# E-waste management– Role of Schools

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### **Content Flow**

#### Section 1 – E-waste

- Definition
- Composition of E-waste
- E-waste generation and challenges
- Rules
- Stakeholders
- Compliance
- E-waste Hazards-Environment & Health impact
- Role of schools in e-waste management

#### Section 2 – Diksha Platform

- Objective
- Content
- Short videos

## Section 1

E-Waste



## Electronic Waste -Definition

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

### **Composition of** E-waste





'among them, less than 0.1% of antimony, gold and berrylium Sources: Basel Convention, 2006; Lindholm (Nokia report), 2003.



•Source: http://www.fastcoexist.com/1681368/visualizing-the-worlds-e-waste-probl

#### WHAT CAN WE GAIN FROM OUR E-WASTE BY RECYCLING IT? 🍃

E-waste contains many valuable and precious materials, up to 60 elements from the periodic table can be found in complex electronics. Physical components in mobile phones can be harmful if left to decay, and there are two ways to go about recycling them.

THE 1ST WAY: TO BREAK DOWN THE MOBILES AND SOURCE THE MATERIALS INSIDE THEM.



•Source: http://www.fastcoexist.com/1681368/visualizing-the-worlds-e-waste-problem





# E-waste Management Rules

- First E-Waste (Management and Handling) Rules, 2011
- Notified in May 2011 and became effective from May 2012
- RoHS provisions effective from May 2014
- Supersession of E-Waste (Management and Handling) Rules, 2011
- Notified on March 23, 2016 and became effective from October 1, 2016

### E-waste Rules – Objectives & Highlights

- Minimize illegal recycling / recovery operations
- Environmentally Safe & Sound Recycling by channelizing E-waste to registered E-waste recyclers
- Extended Responsibilities to producers to manage a system of E-waste collection/take back and channelizing to a registered dismantler/recycler.
- Responsibilities to Urban Local Bodies for orphan products and for waste found mixed with MSW
- To Create an E-waste collection channelization system
- Reduce Hazardous substances in Electrical and Electronic components

### Schedule I – Items Covered in e-Waste Rules

Categories of electrical and electronic equipment
Information technology and telecommunication equipment :
Centralised data processing: Mainframes, Minicomputers
Personal Computing: Personal Computers (Central Processing Unit with input and output
devices)
Personal Computing: Laptop Computers(Central Processing Unit with input and output
devices)
Personal Computing: Notebook Computers
Personal Computing: Notepad Computers
Printers including cartridges
Copying equipment
Electrical and electronic typewriters
User terminals and systems
Facsimile
Telex
Telephones
Pay telephones
Cordless telephones
Cellular telephones
Answering systems
Consumer electrical and electronics:
Television sets (including sets based on (Liquid Crystal Display and Light Emitting
Diode technology)
Refrigerator
Washing Machine
Air-conditioners excluding centralised air conditioning plants
Fluorescent and other Mercury containing lamps

## E-waste Rules -Stakeholders

- Every producer, consumer or bulk consumer, involved in the manufacture, sale, and purchase and processing of electrical and electronic equipment or components as specified in schedule I
- Refurbishers, Collectors, Dismantlers & Recyclers of E-waste
- Bulk Consumer/Consumer
  - Bulk users of electrical and electronic equipment such as central government or state government departments, public sector undertakings, banks, educational institutions, multinational organizations, international agencies and private companies that are registered under the Factories Act, 1948 and Companies Act, 1956
- MoEF/CPCB/SPCBs/PCCs. ULBs

# Compliance – Bulk Consumers

Channelization of E-Waste generated to authorized collection centers or registered dismantlers or recyclers or is returned to pick-up or take back services provided by the producers

Maintaining records in Form – 2 for inspection by SPCBs/PCCs

File annual returns in <u>Form-3</u>, to the concerned State Pollution Control Board









# Collection Center -Compliance

## Managing E-Waste – Setting Up a Collection Center

- Bulk Consumers can set-up collection centers in their premises to better manage e-waste
- Should tie-up with an authorized producer/dismantler/recycler
- Ensure provision for safe storage of e-waste
- Ensure safe transportation to stakeholders authorized under the rules
- Maintain annual reports in Form-2
- File returns in Form-3

### E-waste Generation and challenges

 Global E-waste generation: 53.6 million tones

• Only 17.4 percent was recycled

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China, United States, and India are the biggest contributors of e-waste

China- 10.1 million tonnes

- United States- 6.9 million tonnes
- India-3.2 million tonnes

- Uncertain Financial Mechanism
- Import of second-hand equipment
- Capacity Building of regulatory authorities
- Setting-up of Collection Systems
- Inventorization of E-waste
- Promotion for development of infrastructure for recycling
- Monitoring Mechanisms for EPR and RoHS



Source: Global E-waste Monitor, 2020

## Is E-waste hazardous?

- It contains many toxic and hazardous ingredients. The hazardous constituents such as heavy metals like lead, cadmium and mercury, Poly-Chlorinated-Bi-phenyl(PCB), Brominated Flame Retardants (BFRs) etc, that have the potential to cause environmental pollution and pose health hazards when processed, recycled or disposed off.
- Hence E-waste is considered hazardous in nature.

## **Toxics in E-waste**

#### Over 1000 materials, many toxic

- Lead and cadmium in circuit boards;
- Lead oxide & cadmium in monitor cathode ray tubes (CRTs);
- Mercury in switches and flat screen monitors
- Cadmium in computer batteries;
- Polychlorinated biphenyls (PCBs) in older capacitors and transformers;
- Brominated Flame Retardants (BFR)on printed circuit boards, plastic casings, cables
- Polyvinyl chloride (PVC) cable insulation release highly toxic dioxins and furans when burned





## **Environment Impacts**

- Emissions of dioxins/ heavy metals lead, cadmium, mercury
- Other contaminants like BFRs
- Spent fluids/chemicals in soil
- Groundwater contamination
- Non-recyclables- Landfilling and leachate
- Beyond workplace street dusts showed traces of PCBs

### **Health Impacts**

SELENIUM: high concentration causes salenosis, hair loss, nail brittleness & neurological disorders.

BERYLLIUM: from motherboard is carcinogenic in nature and causes lung cancer and skin diseases.

MERCURY: from relays and switches causes chronic damage to brain, respiratory and skin diseases.

CHROMIUM (IV): from galvanised steel parts and causes strong allergic reactions (bronchitis) and DNA damage

ARSENIC: Long term exposure causes lung cancer, nervous damage and skin diseases

Trichloroethylene (TCE): depending upon amount & route, it can cause liver, kidney damage and impaired immune system

CADMIUM: from chip resistors and semi conductors can cause kidney, bone structure damage and is also a known carcinogen



LEAD: from printed circuit boards and monitors causes brain, nervous, kidney damage, blood disorder & developmental damage to fetus

POLYVINYL CHLORIDE (PVC): most used plastic in EEE. Comes from cabling, computer housing & affects reproductive & immune system and also leads to hormonal disorders

BARIUM: from front panels of cathode rays tubes causes brain swelling, muscle weakness, heart liver and spleen damage

BROMINATED FLAME RETARDANTS (BFR): from electronic equipments and circuit boards and disrupts the endocrine system

Polychlorinated Biphenyls (PCB): caused immune suppression, liver damage, cancer promotion, nervous and reproductive damage and behavioural changes. PCB's were widely used in transformers and capacitors (prior 1930) banned in many countries but are still there in e-waste

DIOXINS AND FURANS: hormonal disruptions, damage to fetus and reproductive harm and impairment of immune system

### **Role of Schools in e-waste management**





### Role of Schools in establishing a Collection Channel

- Enhance Awareness in Children through Course curriculum
- Enhance community participation through involvement of RWAs
- Establish Linkages between schools & Manufacturers/ producers/PROs
- Recreate products from waste & conduct model making competitions



### Enhance Awareness – Major Activities

- Awareness programme for school teachers & children on safe disposal of e-waste
- Awareness package including E-waste films, AV guides, posters and pamphlets disseminated
- Information session under E-waste management programmes by producers/manufacturers
- Develop Course curriculum for schools
- Visit to nearby e-waste recycling facility

#### **E-waste Awareness Programme-MeitY**





#### www.greene.gov.in

### **Community Participation – Major Activities**

- Increase awareness of neighborhood communities on safe e-waste disposal
- Set up linkages with Resident Welfare Association (RWAs)
- Organize collection drives for schools and neighboring communities



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#### રિસાયકલીંગ રાજ્યમાં ઈ-કલેક્શન સેન્ટ્સે ઉભાં કરશે અમદાવાદ | મહારાષ્ટ્રમાં ઇવેસ્ટ રિસાયક્લિંગ યુનિટ્સ ધરાવતી કંપની ઈકો રિસાયકલીંગ લિમિટેડ ગુજરાતમાં 12.5 કરોડના ખર્ચે પાંચ ડિસમેન્ટલિંગ સેન્ટર્સ તેમજ મોટાભાગના શહેરોમાં ઘરઆંગણેથી જ ઇ-વેસ્ટ મટિરિયલ કલેકશન માટેની વ્યવસ્થા સ્થાપી રહી છે. પ્રતિ વર્ષ 10000 એમટી જેટલી ઓવરઓલ કેપેસિટી સાથે સ્થાપશે, ઈકોરેકોની ટોપલાઈનમાં 50 કરોડની વધ આવકનો ઉમેરો થવાની ધારણા છે. કલેક્શન સેન્ટર્સ બનવા ટેક બેક પોઈન્ટસ માટે પણ કામ કરી રહી છે.

#### R-వ్యర్థాల నిర్వహణపై ప్రచారం

కలో 30 నగరాల్లో అనగాహన కార్యక్రమాలు కుండాని చెరు ఉంది. ఉన్నార్గి fees nood sign servers debut ్రములుగా ముందుకొచ్చిన (పముఖ సంస్థలు ing para-sealand i prandatore stantagin in greu togoni in igreu nég nijevité vote, gágin in žong L vot najdját stejut zupajev vajnjust i vije žešt vájnar nájni ikutýců. A úzev tati the subset and a stated as when is an and a stated as and a second and have been can be able has been an another and here of (I mobul to deman a magnet in providence denor there are and and and the second sec n pridyla accol. A pychant is blod's talejnyn singtale 6 prijsta 17 migus 3 had d a hipbes proveds as pos stored proveds as stretch deaders parts terbs (c. e-cipe le legioni nettigo mingi fangon ded, peñes super co lege tetatose e pinere tribue corregio entroi entroi anticiano super co fís decos, preco, aporto su (Maria di sutar ad ece sone capore) entrycence does that paper whereas sizes logare light and solar when providences and solars solars and any and the statements whereas should be stateging ప్రాజ కార్యకరు కొంపారికోండి. వరార్షా ఉం ప్రధా శార్రికి శరిప ప్రదర్శానికి పెద్దితగా సాద్యాని ప్రైకోరెడ్డ్ కి - జరోగ్రాపై పరుశాన్ని కట్టిస్తారానికి గురివియా గోనికి పోటిని, రాయన్, ఇట్టి, ప్రదర్ వేళ్లోకి కో డైన్. అ ప్రాడకిండి వర జీవు పట్టులు పరుగు శార్మంగా తెళ్లు. కింటి, కింటి అంది గోనికి పోటిని పరిగ్గ కార్ ear of blor and mis many of a signer and and and a proof of a e-appen and benef preserves beef the server topological backets and part at 

#### **Campaign for Responsible E-waste Disposal and Management**

Imphal: Under the aegis stakeholders of the Ministry of Electronics schools, colleges, RWAs, bulk and Information Technology consumers, dealers, refurbish-(MeitY) initiative, 'Awareness ers, informal sector and manuon Environmental Hazards of Electronic Waste', RLG has partnered with Manufacturers' Association for Information improper disposal of e-Technology (MAIT) to drive waste. This programme the 'Clean to Green' campaign in India. The campaign seeks to further MeitY's objective of creating outreach and advocacy on responsible disposal of electronic waste. The 'Clean to Green' campaign will encompass 30 cities across 26 states and 4 union territories. The primary focus of the

Awareness Programme on En-

(including facturers) in order to reduce the adverse impact on environment and health due to under the Digital India and Swacch Bharat missions aims to enhance proper disposal and recycling of ewaste such environmental and health hazards are mitigated. Anwar Shirpurwala, CEO, MAIT, stated, "Through this programme,



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(एमएआइटा) न साझदारा कर भारत म एमइआइटा वाइ क इलक्ट्रानिक वस्ट के पर्यावरणीय खतरों पर जागरूकता अभियान को बढ़ावा देने के लिए क्लीन ट ग्रीन कैम्पेन चलाया है। यह कैम्पेन इलेक्ट्रॉनिक वेस्ट का जिम्मेदारी से डिस्पोसल और मैनेजमेंट के जरिए एमईआईटी वाई के उद्देश्य को आगे बढाने का प्रयास करता है। क्लीन टू ग्रीन कैम्पेन में 26 राज्यों और 4 केंद्र शासित प्रदेशों में 30 शहरों को शामिल किया जाएगा।इलेक्ट्रॉनिक वेस्ट के पर्यावरणीय खतरों पर जागरूकता कार्यक्रम का प्राथमिक ध्यान पर्यावरण पर प्रतिकल प्रभाव को कम करने के लिए विभिन्न स्टेक्होल्डर (स्कल, कॉलेज, आरडब्ल्यए, थोक उपभोक्ता, डीलर, रिफर्बिशर, अनौपचारिक क्षेत्र और निर्माताओं सहित) के बीच जागरूकता पैदा करना है, जिससे ई-वेस्ट के अनुचित डिस्पोसल के कारण स्वास्थ्य एवं पर्यावरण पर पड रहे खराब प्रभाव को कम किया जा सके। डिजिटल इंडिया और स्वच्छ भारत मिशन के तहत यह कार्यक्रम ई-वेस्ट का ठीक तरह से डिस्पोसल और रीसाइक्लिंग को बढाने का लक्ष्य रखता है जिससे पर्यावरणीय और स्वास्थ्य संबंधी खतरों को कम किया जा सके। एमएआईटी के सीईओ अनवर शिरपुरवाला ने कहा- +भारत में ई-वेस्ट मैनेजमेंट एक बेहद असंगठित क्षेत्र है। इस कार्यक्रम के माध्यम से, एमएआईटी देश के 17 राज्यों और 3 केंद्र शासित प्रदेशों में 20 शहरों तक पहुंचने और स्थायित्व सुनिश्चित करने के लिए कार्यक्रम के प्रारंभिक चरण में शामिल 10 शहरों को शामिल करके विभिन्न स्टेक्होल्डर के बीच जागरूकता पैटा करना चाहता है। कार्यक्रम में उनकी भागीतारी पर टिप्पणी करते हुए सश्री

### Activities in Schools in various States



### Section 2

**Diksha Platform** 

### **Diksha platform**

The content is online non-credit courses for 7-9 standards school students and training of teachers in self learning mode

#### **Objectives**

- To provide the content for School students and teachers
- To enhance the knowledge of teachers on e-waste management
- To build a platform which can support schools to provide sufficient knowledge towards e-waste management
- To develop a self support system for schools

### Content: Handbooks Videos Assessment

#### **Discussion Forum**



### **E-waste Management in Schools**





## Next Step – Your Action Plan

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

# Questions

