*	<b>BULK CONSUMERS:</b> Quantity of e-waste sold/ sent to:		
3(C)*	<b>REFURBISHER:</b> Quantity of e-waste purchased/sent to:		
3(A)*	<b>DISMANTLERS:</b> Quantity of e-waste in MT purchased & processed and sent to (category wise):		
3(B)*	<b>RECYCLERS:</b> Quantity of e-waste in MT purchased/processed (category wise):		
4	Name and full address of the destination with respect to 3 (A-B) above		
5	Type and quantity of materials segregated/ recovered from e-waste of different categories as applicable to 3(A) &3(B)	Type	Quantity

Note: The applicant shall provide details of funds received (if any) from producers and its utility with an audited certificate.

**Figure 10: Form for filing returns of amount of e-waste generated in a year**

## 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 the 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.

### i) 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<sub>2</sub>). In other words: When you drive a car, the engine burns fuel which creates a certain amount of CO<sub>2</sub>, depending on its fuel consumption and the driving distance. (CO<sub>2</sub> is the chemical symbol for carbon dioxide). When you heat your house with oil, gas or coal, then you also generate CO<sub>2</sub>. Even if you heat your house with electricity, the generation of the electrical power may also have emitted a certain amount of CO<sub>2</sub>. When you buy food and goods, the production of the food and goods also emitted some quantities of CO<sub>2</sub> (TFC (2016)).

**Source:**

Time for Change (TFC), (2016), Definition of Carbon Footprint, <http://timeforchange.org/what-is-a-carbon-footprint-definition>

Free Online Tool to calculate Carbon Footprint: <http://www.nature.org/greenliving/carboncalculator/>

## 5. Session Plans:

### E-Waste Curriculum: Training of Trainers

This curriculum 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 curriculum, 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 transacting the curriculum. The session also aims to build an understanding of participants around the concept of E-waste and problems associated with E-waste.

## Session Objectives

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

- Explain what E-waste is composed of, where e-waste is produced and in what quantities
- Identify the problems associated with E-waste Management

Flow Step	Key Idea/Description	Methodology/ Tools	Duration
<b>Mind Jog</b> 	<b>Familiarizing with the concept of E-waste</b> How many of you have heard of the word e-waste; show of hands; get responses from few participants.	Group activity	15 minutes
<b>Personal Connect</b> 	<b>Connecting personal experiences with E-Waste</b> One thing which I am doing, through which I am augmenting e-waste in the environment (think individually and then share in small groups). <ul style="list-style-type: none"> <li>• Individually reflect and write (10 minutes)</li> <li>• In small groups, share. (20 minutes)</li> </ul>	Individual reflection and Group Work	30 minutes
<b>Information Exchange</b> 	<b>Defining the concept of E-waste</b> Case study: Read aloud 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. It is a good idea to give the case study as a pre-work so that the participants have at least read it before they come and this is only a refresher.	Group study and Discussion Case study	1 hour
<b>Information Application</b> 	<b>Learning about the themes of the E-waste curriculum</b> Group processing of the case study to identify the major themes of curriculum <ul style="list-style-type: none"> <li>• Make 4 small groups</li> <li>• Participants share individual written thoughts in small groups</li> </ul>	Discussion	1 hour

	<ul style="list-style-type: none"> <li>• As a group discuss the case study and bring out the core themes which the case study is focusing on</li> <li>• Each group presents to the larger group the themes which they have been able to identify from the case study .</li> <li>• The facilitator sums up the discussion by introducing the curriculum themes and how each theme will be treated as a session which the participants will undergo over the course of next 4 days .</li> <li>• Theme 1 – Introduction to E-waste and the resources embedded in e-waste</li> <li>• Theme 2 –Harmful effects of E-waste on human health and environment</li> <li>• Theme 3 – Policies for E—waste management in India and Building blocks of creating a policy document on e-waste disposal in your organisation including questions to ask the manufacturer when you do bulk procurement of electrical and electronic goods and what questions should you ask the e-waste collector/ dismantler/ recycler when you dispose of your e-waste,what conditions can be introduced in your tender document, collection drives , employee engagement</li> <li>• Theme 4 -Information on locally available collection and setting up collection points</li> </ul>		
<p><b>Real World Connect</b></p> 	<p><b>Reflecting on one’s understanding wrt E-waste themes</b> Self-assessment on E-waste themes</p>	<p>Individual reflection</p>	<p>15 minutes</p>

<p><b>MIND JOG</b> Slide – What is E-Waste?</p> 	<p><i><b>INSTRUCT</b></i> Make a circle How many of you have heard of the word e-waste? Please raise your hands if you have heard and if you have not please don't ; get responses from few participants. <b>EXPLAIN:</b> All of us have some idea about E-Waste. In the course of next 3 hours , we will be engaging more deeply with the subject and get to build a more informed understanding on the issue.</p>
<p><b>PERSONAL CONNECT</b></p>	<p><b>SAY:</b> Take a minute to reflect on “One thing which you are doing, through which you are augmenting e-waste in the environment” and write down for yourself on a card. <i>(Give participants 5 minutes for this)</i> <b>SAY:</b></p>

	<p>Now, let's get into three groups. Within your groups, take a look at your reflections and as a group capture the actions which are adding to e-waste in the environment.</p> <p><b>INSTRUCT</b> Will one person from each group share their groups' chart with the larger group? As the groups are sharing, capture what they are saying on a chart or white board</p> <p><b>EXPLAIN</b> Each one of us is responsible for creating e-waste some more some less. Its important that first we accept that we are contributing to e-waste and take necessary actions to mitigate e-waste within our schools, family and community</p>
<p><b>INFORMATION EXCHANGE</b></p> <p>Handout1.1 What is E-waste? Handout1.2 What are the 10 categories of e-waste? Handout 1.3 Generation of E-waste globally Handout 1.4 Generation of E-waste in India</p> 	<p><b>INSTRUCT</b> Read the case study in small groups with participants reading the part of different characters</p> <p><b>Prakash:</b> <i>You see the organisation procures electronics in bulk every year depending upon the request for replacement as well as the projected growth of the company and the addition of new employees.</i> <b>Sarvesh:</b> <i>True. I guess everyone works in the same manner.</i> <b>Prakash:</b> <i>Yes, but we have never bothered to ensure that all the material which has reached end of life or is being replaced for other purposes is disposed off in an environmentally sound manner.</i> <b>Sarvesh:</b> <i>Yes, I agree.</i> <b>Prakash:</b> <i>So what we should do is to ensure that we take the environment impact into consideration of improper disposal of e-waste and incorporate a policy in our organisation which will ensure that we comply with the rules as well.</i></p> <p><b>ASK</b> How was it? What have you learnt?</p>
<p><b>INFORMATION APPLICATION</b></p> 	<p><b>INSTRUCT:</b> Get into your groups again . Now discuss the case study in your small groups and respond to the following questions -What is the case study about ? -Why do you think we are studying this case study? -Who are the different characters and what roles are they playing ? - Which character has fascinated you the most and why? - What is your learning from the case study ? -How would you like to use this learning in your life ? - What are the different themes which the case study brings out?</p> <p><b>EXPLAIN</b></p> <ul style="list-style-type: none"> <li>• The case study brings out the different themes which an E-Waste facilitator needs to understand to facilitate sessions with bulk consumers . During the course of the next 4 days of this TOT we will be referring to the case study to highlight different themes:</li> <li>• Theme 1 – Introduction to E-waste and the resources embedded in e-waste</li> <li>• Theme 2 –Harmful effects of E-waste on human health and</li> </ul>

	<p>environment</p> <ul style="list-style-type: none"> <li>• Theme 3 – Policies for E—waste management in India and Building blocks of creating a policy document on e-waste disposal in your organisation including questions to ask the manufacturer when you do bulk procurement of electrical and electronic goods and what questions should you ask the e-waste collector/ dismantler/ recycler when you dispose of your e-waste, what conditions can be introduced in your tender document, collection drives , employee engagement</li> <li>• Theme 4 -Information on locally available collection and setting up collection points</li> </ul>
<p><b>REAL WORLD CONNECT</b></p> 	<p><b>ASK:</b> Each one of you need to fill –up this questionnaire. You have ½ hour to fill this and your time starts now .....</p> <p><b>ASK:</b></p> <ul style="list-style-type: none"> <li>• How was your experience?</li> <li>• Why did it work /not work well?</li> </ul> <p><b>EXPLAIN:</b> Our understanding of E-waste is at different levels . For us to be a credible E-waste facilitator its important for us to have the right information . The questionnaire clearly indicates your current understanding of the subject and also brings out the learning gap.</p>

## Session 1 and Session 2

### Transition Note:

*In the last session, we discussed about the concept of 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: Harmful effects of e-waste on the environment and human health

## Purpose

This session explains the harmful effects of E-waste. The focus will be on understanding the harmful effects of e-waste on human health and environment.

## Session Objectives

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

- Explain the hazardous substances found in e-waste
- Describe the risks associated with hazardous substances
- Explain the actions on how to prevent the hazards resulting from these substances

## Summary session plan:

Flow Step	Description Key Idea	Methodology/Tools	Duration
<b>Mind Jog</b> 	<b>Linking personal associations of E-waste with the session</b> Photo language (photos depicting the harmful effects of e-waste on health and environment).	Photo language Set of 30 photographs depicting impact of e-waste ( To be sourced) The activity can be done either ways - with photo prints or soft copies if all participants have laptops.	10 minutes
<b>Personal Connect</b> 	<b>Reflecting on personal experiences wrt E-waste</b> Why have you selected this particular photograph? What story does this photograph tell you?	Individual Reflections + Group work	30 minutes
<b>Information Exchange</b>	<b>Defining E-waste impact</b> Case study: read aloud the RELEVANT SECTION of case study with participants reading the part of different characters + individual recording after each section. If	Case study	1 hour

	<p>the group is a mixed Hindi/English group, run in one Hindi group and one English group. It is a good idea to give the case study as a pre-work so they have at least read it before they come and this is only a refresher.</p>		
<p><b>Information Application</b></p> 	<p><b>Understanding types of E-waste impact</b>                  Group processing of the case study to identify the impacts of E-waste</p> <ul style="list-style-type: none"> <li>• Make 4 small groups</li> <li>• Participants share individual written thoughts in small groups</li> <li>• As a group discuss the case study and bring out the harmful effects of E-waste</li> <li>• Each group presents to the larger group the harmful effects of E-waste based on the case study .</li> <li>• The facilitator sums up the discussion by sharing the effects with the participants</li> </ul> <p>Post the discussions, participants are asked to prepare a poster/other IEC material in their small groups on E-waste and its harmful effects .</p>	<p>Group work</p>	<p>1 hour</p>
<p><b>Real World Connect</b></p> 	<p><b>Identifying personal learning gap</b>                  Participants are asked to create a personal learning plan for themselves to address the learning gaps from the last session on E-waste and this session on Impact of E-waste . This will help the participants to keep a track of their learning throughout the training workshop. The plan will be reviewed again on the last day of the training workshop.</p>	<p>Creating a personal action plan</p>	<p>20 minutes</p>

<p><b>MIND JOG</b>                  Slide with instructions and questions</p> 	<p>Spread 25-30 photographs depicting the harmful effects of e-waste on health and environment  <i>INSTRUCT</i>  <b>This activity has to be done individually .Please pick up one photograph keeping 2 questions in mind</b>                  Why have you selected this photo?                  What story does this photo tell you?</p>
<p><b>PERSONAL CONNECT</b></p>	<p><b>ASK -Keep the photo with you and get into 3 small groups for a group activity .Each member has to share his /her response to the above 2 questions in the group</b></p>

	<p><b>EXPLAIN:</b> Each one of us is an E-Waste facilitator and all of us have stories to share from the field and from our personal experiences about the harmful effects of e-waste on humans and environment. <b>In this session we'll look at the harmful effects of e-waste on humans and environment more deeply.....</b></p>
<p><b>INFORMATION EXCHANGE</b> Handout 2.1 Hazardous substance in E-waste Handout 2.2 Health impacts of E-waste Handout 2.3 Methods of treating E-waste</p> 	<p><b>INSTRUCT</b> Case study: 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 Hindi/English group, run in one Hindi group and one English group. It is a good idea to give the case study as a pre-work so they have at least read it before they come and this is only a refresher.</p> <p><b>Sarvesh:</b> <i>What is the entire logic behind disposing off in this manner?</i> <b>Prakash:</b> <i>You see, the electronic items which we use, contain hazardous materials as well along with plastics, metals and even rare earths. The recycling process that is followed by the informal sector is not adept at dealing with the hazardous materials in end of life electronic products. This leads to pollution of the environment and creates health hazards for people working in this sector as well as those who are residents of areas where this work takes place. A case in point is Buradabad in our neighbourhood.</i> <b>Sarvesh:</b> <i>But why isn't the government doing anything in this regard?</i> <b>Prakash:</b> <i>You see the new e-waste rules actually are meant to ensure that we as bulk consumers and hence disposers of e-waste are able to guide the material back through proper channels so that they have an incentive to formalise in order to gain access to materials.</i> <b>Sarvesh:</b> <i>That's a good step that way.</i> <b>Prakash:</b> <i>It is also important that we are able to check the process that is followed at the end of the recycler to be able to understand that the material that we are disposing is properly recycled and the material is recovered to the maximum extent possible. We need to ensure that we include conditions like visitation rights to their facilities so that we can monitor that the e-waste is being recycled in an environmentally sound manner, the material that is recovered is channelled through proper sources and we get a certificate for the material that we have disposed stating that it has been recycled as per the norms laid down by the central pollution control board.</i></p>
<p><b>INFORMATION APPLICATION</b></p> 	<p><b>INSTRUCT</b></p> <ul style="list-style-type: none"> <li>• Make 4 small groups</li> <li>• Participants share individual written thoughts in small groups</li> <li>• As a group discuss the case study and bring out the harmful effects of E-waste</li> <li>• Each group presents to the larger group the harmful effects of E-waste based on the case study .</li> <li>• The facilitator sums up the discussion by sharing the effects with the participants</li> </ul> <p>Post the discussions, participants are asked to prepare a poster/other IEC material in their small groups in order to generate a discussion</p>

	<p>with adolescents on E-waste and its harmful effects .</p> <p><b>EXPLAIN</b> As E-waste facilitators it is important for you to not just have the right information but also the right resources and the methodology to make the target group understand the concepts in a fun way so that maximum learning can happen.</p>
<p><b>REAL WORLD CONNECT</b></p> 	<p><b>INSTRUCT</b> Create a learning plan for self to address the learning gaps which has been identified through the self-assessment tool. Request you to keep a track of your learning throughout the training workshop. We will review it again on the last day of the training workshop.</p> <p><b>EXPLAIN</b> Its important as a facilitator to keep an eye on your own learning and unlearning because it will help you not only transfer the concepts better but also help you to respond to the questions of the participants</p>

## Session 2 and Session 3

### Transition Note:

*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 available in India, responsibilities of the different stakeholders and challenges in the policy implementation.*

## Session 3: What are the policies for e-waste management in our country?

### Purpose

This session seeks to build an understanding of the participants about the policies and rules associated with E-waste in India . The session also helps participants identify the responsibilities of different stakeholders in the effective implementation of the rules.

### Session Objectives

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

- Explain the policy, rules and important terms used in the Rules and their definition
- Explain their responsibility as an E-waste facilitator and also the responsibility of other stakeholder groups for the implementation of the Rules
- Identify the challenges in implementing the Rules

### Summary session plan:

Flow Step	Description	Methodology/Tools	Duration
 <b>Mind Jog</b>	<b>Connecting with the session objective</b> Quiz about the rules and policies ( <b>Prepare a quiz with 6 questions</b> )	Quiz	20 minutes
 <b>Personal Connect</b>	<b>Reflecting on personal responsibility as an E-waste facilitator</b> My responsibility as an E-Waste facilitator.....	Individual reflection	30 minutes
 <b>Information Exchange</b>	<b>Defining different policies and rules wrt E-waste</b> Case study: 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. It is a good idea to give the case study as a pre-work so they have at least read it before they come and	Case study Speakers	1 hour

	<p>this is only a refresher. Sharing about E-waste policy by experts ( 1speaker from the formal and another from the informal sector )</p>		
<p><b>Information Application</b></p> 	<p><b>Identifying different stakeholders</b> Group processing of the case study to identify the policy /rules for E-Waste</p> <ul style="list-style-type: none"> <li>• Make 4 small groups</li> <li>• Participants share individual written thoughts in small groups</li> <li>• As a group discuss the case study and bring out Policies/rules building blocks of a policy on e-waste, including questions to ask the manufacturers when bulk procurement of electrical and electronic goods is done, conditions that you introduce in your tender specification to enable easy disposal of e-waste?, questions to ask the e-waste collector/ dismantler/ recycler when you dispose of your e-waste?</li> <li>• Each group presents to the larger group the above points</li> <li>• The facilitator sums up the discussion by sharing the policy /rules with the participants</li> </ul> <p>Based on your understanding of E-waste create a policy of e-waste disposal in your organization . This is followed by group presentations and also responses from the participants</p>	Group work	1 hour
<p><b>Real World Connect</b></p> 	<p><b>Exploring the importance of policy and rules in regulating E-waste in organizations</b> Understand the e-waste policies from other organizations and identify challenges in their implementation</p>		10 mins

<p><b>MIND JOG</b></p> 	<p><b>STATE:</b> Before we begin our session let's take a quick quiz</p> <p><b>EXPLAIN:</b></p> <ul style="list-style-type: none"> <li>• Please be ready with a paper and pencil</li> <li>• There will be total five questions</li> <li>• I will not repeat any of the questions</li> <li>• Maintain complete silence till the quiz gets over. You will write the responses to the questions and not speak about it</li> </ul> <p><b>ASK:</b></p> <ul style="list-style-type: none"> <li>• 'Are you ready?'</li> </ul>
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	<p>If they are ready you begin administering the quiz Just wait for about half a minute between each question After asking all the questions then you can discuss the answers Clarify all the answers using the quiz paper</p> <p><b>ASK:</b> How many of you have got more than five?</p> <p>Appreciate them quickly and...</p> <p><b>ASK:</b> What do you think the quiz was about?</p> <p><b>EXPLAIN:</b></p> <ul style="list-style-type: none"> <li>• This quiz was about E-Waste</li> <li>•</li> </ul>
<p><b>PERSONAL CONNECT</b></p> 	<p><b>ASK :</b> What is your responsibility as an E-Waste Facilitator?</p> <p><b>EXPLAIN</b> As E-waste facilitator what is your responsibility to uphold the rules and policy of the state</p>
<p><b>INFORMATION EXCHANGE</b> Handout 3.1 National environment Policy Handout 3.2 E-waste ( Management) Rules 2016 Handout 3.3 Challenges of implementing the Rules</p> 	<p><b>INSTRUCT</b> Case study: 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. It is a good idea to give the case study as a pre-work so they have at least read it before they come and this is only a refresher.</p> <p><b>Prakash:</b> <i>So tell me. When did you start thinking about having a process set in place for e-waste disposal?</i></p> <p><b>Shankar:</b> <i>You see, in 2012 when the e-waste rules were first published, I went through the same and realised the importance that this subject, the increasing quantities of e-waste being generated in India, the likely adverse impact it may have on environment and health, if safe disposal practices are not implemented. I also chanced upon some research regarding the materials which go into manufacturing of electronics. It was only then that I decided that as one of the largest government organisations in the city, we ought to do something to show the way.</i></p> <p><b>Prakash:</b> <i>Was this decision driven by environment concerns or compliance to the rules?</i></p> <p><b>Shankar:</b> <i>In fact both. You see compliance with the rules was the starting point but once I got to know about the environment issues that are related to better e-waste management, I took it upon myself to ensure that we disposed off our e-waste properly.</i></p>
<p><b>INFORMATION APPLICATION</b></p>	<p><b>INSTRUCT</b> Group processing of the case study plus the talks with the practitioners to identify the policy /rules available in the country Group processing of the case study to identify the policy /rules for E-Waste</p> <ul style="list-style-type: none"> <li>• Make 4 small groups</li> </ul>

	<ul style="list-style-type: none"> <li>• Participants share individual written thoughts in small groups</li> <li>• As a group discuss the case study and bring out Policies/rules wrt E-waste in India and identify the building blocks of a policy on e-waste</li> <li>• Each group presents to the larger group the Policy/rules and the building blocks of the policy on e-waste based on the case study</li> <li>• Presents to the larger group the Policy/rules based on the case study .</li> <li>• The facilitator sums up the discussion by sharing the policy /rules with the participants</li> </ul> <p>Based on your understanding of E-waste create a policy of e-waste disposal in your organization . This is followed by group presentations of questions and also responses from the participants</p>
<p><b>REAL WORLD CONNECT</b></p> 	<p><b>Exploring the importance of policy and rules in regulating E-waste in organizations</b></p> <p>Understand the e-waste policies from other organizations and identify challenges in their implementation</p>

## Session 3 and Session 4

### Transition Note:

*In the last three sessions we have learnt about the concept of E-waste, harmful effects and also the polices and the rules available in India to address and manage the e-waste problem in the country. We also understood the building blocks of creating an e-waste policy and created one for our organization .In this session, we will discuss disposing E-waste in an environmentally sound manner.*

# Session 4: Disposing E-waste in an environmentally sound manner

## Purpose

This session seeks to give an introduction about E-Waste disposal in an environmentally sound manner.

## Session Objectives

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

- List down the locally available collection services for e-waste
- List down the questions regarding e-waste while buying a new product or disposing off an old one
- Explain the process of organizing a collection drive for e-waste
- List down the information on who can support the setting up of collection points for low-value e-waste?
- Articulate the precautions for setting up and managing such collection points

Flow Step	Description	Methodology/ Tools	Duration
 <b>Mind Jog</b>	<b>Connecting with the session objective</b> A film on E-waste disposal ( To be developed)		20 minutes
 <b>Personal Connect</b>	<b>Linking personal experiences with E-waste disposal</b> One electronic product which you have disposed -off in the last month and what did you do with it?	Reflection and Group work	30 mins
 <b>Information Exchange</b>	<b>Explaining the importance of setting up of the E-waste collection centers</b> Case study: 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. It is a good idea to give the case study as a pre-work so they have at least read it before they come and this is only a refresher.	Group Work	1 hour

	We will have practitioners one from formal and the other from the informal sector to talk about the polices and rules ; responsibility of different stakeholders and the challenges in the implementation of the policy		
<b>Information Application</b> 	<b>Processing of learning from the activity</b> Group processing of the case study to identify the disposing of E-waste in an environmentally sustainable manner <ul style="list-style-type: none"> <li>• Make 4 small groups</li> <li>• Participants share individual written thoughts in small groups</li> <li>• As a group discuss the case study and bring out ways of disposing of E-waste</li> <li>• Each group presents to the larger group the ways of disposing E-waste based on the case study .</li> <li>• The facilitator sums up the discussion by sharing the mechanisms of E-waste disposal with the participants</li> </ul> Exposure to a collection facility to understand the setting up and implementation of the collection centre	Individual work on project and self	1 hour
<b>Real World Connect</b> 	<b>Exploring the importance of collection centres</b> Design a collection drive to be set-up and rolled in the school with adolescent groups		20 mins

<b>MIND JOG</b> 	<b>ASK:</b> Participants to place their watches/ phones/calcs in the centre) – <b>INSTRUCT</b> Now there are so many gadgets lying in front of you , you are requested to pick up your favorite gadget and share the reason for choosing the same. Explain We choose things because of appearance, brand, popularity, price OR alternate activity Inform the participants that they are going to play a game called gadget . Share that as you clap your hands , they will have to start walking in the circle and when you specify a pose and call out gadget , they will have to strike the pose of that gadget Begin the game by clapping out the following: Phone Computer/laptop Watch Television
<b>PERSONAL CONNECT</b>	Ask each participant to write down the purpose of their favourite gadget and how it eases their life

	
<p><b>INFORMATION EXCHANGE</b></p> <p>Handout 5.1 List of dos and don'ts for setting up of the collection centres Handout 5.2 Managing a collection centre Handout 5.3 List of agencies which can support you in organizing such a collection and awareness drive Handout 5.4 List of E-waste collection centres in your city</p> 	<p>Case study: 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. It is a good idea to give the case study as a pre-work so they have at least read it before they come and this is only a refresher.</p> <p><b>Prakash:</b> <i>You see the new e-waste rules actually are meant to ensure that we as bulk consumers and hence disposers of e-waste are able to guide the material back through proper channels so that they have an incentive to formalise in order to gain access to materials.</i></p> <p><b>Sarvesh:</b> <i>That's a good step that way.</i></p> <p><b>Prakash:</b> <i>It is also important that we are able to check the process that is followed at the end of the recycler to be able to understand that the material that we are disposing is properly recycled and the material is recovered to the maximum extent possible. We need to ensure that we include conditions like visitation rights to their facilities so that we can monitor that the e-waste is being recycled in an environmentally sound manner, the material that is recovered is channelled through proper sources and we get a certificate for the material that we have disposed stating that it has been recycled as per the norms laid down by the central pollution control board.</i></p> <p><b>Sarvesh:</b> <i>Doesn't that increase our work a great deal?</i></p> <p><b>Prakash:</b> <i>It does in the first phase but we need to ensure that we have guidelines set for our organisation regarding proper disposal of e-waste. Once this is done, we shall be monitoring the process which will only breed efficiency within our organisation as well.</i></p> <p><b>Sarvesh:</b> <i>What other support will you need from the organisation?</i></p> <p><b>Prakash:</b> <i>I would like to organise a workshop with all departmental heads including you if possible so that I am able to guide everyone regarding the steps which we wish to take in order to set up this process. I will also be inviting a couple of experts who will be able to advise on what we can do in order to ensure that we are complying with the rules.</i></p>
<p><b>INFORMATION APPLICATION</b></p> 	<p><b>SAY:</b></p> <p>Group processing of the case study to identify the disposing of E-waste in an environmentally sustainable manner</p> <ul style="list-style-type: none"> <li>• Make 4 small groups</li> <li>• Participants share individual written thoughts in small groups</li> <li>• As a group discuss the case study and bring out ways of disposing of E-waste</li> <li>• Each group presents to the larger group the ways of disposing E-waste based on the case study .</li> <li>• The facilitator sums up the discussion by sharing the mechanisms of E-waste disposal with the participants</li> </ul> <p>Design and run a collection drive in your organisation</p>
<p><b>REAL WORLD APPLICATION</b></p>	<p>Inventory of e-waste in your organisation</p>



## Session 4 and Session 5

### Transition Note:

*This session will introduce the participants to the concept of carbon footprint, understand the life-cycle of the product and how carbon footprint is created at various stages including sourcing, production, consumption and disposal.*

# Session 5: Developing Internal Policies for E-waste Management within Organizations

## Purpose

This session seeks to support the participants to develop internal policies within their organization's about the policies and rules associated with E-waste in India.

## Session Objectives

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

- Explain the building blocks of a policy on e-waste disposal
- Explain how and where can you get information on the locally available collection, dismantling and recycling services for e-waste, responsibility as an E-waste facilitator and also the responsibility of other stakeholder groups for the implementation of the Rules
- Explain the questions you should ask the manufacturers during bulk procurement of electric and electronic goods
- Policies via vis tender

## Summary session plan:

Flow Step	Description	Methodology/Tools	Duration
<b>Mind Jog</b> 	<b>Connecting with the session objective</b> Quiz about the rules and policies ( <b>Prepare a quiz with 6 questions</b> )	Quiz	20 minutes
<b>Personal Connect</b> 	<b>Reflecting on personal responsibility as an E-waste facilitator</b> My responsibility as an E-Waste facilitator.....	Individual reflection	30 minutes
<b>Information Exchange</b>	<b>Defining different policies and rules wrt E-waste</b> Case study: read aloud the RELEVANT SECTION of the case study with participants reading the part of different	Case study Speakers	1 hour

	<p>characters + individual recording after each section. If the group is a mixed Hindi/English group, run in one Hindi group and one English group. It is a good idea to give the case study as a pre-work so they have at least read it before they come and this is only a refresher.</p> <p>Sharing about E-waste policy by experts ( 1 speaker from the formal and another from the informal sector )</p>		
<p><b>Information Application</b></p> 	<p><b>Identifying different stakeholders</b></p> <p>Group processing of the case study to identify the policy /rules for E-Waste</p> <ul style="list-style-type: none"> <li>• Make 4 small groups</li> <li>• Participants share individual written thoughts in small groups</li> <li>• As a group discuss the case study and bring out Policies/rules wrt E-waste in India</li> <li>• Each group presents to the larger group the Policy/rules based on the case study .</li> <li>• The facilitator sums up the discussion by sharing the policy /rules with the participants</li> </ul> <p>Based on your understanding of E-waste thus far create a list of 5 Questions as a group . This is followed by group presentations of questions and also responses from the participants</p>	<p>Group work</p>	<p>1 hour</p>
<p><b>Real World Connect</b></p> 	<p><b>Exploring the importance of policy and rules in regulating E-waste</b></p> <p>Read about the policies from other countries to do a comparative analysis- Facilitator to give suggested readings.</p>		<p>10 mins</p>

<p><b>MIND JOG</b></p> 	<p><b>STATE:</b> Before we begin our session let's take a quick quiz</p> <p><b>EXPLAIN:</b></p> <ul style="list-style-type: none"> <li>• Please be ready with a paper and pencil</li> <li>• There will be total five questions</li> <li>• I will not repeat any of the questions</li> <li>• Maintain complete silence till the quiz gets over. You will write the responses to the questions and not speak about it</li> </ul> <p><b>ASK:</b></p> <ul style="list-style-type: none"> <li>• 'Are you ready?'</li> </ul> <p>If they are ready you begin administering the quiz Just wait for about half a minute between each question After asking all the questions then you can discuss the answers Clarify all the answers using the quiz paper</p>
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	<p><b>ASK:</b> How many of you have got more than five?</p> <p>Appreciate them quickly and...</p> <p><b>ASK:</b> What do you think the quiz was about?</p> <p><b>EXPLAIN:</b></p> <ul style="list-style-type: none"> <li>• This quiz was about E-Waste</li> <li>•</li> </ul>
<p><b>PERSONAL CONNECT</b></p> 	<p><b>ASK :</b> What is your responsibility as an E-Waste Facilitator?</p> <p><b>EXPLAIN</b> As E-waste facilitator what is your responsibility to uphold the rules and policy of the state</p>
<p><b>INFORMATION EXCHANGE</b></p> <p>Handout 3.1 National environment Policy Handout 3.2 E-waste ( Management) Rules 2016 Handout 3.3 Challenges of implementing the Rules</p> 	<p><b>INSTRUCT</b> Case study: 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. It is a good idea to give the case study as a pre-work so they have at least read it before they come and this is only a refresher.</p> <p>We will have practitioners one from formal and the other from the informal sector to talk about the polices and rules ; responsibility of different stakeholders and the challenges in the implementation of the policy</p> <p><b>Shankar:</b> <i>Yes, that was the norm and in some cases still is. But its not complying with the rules. What you need to do is to ensure that these items go back to a proper recycler. Environmentally, it is important because the unauthorized recyclers dismantle and recycle your products in ways which leads to environment pollution. This not only has impacts on our health but the material recovery that happens from these items is less than what should be.</i></p> <p><b>Prakash:</b> <i>But isn't it their livelihood as well.</i></p> <p><b>Shankar:</b> <i>It is, but there is nothing stopping them from becoming authorized to carry on with their trade. You see, we live in a world which has finite resources and we need to ensure that our coming generations and also lay their hands on the same so that they are able to grow as well. If we keep losing materials and not recovering them properly, then we might leave nothing for them.</i></p> <p><b>Prakash:</b> <i>I agree. I have read about crude oil and the fact that we might finish the reserves for petroleum in the next 50 years. But I think you will also agree that not many people are thinking about resources from the point of conserving them and using them optimally.</i></p> <p><b>Shankar:</b> <i>You know that was the second step as part of our process. We even encouraged employees to dispose off their electronics in a manner that was environmentally sound. We have tied up with NGOs to ensure that they conduct e-waste collection drives in our offices and whatever is collected is channelised to the formal recyclers. This</i></p>

	<p><i>helps us to create some social impact as well.</i></p> <p><b>Prakash:</b> <i>That's great. I never thought of it in that manner.</i></p> <p><b>Shankar:</b> <i>You see in large organisations, departments work in silos which is why we never think of solving problems which have a larger social and environment impact holistically.</i></p> <p><b>Prakash:</b> <i>But how did you get so many departments in your organisation on board.</i></p> <p><b>Shankar:</b> <i>You see, I organised a workshop of all departmental heads and requested a couple of experts to guide us on setting up these processes in systems. This helps to create awareness in the organisation on the issue. The department heads then took it upon themselves to ensure that employees in their respective work streams were made aware about the issue at hand and that is how we created this change.</i></p> <p><b>Prakash:</b> <i>But how did you ensure that the external agencies were complying with the rules.</i></p> <p><b>Shankar:</b> <i>We have contracts and conduct due diligence at regular intervals. These include onsite inspections with suppliers and their recyclers. We also speak to their employees to ensure that they are aware of the rules and regulations so that compliance is taking place at all levels.</i></p>
<p><b>INFORMATION APPLICATION</b></p> 	<p><b>INSTRUCT</b></p> <p>Group processing of the case study plus the talks with the practitioners to identify the policy /rules available in the country</p> <p>Group processing of the case study to identify the policy /rules for E-Waste</p> <ul style="list-style-type: none"> <li>• Make 4 small groups</li> <li>• Participants share individual written thoughts in small groups</li> <li>• As a group discuss the case study and bring out Policies/rules wrt E-waste in India</li> <li>• Each group presents to the larger group the Policy/rules based on the case study .</li> <li>• The facilitator sums up the discussion by sharing the policy /rules with the participants</li> </ul> <p>Based on your understanding of E-waste thus far create a list of 5 Questions as a group which adolescents may ask when you facilitate the session with them. This is followed by group presentations of questions and also responses from the participants</p>
<p><b>REAL WORLD CONNECT</b></p> 	<p>Read about the policies from other countries to do a comparative analysis</p>

## Session 5 and Session 6

### Transition Note:

*This session will introduce the participants to the concept of environmentally sound management of e-waste disposal and management.*

# Session 6: Disposing E-waste in an environmentally sound manner

## Purpose

This session seeks to give an introduction about E-Waste disposal in an environmentally sound manner.

## Session Objectives

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

- List down the locally available collection services for e-waste
- List down the questions regarding e-waste while buying a new product or disposing off an old one
- Explain the process of organizing a collection drive for e-waste
- List down the information on who can support the setting up of collection points for low-value e-waste?
- Articulate the precautions for setting up and managing such collection points

Flow Step	Description	Methodology/ Tools	Duration
 <b>Mind Jog</b>	<b>Connecting with the session objective</b> A film on E-waste disposal ( To be developed)		20 minutes
 <b>Personal Connect</b>	<b>Linking personal experiences with E-waste disposal</b> One electronic product which you have disposed -off in the last month and what did you do with it?	Reflection and Group work	30 mins
 <b>Information Exchange</b>	<b>Explaining the importance of setting up of the E-waste collection centers</b> Case study: 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. It is a good idea to give the case study as a pre-work so they have at least read it before they come and	Group Work	1 hour

	<p>this is only a refresher.                  How can you organize a collection drive for e-waste in your organization? Which agencies can support you in organizing such a collection and awareness drive?                  How can you engage your employees in such an awareness and collection drive?</p>		
<p><b>Information Application</b></p> 	<p><b>Processing of learning from the activity</b>                  Group processing of the case study to identify the disposing of E-waste in an environmentally sustainable manner</p> <ul style="list-style-type: none"> <li>• Make 4 small groups</li> <li>• Participants share individual written thoughts in small groups</li> <li>• As a group discuss the case study and bring out ways of disposing of E-waste</li> </ul> <p>Each group presents to the larger group the ways of disposing E-waste based on the case study . How to organize a collection drive for e-waste in your organization?                  Which agencies can support you in organizing such a collection and awareness drive?                  How can you engage your employees in such an awareness and collection drive?</p> <ul style="list-style-type: none"> <li>•</li> <li>• The facilitator sums up the discussion by sharing the mechanisms of E-waste disposal with the participants</li> </ul>	Individual work on project and self	1 hour
<p><b>Real World Connect</b></p> 	<p><b>Exploring the importance of collection centres</b> Design a collection drive to be set-up and rolled in the school with adolescent groups</p>		20 mins

<p><b>MIND JOG</b></p> 	<p><b>ASK:</b>                  Participants to place their watches/ phones/calcs in the centre) –  <b>INSTRUCT</b>                  Now there are so many gadgets lying in front of you , you are requested to pick up your favorite gadget and share the reason for choosing the same.                  Explain                  We choose things because of appearance, brand, popularity, price                  OR alternate activity                  Inform the participants that they are going to play a game called gadget .                  Share that as you clap your hands , they will have to start walking in the circle and when you specify a pose and call out gadget , they will have to strike the pose of that gadget                  Begin the game by clapping out the following:                  Phone                  Computer/laptop</p>
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	<p>Watch Television</p>
<p><b>PERSONAL CONNECT</b></p> 	<p>Ask each participant to write down the purpose of their favourite gadget and how it eases their life</p>
<p><b>INFORMATION EXCHANGE</b></p> <p>Handout 5.1 List of dos and don'ts for setting up of the collection centres Handout 5.2 Managing a collection centre Handout 5.3 List of agencies which can support you in organizing such a collection and awareness drive Handout 5.4 List of E-waste collection centres in your city</p> 	<p>Case study: 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. It is a good idea to give the case study as a pre-work so they have at least read it before they come and this is only a refresher.</p> <p><b>Prakash:</b> <i>You see, what we have been doing till date is procuring items from manufacturers or their authorised suppliers. Having used these items till a point where they are not useful to us anymore, we have been disposing them off to the highest bidder through an open tender process.</i> <b>Sarvesh:</b> <i>But that is common practice. Isn't it?</i> <b>Prakash:</b> <i>Yes, but it is not environmentally sound. In order to ensure that we are disposing them in an environmentally sound manner, we should dispose it off to the authorised recycler so that he can recycle the e-waste properly while complying with the rules.</i> <b>Sarvesh:</b> <i>Yes, I read about the rules and the responsibilities that we have as bulk consumers.</i> <b>Prakash:</b> <i>In fact information on those recyclers who have been authorised for proper handling and management of e-waste is available on the website of the central pollution control board.</i> <b>Sarvesh:</b> <i>Ok. So does that mean that from now onwards we will have to give away our e-waste to only these recyclers and not to anyone else who comes and bids in an open tender process that we follow.</i> <b>Prakash:</b> <i>Yes but there are other ways to manage this as well. We need to ensure that there are guidelines which we draw up in these tenders which ensures that all the items which we dispose off are recycled in a manner which is environmentally sound and complies with the rules. In most cases, we can exchange these items for news ones from our existing suppliers, but we need to ensure that all contracts will specifically mention that the old items which have been replaced will be sent across to authorised recyclers only and we need to be provided with evidence that the items have been properly recycled in compliance with the standards that have been set in the e-waste rules.</i></p>
<p><b>INFORMATION APPLICATION</b></p> 	<p><b>SAY:</b> Group processing of the case study to identify the disposing of E-waste in an environmentally sustainable manner</p> <ul style="list-style-type: none"> <li>• Make 4 small groups</li> <li>• Participants share individual written thoughts in small groups</li> <li>• As a group discuss the case study and bring out ways of disposing of E-waste</li> </ul> <p>How can you organize a collection drive for e-waste in your organization? Which agencies can support you in organizing such a collection and awareness drive?</p>

	How can you engage your employees in such an awareness and collection drive?
<b>REAL WORLD APPLICATION</b> 	one personal action I will take which will help in accomplishing LOHAS

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

For Bulk Consumers:

Methods of identification of toxic substances in e-waste:

<http://ewasteguide.info/hazardous-substances>

<http://www.who.int/ceh/risks/ewaste/en/>

Kumar Binay. IRSEE / Prof. (Network Management) / NAIR, Vadodara: “e-Waste – Environment and Human Health Hazards and Management”

[http://www.nair.indianrailways.gov.in/uploads/files/1410168855632-PNM%20E-wast%20mgt\\_Abhivyakti.pdf](http://www.nair.indianrailways.gov.in/uploads/files/1410168855632-PNM%20E-wast%20mgt_Abhivyakti.pdf)

Patent Landscape Report on E-waste Recycling Technologies, 2013

[http://www.wipo.int/edocs/pubdocs/en/patents/948/wipo\\_pub\\_948\\_4.pdf](http://www.wipo.int/edocs/pubdocs/en/patents/948/wipo_pub_948_4.pdf)

Violet N. Pinto, Indian J Occup Environ Med. 2008 Aug; 12(2): 65–70: E-waste hazard: The impending challenge

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2796756/?report=classic>

Ramachandra T.V., Saira Varghese K. Energy and Wetlands Group, Center Ecological Sciences, Indian Institute of Science, Bangalore; Envis Journal of Human Settlements, March 2004 : Environmentally Sound Options for E-waste Management

<http://www.ces.iisc.ernet.in/energy/paper/ewaste/ewaste.html>

### Recycling of e-waste specific to different materials of its composition

A. Fornalczyk a, J. Willner a, K. Francuz b, J. Cebulski b; International Scientific Journal published monthly by World Academy of Materials and Manufacturing Engineering, Vol. 63, issue 2, October 2013, pages 87-92: E-waste as a source of Valuable Metals:

[http://www.archivesmse.org/vol63\\_2/6325.pdf](http://www.archivesmse.org/vol63_2/6325.pdf)

CPCB E-waste document: <http://www.cpcb.nic.in/TEXT/AS/Final-Ewaste-Documents/full-text.pdf>

Naturvardsverket Report Recycling and Disposal of E-waste Health Hazards and Environmental Impacts, March 2011:

<https://www.naturvardsverket.se/Documents/publikationer6400/978-91-620-6417-4.pdf>

WEEE Recycle & CSE. E-Waste Training Course for Policymakers and Regulators – Facilitator's Manual

<http://www.igep.in/live/hrdpmp/hrdpmaster/igep/content/e54413/e54441/e62968/WEEERecycleCSEmanual.pdf>

UNU-IAS: THE GLOBAL E-WASTE MONITOR, 2014, Quantities, flows and resources

<http://i.unu.edu/media/unu.edu/news/52624/UNU-1stGlobal-E-Waste-Monitor-2014-small.pdf>

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?)

Environment Alert Bulletin of UNEP: E-waste, the hidden side of IT equipment's manufacturing and use

[http://www.grid.unep.ch/products/3\\_Reports/ew\\_ewaste.en.pdf](http://www.grid.unep.ch/products/3_Reports/ew_ewaste.en.pdf)

Greenpeace Report, Green Gadgets: Designing the future The path to greener electronics, September, 2014

<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](http://www.unep.org/resourcepanel/Portals/24102/PDFs/PriorityProductsAndMaterials_Report.pdf)

Article | 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](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>

E-waste Recycle or Reuse: Infographs

<https://fr.pinterest.com/pin/141159769542686136/>

## LOHAS and how to draw a personal action plan on LOHAS

CONSUMERS & INDIVIDUAL ACTION IN THE LOHAS SPACE: A GLOBAL PERSPECTIVE

<http://www.lohas.com/consumers-individual-action-lohas-space-global-perspective>

Green Marketing from Wikipedia

[https://en.wikipedia.org/wiki/Green\\_marketing#LOHAS](https://en.wikipedia.org/wiki/Green_marketing#LOHAS)

European Commission report on Sustainable lifestyles baseline: SUSTAINABLE LIFESTYLES: TODAY'S FACTS & TOMORROW'S TRENDS

[http://www.sustainable-lifestyles.eu/fileadmin/images/content/D1.1\\_Baseline\\_Report.pdf](http://www.sustainable-lifestyles.eu/fileadmin/images/content/D1.1_Baseline_Report.pdf)

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)

Jalal Uddin M.D.; IOSR Journal of Mechanical and Civil Engineering (IOSRJMCE) ISSN: 2278-1684 Volume 2, Issue 1 (July-Aug 2012), PP 25-45: Journal And Conference Paper On (Environment) E – Waste Management

<http://iosrjournals.org/iosr-jmce/papers/vol2-issue1/C0212545.pdf?id=2627>

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](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](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:

<http://www.cpcb.nic.in/ImplimentationE-Waste.pdf>

Integrated Solid waste management Policy, 2012 by BBMP:

<http://218.248.45.169/download/engineering/iswmp.pdf>

WEEE Recycle & CSE. E-Waste Training Course for Policymakers and Regulators – Facilitator's Manual:

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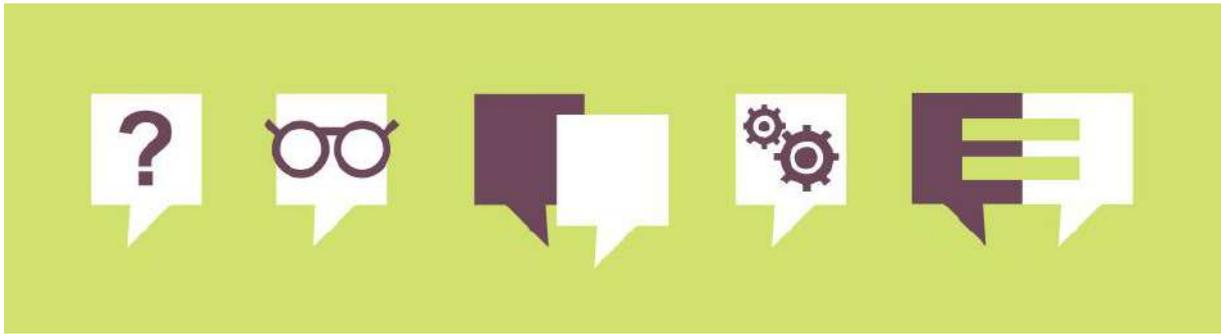
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## List of Abbreviations

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  
CO<sub>2</sub>: 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 bulk consumers, 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 bulk consumers, the largest producers of e-waste in society. This manual intends to present the subject of e-waste and its multiple facets in a manner that engages those in the decision making process 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 bulk consumers 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 bulk consumers 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 bulk consumers by the trainer.

