E-Waste Management

Bharti Trivedi
PhD, MSc

- What is E-Waste?
- Electronic equipments in E- waste
- How these become e-waste
- Generators of e-waste
- Constituents of e-waste
- E-waste disposal
- E-waste in India
- E-waste in Switzerland
- WEEE directives
- What should be done?

Today's Electronic Gadgets Tomorrow's Electronic waste

What is e-waste?

- **Electronic waste**, **e-waste**, **e-scrap**, or **Waste Electrical and Electronic Equipment** (**WEEE**) describes loosely discarded, surplus, obsolete, or broken electrical or electronic devices

- Electronic waste (e-waste) comprises waste electronics/electrical goods that are not fit for their originally intended use or have reached their end of life.
- This may include items such as computers, servers, mainframes, monitors, CDs, printers, scanners, copiers, calculators, fax machines, battery cells, cellular phones, transceivers, TVs, medical apparatus and electronic components besides white goods such as refrigerators and air-conditioners.
- E-waste contains valuable materials such as copper, silver, gold and platinum which could be processed for their recovery.

Is e-Waste dangerous?

- E-waste is not hazardous *per se.* However, the hazardous constituents present in the e-waste render it hazardous when such wastes are dismantled and processed, since it is only at this stage that they pose hazard to health and environment.

How these become e-waste?

- Changes and advances in technology
- Changes in style, fashion and status
- Changing configuration
- Attractive offers from manufactures
- Small life of equipments

Generators of e-waste

- Small business and household
- Large businesses
- Institutions and government offices
- Equipment manufactures

Some Examples

- Cell phone upgrades
- Digital TV conversion
- Software upgrades
- Can’t change the battery in your i-pod
- Disposable printers

Why e-waste a problem?

- Composed of hazardous materials
- Products are quickly obsolete and discarded
- Electronic products are difficult to recycle
- Discarded electronics are managed badly
- Most e-waste goes to landfills
- Most recycler's don't recycle, they export
- Prison recycling; high tech chain gang

Main Issues

- E-waste is partly very valuable
  - Recover (precious) metals
  - Recover huge amounts of plastic
- E-waste is partly very hazardous
  - Contains 1,000 different toxic substances
- E-waste is increasing at alarming rates
  - Rates of obsolescence are becoming very high
  - Computers are one of the highly purchased electronic items and have a useful life of 3-5 years only, thus contributing huge amounts to annual e-waste volumes. Further it has been estimated that the obsolescence rate of computers may be reduced to 2 years only very soon.

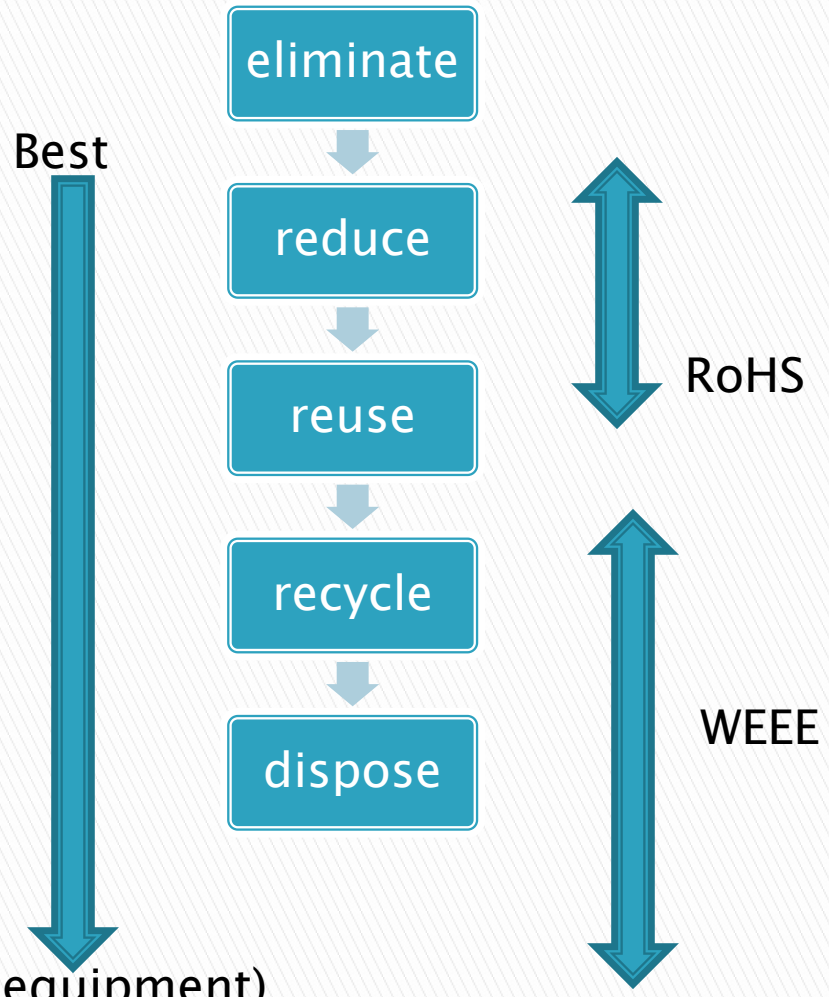
Sources of e-waste	Constituents (hazardous)	Affected Body parts
Printed circuit board, computer monitors	Lead & cadmium	Damage to nervous system, kidney and lever. Affects brain development of child
Chip registers and semi conductors	Cadmium	Accumulates in kidney and lever Causes neural damage
Relays and switches, printed circuit board	Mercury	Chronic damage to brain Respiratory and skin disorders
Motherboard	Beryllium	Lung & skin
Front panel of CRT's	Lead oxide, Barium & cadmium	Muscle weakness Damage to heart, lever and spleen
Capacitors & Transformers	Polychlorinated biphenyls (PCBs)	
Cable insulating coating	Polyvinyl chloride (PVC)	Immune System
Plastic Housing	Bromine	Endocrine

Valuable materials

Sources of e-waste	Constituents	Uses
Cable, housing	Plastics	insulation
Funnel glass in CRT, PWB	Lead, gold	Metal joining, connectivity
Housing, PWB, CRT	Mercury, zinc	Batteries switches
Housing, CRT, PWD, Connectors	Aluminum, silver, copper, iron	Conductivity Magnetivity

Waste hierarchy

- Refers to 3 R's – Reduce, Reuse and Recycle
- Its aim is to extract maximum benefits from products and to generate the minimum amount of waste



RoHS(restriction on hazardous Substances
WEEE (Waste Electrical and electronic equipment)

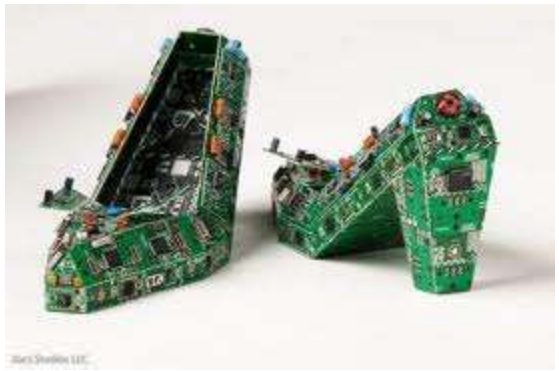
The waste hierarchy

E-waste disposal Methods

Recycle

Landfill

Incineration



Reuse

E-waste Recycling

- Definition
  - Recycling is defined as assembling, developing, promoting or buying of new products which are prepared from waste materials
- Steps in Recycling
  - Dismantling of e-waste
  - Removal of hazardous materials such as PCB, HG, removal of plastics etc.
  - Strong acids are used to remove valuable metals such as gold, lead, copper etc.

- Methods of recycling
  - Consumer recycling
  - Donation
  - Take – Back
  - Exchange
  - Corporate recycling
- Advantages –
  - Recycled materials can be used in developing new equipments
  - Valuable materials are retrieved
  - Help environment by avoiding pollution

State-of-the-art Recycling Technologies

- The state-of-the-art recycling of e-waste comprises three steps:

Detoxication

The first step in the recycling process is the removal of critical components from the e-waste in order to avoid dilution of and / or contamination with toxic substances during the downstream processes. Critical components include, e.g., lead glass from CRT screens, CFC gases from refrigerators, light bulbs and batteries.

Shredding

Mechanical processing is the next step in e-waste treatment, normally an industrial large scale operation to obtain concentrates of recyclable materials in a dedicated fraction and also to further separate hazardous materials. Typical components of a mechanical processing plant are crushing units, shredders, magnetic- and eddy-current- and air-separators. The gas emissions are filtered and effluents are treated to minimize environmental impact.

Refining

The third step of e-waste recycling is refining. Refining of resources in e-waste is possible and the technical solutions exist to get back raw with minimal environmental impact. Most of the fractions need to be refined or conditioned in order to be sold as secondary raw materials or to be disposed of in a final disposal site, respectively. During the refining process, to three flows of materials is paid attention: Metals, plastics and glass.

Hazardous techniques

Incineration is the process of destroying waste through burning. Because of the variety of substances found in e-waste, incineration is associated with a major risk of generating and dispersing contaminants and toxic substances.

The gases released during the burning and the residue ash is often toxic. Studies of municipal solid waste incineration plants have shown that copper, which is present in printed circuit boards and cables, acts a catalyst for dioxin formation when flame-retardants are incinerated. These brominated flame retardants when exposed to low temperature (600-800°C) can lead to the generation of extremely toxic polybrominated dioxins (PBDDs) and furans (PBDFs).

Incineration also leads to the loss valuable of trace elements which could have been recovered had they been sorted and processed separately.

Open Burning

Since open fires burn at relatively low temperatures, they release many more pollutants than in a controlled incineration process.

Inhalation of open fire emissions can trigger asthma attacks, respiratory infections, and cause other problems such as coughing, wheezing, chest pain, and eye irritation. Chronic exposure to open fire emissions may lead to diseases such as emphysema and cancer. For example, burning PVC releases hydrogen chloride, which on inhalation mixes with water in the lungs to form hydrochloric acid. This can lead to corrosion of the lung tissues, and several respiratory complications.

Often open fires burn with a lack of oxygen, forming carbon monoxide, which poisons the blood when inhaled. The residual particulate matter in the form of ash is prone to fly around in the vicinity and can also be dangerous when inhaled.

Land Filling

Landfilling is one of the most widely used methods of waste disposal. However, it is common knowledge that all landfills leak. The leachate often contains heavy metals and other toxic substances which can contaminate ground and water resources. Even state-of-the-art landfills which are sealed to prevent toxins from entering the ground are not completely tight in the long-term. Older landfill sites and uncontrolled dumps pose a much greater danger of releasing hazardous emissions. Mercury, Cadmium and Lead are among the most toxic leachates. Mercury, for example, will leach when certain electronic devices such as circuit breakers are destroyed

Re use

- It constitutes direct use or use after slight modification to the original functioning equipment
- Advantages
  - Electronic equipments like computers, cell phones, etc can be reused
  - This method also reduce the volume of e-waste generation
  - No wastage of time and money

The Scenario

- The Basel Action Network (BAN) which works for prevention of globalization of toxic chemicals has stated in a report that 50 to 80 per cent of e-waste collected by the US is exported to India, China, Pakistan, Taiwan and a number of African countries.
- This is done because cheaper labor is available for recycling in these countries.
- And in the US, export of e-waste is legal.

- e-waste recycling and disposal in China, India and Pakistan are highly polluting. Of late, China has banned import of e-waste. Export of e-waste by the US is seen as lack of responsibility on the part of Federal Government, electronics industry, consumers, recyclers and local governments towards viable and sustainable options for disposal of e-waste.
- In India, recycling of e-waste is almost entirely left to the informal sector, which does not have adequate means to handle either the increasing quantities or certain processes, leading to intolerable risk for human health and the environment.

Discard rate of Electronics items

Item Discard /	Replace Rate
Mobile telephone	1 to 3 years
PC	Every 2 years
Camera	3 to 5 years
Television	6 to 7 years
Refrigerator	6 to 8 years
Washing Machine	10-15 years
IT accessories	Very fast

Dynamics of E-waste generation

- The global volume of e-waste generated is expected to reach 93.5 million tons in 2016 from 41.5 million tons in 2011 at a CAGR (Compound annual growth rate) of 17.6% from 2011 to 2016.
- Studies indicate that around eight out of ten computers disposed in the U.S. are sent to developing countries, particularly Asia and Africa.

E-Waste In India

- E-waste in India to rise 500% by 2020
- Not only will India see a 500% increase in e-waste, but China and South Africa will see a 400% increase from 2007 levels over the next ten years, with mobile phones being a significant component, rising 7 times higher in China and 18 times higher in India. E-Waste from televisions will be 1.5 to 2 times higher in China and India, and e-waste from discarded refrigerators will double or triple in India

Dynamics of electronic products In India

Telecommunications and information technology are the fastest growing industries today not only in India but world over. Manufacturers' Association for Information Technology (MAIT) has collected the following statistics on the growth of electronics and IT equipment in India:

1. PC sales were over 7.3 million units during 2007-08, growing by 16 per cent. There is an installed base of over 25 million units.
2. The consumer electronics market is growing at the rate of 13-15 per cent annually. It has an installed base of 120 million TVs.
3. The cellular subscriber base was up by 96.86 per cent during 2007-08. Its installed base is estimated to cross 300 million mark by 2010.
4. As per a GTZ-MAIT sponsored study conducted recently by IMRB, e-waste generated in India during 2007 was around 332,979 MT besides about 50,000 MT entering the country by way of imports.

Components of E-Waste Management

The major components of e-waste management are:

1. e-waste collection, sorting and transportation
2. e-waste recycling;

The stakeholders, i.e., the people who can help in overcoming the challenges posed by e-waste, are:

1. Manufacturers
2. Users
3. Recyclers
4. Policy makers

E-Waste concerns and challenges

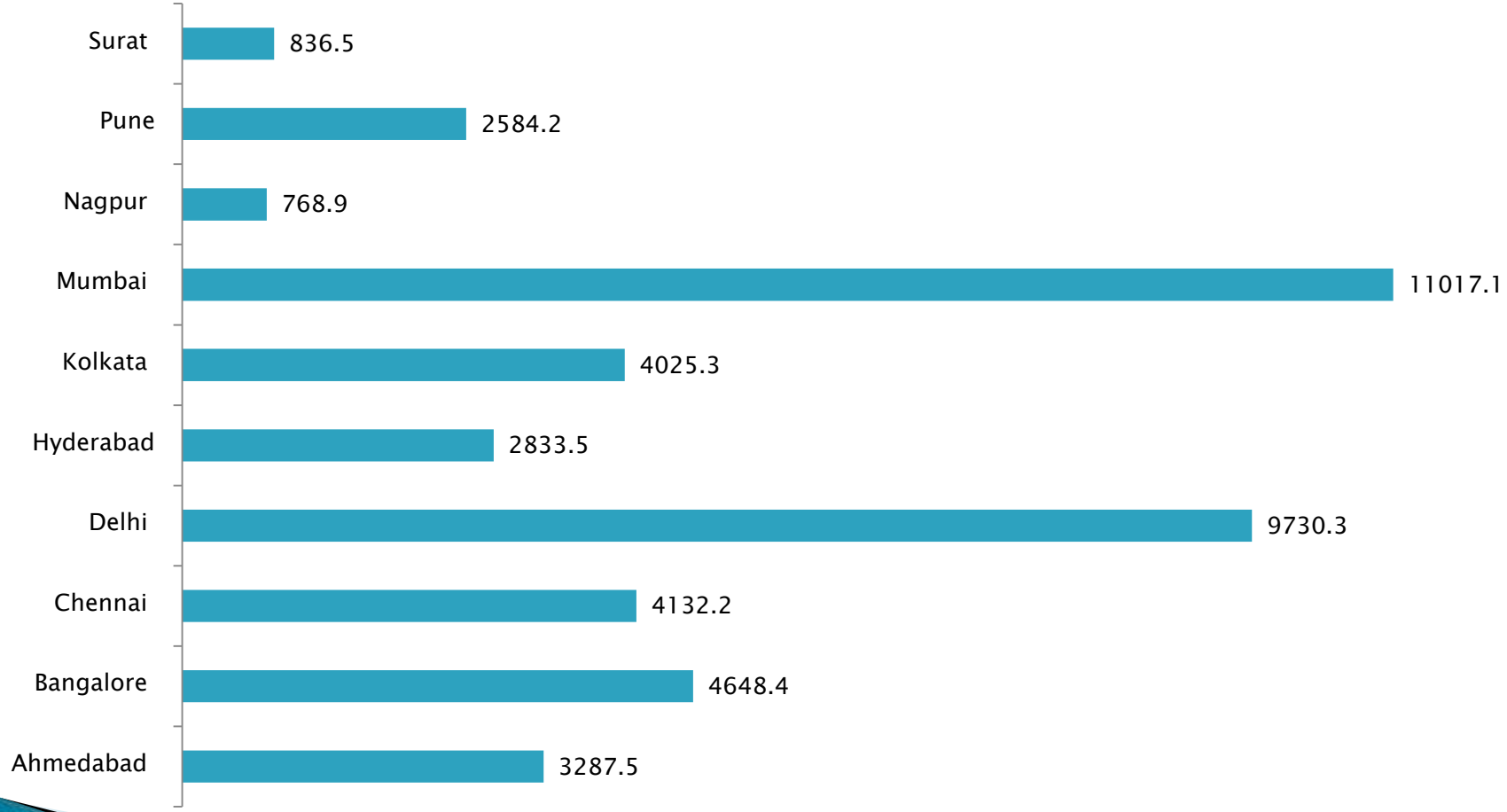
- Accurate figures not available for rapidly increasing e-waste volumes— generated domestically and by imports
- Low level of awareness among manufacturers and consumers of the hazards of incorrect e-waste disposal
- No accurate estimates of the quantity of e-waste generated and recycled available in India
- Major portion of e-waste is processed by the informal (unorganized) sector using rudimentary techniques such as acid leaching and open-air burning, which results in severe environmental damage

- e-waste workers have little or no knowledge of toxins in e-waste and are exposed to health hazards
- High-risk backyard recycling operations impact vulnerable social groups like women, children and immigrant laborers
- Inefficient recycling processes result in substantial losses of material value and resources
- Cherry-picking by recyclers who recover precious metals (gold, platinum, silver, copper, etc) and improperly dispose of the rest, posing environmental hazards
- No specific legislation for dealing with e-waste at present

WEE Generating Top Ten States State WEE (Tones)

State	WEE (Tones)
Maharashtra	20270.59
Tamil Nadu	13486.24
Andhra Pradesh	12780.33
Uttar Pradesh	10381.11
West Bengal	10059.36
Delhi	9729.15
Karnataka	9118.74
Gujarat	8994.33
Madhya Pradesh	7800.62
Punjab	6958.46

WEE (Tonnes)


Surat
836.5
Pune
2584.2
Nagpur
768.9
Mumbai
11017.1
Kolkata
4025.3
Hyderabad
2833.5
Delhi
9730.3
Chennai
4132.2
Bangalore
4648.4
Ahmedabad
3287.5

Steps taken by DPCC

- Delhi Pollution Control Committee's Plan of Action for E-waste Management On similar line of Karnataka Pollution Control Board, DPCC is examining the issue of authorization to software companies and other electronic industries to store e-waste and handover the same to authorized recyclers.
- DPCC will organize a private developer for recycling of e-waste by authorizing him to collect e-waste from such agencies and institutions.

E-waste project launched in Chandigarh

- Chandigarh, June 4, 2011 (PTI) Ahead of the World Environment Day tomorrow, Chandigarh Administration has entered into a collaboration with Confederation of Indian Industry (CII)and a private firm to tackle the E-waste problem in the city.
- Initially the firm would collect e-waste from eight identified sites in the city from tomorrow. "Eight nodal points will be set up in the city where e-waste will be collected,".
- The IT industries and the households here will be asked to deposit their waste at these points. From there, the waste will be sent to Roorkee by the firm for recycling or its proper disposal,
- **E-waste recycling in India is less than 5 p.c.**

What is end-to-end e-waste recycling? What are the various processes involved? Also it would be great if you could talk about your plant in Roorkee.

We recycle each and every part of a PC or electronic product. An end-to-end recycling starts with dismantling, metal extraction and final refining.

We collect the e-waste from our centers in Bangalore, Mumbai Chennai and Kolkata. We also have indirect logistics operations in all tier-I and tier-II cities. From the collection to final refining, a PC would take 15 to 30 days in the complete process.

The first stage is to separate the monitors, then put them through mechanical separation, where everything is crushed automatically and small pieces separated. In metal extraction, the first metal that comes out is the separation of iron through magnets. Next we separate a few chemicals through the process of eddy current, where we separate plastic, aluminum and non-ferrous materials based on the density. All these processes take place in a closed flask.

The third and the final stage is refining, where, through metallurgical process, smelting and electro-refining takes place. It is the heart of technology and this facility is not available anywhere in the domestic market. We make a base mixture with the existing remains and expose to electro refining flask. After this process, all the metals like copper, lead and other materials are separated.

What is the e-waste industry in India? Also what is the global scenario?

In India, very few products come back for recycling. In the 8 million computers and 35 million cellphones used today, the number would be less than 5 per cent.

Not all product companies take the initiative of spreading awareness of e-waste disposal and provide the facility. A few forward-looking companies that work in this direction are Wipro, HCL, Tata Teleservices, HP and Nokia.

What are the challenges in e-waste collection and what are the initiatives to collect domestic e-waste?

Two major challenges in this business are low awareness level among the companies and individuals about the recycling and the collection of the waste products. Because of low infrastructure, collection of electronics for recycling becomes much more costly affair.

The need of the hour is collaboration between government, various NGOs, enterprises and recyclers like us, to build up a unified collection system. The pooled in responsibility for the collection mechanism will help in spreading awareness about e-waste recycling, ensure smooth collection and proper recycling of the products.

Methodology

e-waste recycling India

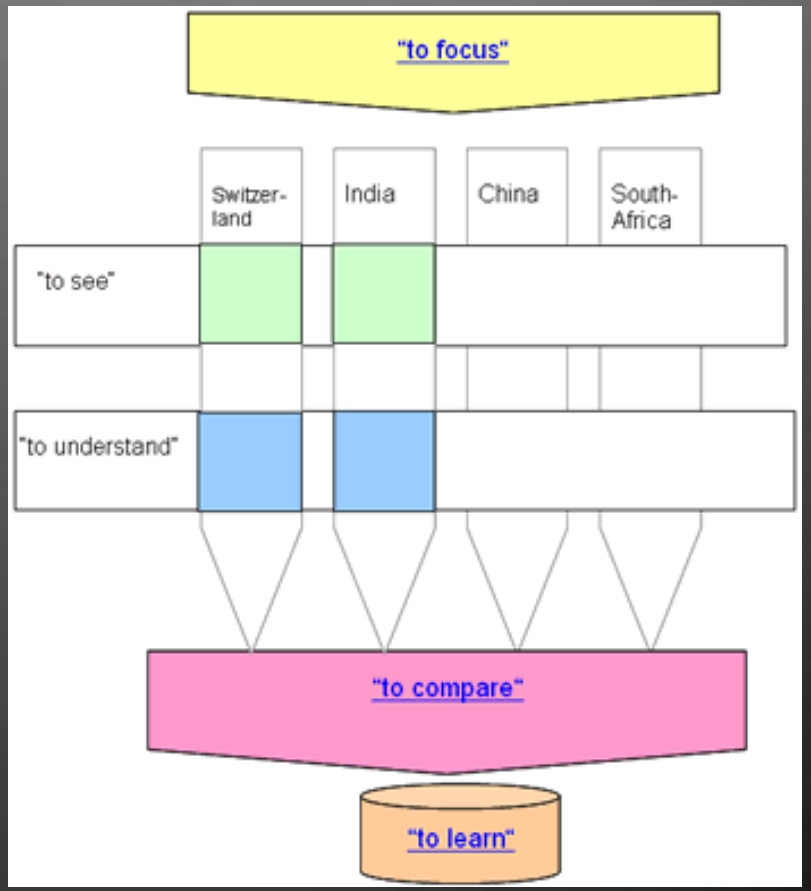
???

e-waste recycling Switzerland

What is important to **focus on?**
What can be **seen?**
Do we **understand what happens?**
How can we **compare the two situations?**
Can we **learn from each other?**

Procedures in 5 steps

- 1. Find the most important aspects to describe the e-waste system
- 2. Get to know the e-waste aspects by visiting local actors
- 3. Understand, evaluate and map what has been seen
- 4. Compare findings among the assessed countries
- 5. Identify concrete actions, based on a shared understanding of the situation



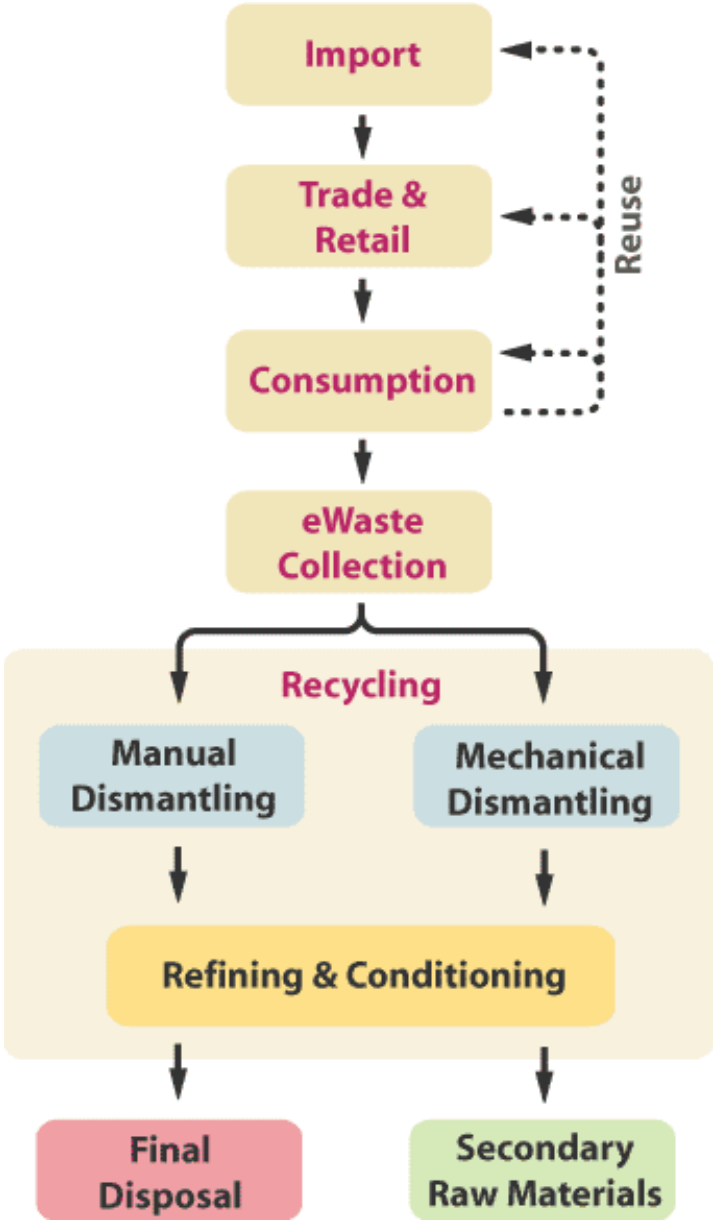
Technologies applied in Switzerland

- Manual dismantling is the first, more traditional way to separate hazardous materials from recyclable materials, and to generate recyclable materials from electronic waste. In a pre-sorting process, the incoming electronic waste first is separated into the different categories, which are to be handled separately in the following dismantling and sorting process. The dismantling process itself is performed with simple tools such as screwdrivers, hammers and tongs.

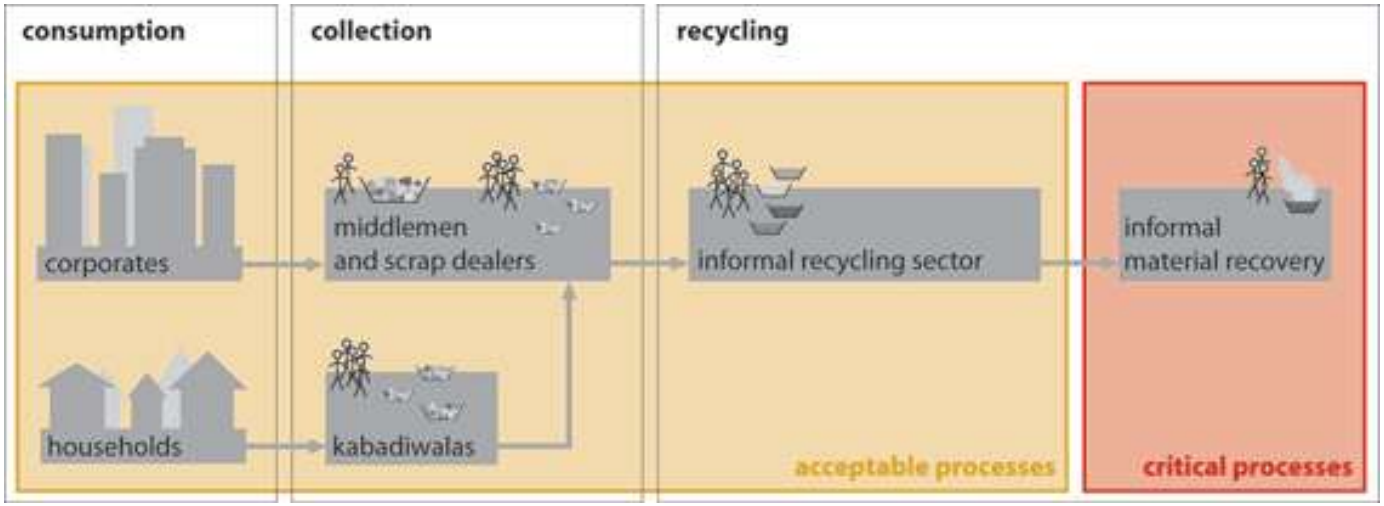
- Mechanical dismantling is the second, more modern way to separate hazardous materials and to generate recyclable materials from electronic waste. In a pre-sorting process, the incoming electronic waste first is separated into the different categories, which are to be handled separately in the following dismantling and sorting process. The dismantling process itself is performed mechanically. Typical components of a mechanical dismantling plant are crushing units, shredders, magnetic separators and air separators. The exhaust gases are cleaned up in waste gas purification plants and the dust generated collected with dust filters. Indoor exposure to is monitored and assessed relative to the Swiss Maximum Allowable Concentration (MAC)-values.

- Refining and Conditioning Most of the fractions need to be refined or conditioned in order to be sold as secondary raw materials or to be disposed of in a final disposal site, respectively. Refining includes mechanical, thermal and chemical processes. It is typically performed for fractions such as batteries, CRT's, ferrous and non-ferrous metals, recyclable plastics and printed boards. Many refining processes take place outside Switzerland, entailing greater transport distances.Conditioning includes Municipal Solid Waste Incineration (MSWI) of fractions such as plastics waste in one of the 36 Swiss MSWI plants and Hazardous Waste Incineration (HWI) of fractions such as condensers in one of the 7 Swiss HWI plants.

- The final disposal of materials from dismantling, refining and conditioning processes takes place in landfills. Swiss landfills are subject to relatively strict emission controls and are comparatively restrictive regarding the materials accepted: since the year 2000 combustive materials have no longer been admitted for final disposal in landfills.


Import
Trade & Retail
Consumption
Reuse
eWaste Collection
Recycling
Manual Dismantling
Mechanical Dismantling
Refining & Conditioning
Final Disposal
Secondary Raw Materials

Watch a short Greenpeace documentary "Where does E-waste end up "...



Initial e-waste situation in India. The e-waste from corporate consumers and households enters a city specific informal e-waste recycling system. The collection and allocation of e-waste is done by middlemen, scrap dealers and rag pickers, also known as «kabadiwalas». The informal recycling system includes acceptable processes such as dismantling and sorting but also very harmful processes such as burning and leaching in order to extract metals from electronic equipment

- *Harmful techniques like burning wires are common practice in the informal recycling sectors in big cities in India.*

E-waste actors in India

- Importer/Manufacturer: Almost 50% of the PC's sold in India are products from the secondary market and are re-assembled on old components. The remaining market share is covered by multinational manufacturers (30%) and Indian brands (22%) . Besides manufacturers are major contributors of e-waste. The waste consists of defective IC chips, motherboards, CRTs and other peripheral items produced during the production process. It also includes defective PCs under guarantee procured from consumers as replacement items.

- Consumer: Individual households: Individual households account for 22% of junk computers in India . The preferred practice to get rid of obsolete computers is to get them in exchange from retailers when purchasing a new computer, or passed on to elatives or friends. Â· Government, public and private sector: The business sector accounts for 78% of all installed PC's in India. Obsolete computers from the business sector are sold by auctions. Sometimes educational institutes or charitable institutions receive old computers for reuse.

- Import of e-waste: Import of e-waste is legally prohibited. Nevertheless, there are reports of e-waste imports from abroad. Analyses by the ministry of environment showed no results concerning import of e-waste, but the ministry admits that a 100% control of the borders is not possible.

- Traders / Scrap dealers / disassemblers: One single person can work as a trader, scrap dealer as well as disassembler all over Delhi. Some of these traders carry out, for example, the primary work of disassembling obsolete computers, they reuse the working components, assemble new computers and sell them again on the secondary market. Non working components are sold to recyclers.

- Recyclers: The market for e-waste in Delhi is not concentrated in a single place, but spread over different areas, each handling a different aspect of recycling. No sophisticated machinery or personal protective equipment is used for the extraction of different materials. All the work is done by bare hands and only with the help of hammers and screwdrivers. Children and women are routinely involved in the operations.

- Disposal: Computer waste, which does not have any resale or reuse value, is openly burnt or disposed off in landfills.

Recycle steps in India

- Manual Dismantling: The accrued electronic and electric waste in India is dismantled and sorted manually to fractions printed wiring boards (PWB), cathode ray tubes (CRT), cables, plastics, metals, condensers and other, nowadays invaluable materials like batteries, LCDs or wood. The valuable fractions are treated in refining and conditioning processes

- Refining and Conditioning : The different e-waste fractions are processed to directly reusable components and to secondary raw materials in a variety of refining and conditioning processes.

- Final Disposal: Solid waste is deposited in a municipal landfill. Systematic gas and water collecting systems are not installed; hence significant emissions to water and air are caused. The site is crowded with informal waste pickers. The people collect valuable materials for recycling.

Development of a national e-waste strategy

- A national framework is required as a basis for the implementation and more importantly for the replication of Clean e-Waste Channels .
- Policy & Legislation:
- Data & Baseline:
- Skills & Technologies :
- Industry Participation & e-Waste Management:
- Awareness & Campaigning

GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT AND FORESTS
NEW DELHI, the 14th May 2010 (WEEE Directives)

(1) These rules shall apply to every producer(s), dealer(s), collection centre(s), refurbishes(s), dismantler(s), recycler(s), auctioneer(s) consumer(s) or bulk consumer(s) involved in the manufacture, sale, purchase and processing of electrical and electronic equipment or components as specified in schedule-I and shall not apply to the following:-

(a) waste water and exhaust gases as covered under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) and the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) respectively and rules made there under;

(b) waste arising out of the normal operations from ships beyond five kilometers of the relevant baseline as covered under the provisions of the Merchant Shipping Act, 1958 (44 of 1958) and the rules made there under;

(c) radio-active wastes as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and rules made there under,

(d) ozone depleting substances (ODS) as covered under the Ozone Depleting Substances (Regulation and Control) Rules 2000 made under the Act; and

(e) batteries as covered under the Batteries (Management and Handling) Rules, 2001 made under the Act.

SCHEDULE 1

A. CATEGORIES OF E-WASTE covered under the rules

Sr. No.	E-waste Categories
i.	Large household appliances
ii.	Small household appliances
iii.	Toys, leisure and sports equipment
iv.	Electrical and electronic tools
v.	Medical devices
vi.	Monitoring and control instruments
vii.	Automatic dispensers
viii.	IT and telecommunication equipment
ix.	Consumer electronics

A: List of products covered under the categories given in schedule-I (SCHEDULE 2)

Sr. No.	Category	Products
1	Large household appliances	Refrigerators and Freezers, Other appliances used for refrigeration, conservation and storage of food Washing machines ,Clothes dryers , Dish washing machines Cooking ranges/stoves, Electric hot plates , Microwaves Other appliances used for cooking and other processing of food , Electric heating appliances, Electric radiators Other fanning, exhaust ventilation and conditioning equipment

2	Small household appliances	Vacuum cleaners , Carpet sweepers , Other appliances used for cleaning Appliances used for sewing, knitting, weaving and other processing for textiles Iron and other appliances used for ironing and other care of clothing Toasters , Fryers , Grinders, coffee machines and equipment for opening or sealing containers or packages Electric knives Appliances for hair-cutting, hair drying, tooth brushing, shaving, massage and other body care appliances Digital clocks, watches and equipment for the purpose of measuring indicating or registering time Scales
3	Toys, leisure and sports equipment	Electric trains or car racing sets , Hand-held video game consoles , Video games Computers for biking, diving, running, rowing, etc. Sports equipment with electric or electronic components Coin slot machines

4	Electrical and electronic tools (except large-scale stationary industrial tools)	Drills , Saws , Sewing machines Equipment for turning, milling, sanding, grinding, sawing, cutting, shearing, drilling, making holes, punching, folding, bending or similar processing of wood, metal and other materials Tools for riveting, nailing or screwing or removing rivets, nails, screws or similar uses Tools for welding, soldering or similar use Equipment for spraying, spreading, dispersing or other treatment of liquid or gaseous substances by other means Tools for mowing or other gardening activities
5	Medical devices (except implanted and infected products)	Radiotherapy equipment, Cardiology, Dialysis Pulmonary ventilators, Nuclear medicine Laboratory equipment for in-vitro diagnosis Analysers ,Freezers , Fertilization tests Other appliances for detecting, preventing, monitoring, treating, alleviating illness, injury or disability

6	Monitoring and control instruments	Smoke detector Heating regulators Thermostats Measuring, weighing or adjusting appliances for household or as laboratory equipment Other monitoring and control instruments used in industrial installations (e.g. in control panels)
7	Automatic dispensers	Automatic dispensers
8	Consumer electronics	Radio sets, Television sets, Video cameras, Video recorders, Digital cameras, Hi-fi recorders, Audio amplifiers, Musical instruments And other products or equipment for the purpose of recording or reproducing sound or image, including signals or other technologies for the distribution of sound and image than by telecommunications

9	IT and telecommunication equipment	Centralized data processing: Mainframes, Minicomputers Personal computing: Personal Computers (CPU with input and output devices) Laptop (CPU with input and output devices) Notebook, Notepad etc., Printers , Copying equipment Electrical and electronic typewriters Pocket and desk calculators And other products and equipment for the collection, storage, processing, presentation or communication of information by electronic means User terminals and systems Facsimile , Telex ,Telephones Pay telephones , Cordless telephones Cellular telephones ,Answering systems And other products or equipment of transmitting sound, images or other information by telecommunications

Schedule 3

Threshold limits for use of certain hazardous substances

- Name Threshold Limit
- Short Chain Chloro Paraffins, Alkanes, >=25%
- 2. Antimony trioxide >=1%
- 3. Beryllium metal >=0.1%
- 4.Beryllium oxide (Beryllia) >=0.1%
- 5.Cadmium >=0.1% to 25% Depending on risk phrase or perception
- 6.Cadmium oxide >=0.1% to 25% Depending on risk phrase or perception
- 7.Cadmium sulphide >=1% to 25% Depending on risk phrase or perception
- 8.Chromium VI >=0.1% to 0.25% Depending on risk phrase or perception
- 9.Copper beryllium alloys >=0.1% to 3%
- Depending on risk phrase or perception
- 10.Decabromodiphenylether (DBDE)Threshold is not mentioned as risk assessment studies are ongoing
- 11.Lead None specific
- 12. Lead oxide >=0.5% to >=25%
- 13.Mercury >=3% to >=0.25%

Schedule 4
LIST AUTHORITIES AND CORREPONDING DUTIES

SI No	AUTHORITY	CORRESPONDING DUTIES
1	Central Pollution Control Board (CPCB) Delhi	(i) Coordination with State Pollution Control Boards/ Committees of UT (ii) Registration of recyclers of e-waste (iii) Preparation of Guidelines for Environmentally Sound Management of e-waste (iv) Conduct assessment of e-waste generation and processing (v) Recommend standards and specifications for processing and recycling e-waste (vi) Documentation, compilation of data on e-waste and uploading on websites of CPCB (vii) Conducting training & awareness programmes (viii) Submit Annual Report to the Ministry (ix) Any other function delegated by the Ministry under these rules

SI No	AUTHORITY	CORRESPONDING DUTIES
2	State Pollution Control Boards/ Committees of UT	(i) Inventorization of e-waste. (ii) Grant & renewal of Authorization (iii) Monitoring compliance of authorization and registration conditions (iv) Maintain information on the conditions imposed for authorization etc. (v) Implementation of programmes to encourage environmentally sound recycling (vi) Action against violations of these rules (vii) Any other function delegated by the Ministry under these rules
3	Ministry of Information & Technology, Department of Information Technology	(i) Enforcement of reduction in use of hazardous substances(RoHS) (ii) Initiatives for IT industry for reducing hazardous substances, RoHS compliance (iii) Set targets for RoHS compliance (iv) Incentives and certification for green design/products

Structure of the Proposed e-Waste Legislations

1. Title: E-waste (Management & Handling) Rules to be published under the Environment Protection Act
2. Objective: To put in place an effective mechanism to regulate the generation, collection, storage, transportation, import, export, environmentally sound recycling, treatment and disposal of e-waste. This includes refurbishment, collection system and producer's responsibility, thereby reducing the wastes destined for final disposal.
3. Essence: The producer of electrical and electronic equipment is responsible for the entire life cycle of its own branded product and in particular the environmentally sound end-of-life management and facilitating collection and take back.
4. Responsibility of each element in the e-waste value chain:
   - Producers
   - Dealers
   - Collection agencies/ collection Centres
   - Dismantlers
   - Recyclers
   - Consumer and bulk consumers
5. Procedure for authorisation of producers, collection agencies, dismantlers, recyclers and enforcement agencies
6. Procedure for registration/renewal of registration of recyclers
7. Regulations for import of e-waste
8. Liability of producers, collection agencies, transporters, dismantlers and recyclers
9. Information & tracking
10. Elimination of hazardous substances used in e-equipment
11. Setting up of designated authority to ensure transparency, audit and inspect facilities,

examine authorisation/registration, etc

- The current practices of e-waste management in India suffer from a number of drawbacks like the difficulty in inventorisation, unhealthy conditions of informal recycling, inadequate legislation, poor awareness and reluctance on part of the corporate to address the critical issues. The consequences are that (i) toxic materials enter the waste stream with no special precautions to avoid the known adverse effects on the environment and human health and (ii) resources are wasted when economically valuable materials are dumped or unhealthy conditions are developed during the informal recycling.

Status of e-waste initiatives

- The Ministry of Environment & Forests (MoEF) of the government of India is responsible for environmental legislation and its control. The Central Pollution Control Board (CPCB), an autonomous body under the MoEF, plays an important role in drafting guidelines and advising the MoEF on policy matters regarding environmental issues.
- Historically, in 2001 in cooperation with MoEF, the German Technology Cooperation (GTZ) began work on hazardous waste management in India through the advisory services in environmental management. Subsequently, Swiss Federal Laboratories for Material Testing and Research (EMPA) started to implement its global programme 'Knowledge Partnerships in e-waste Recycling.'

The vision of this initiative is to establish a clean e-waste channel that is a:

1. Convenient collection and disposal system for large and small consumers to return all their e-waste safely
2. Voluntary system for modern and concerned producers to care for their product beyond its useful life
3. Financially secure system that makes environmentally and socially responsible e-waste recycling viable

The objectives of the initiative are:

1. Reduce the risks to the population and the pollution of the environment resulting from unsafe handling
2. Focus on knowledge transfer to and skills upgrade of all involved stakeholders through trainings and seminars
3. Target mainly the existing informal recyclers allowing for their maximum but safe participation in future e-waste management by facilitating their evolution and integration in formal structures

The milestones achieved so far are:

1. Improved awareness:

- Three WEEE Care! Initiative workshops in Bangalore supported by the Goethe Institute • National e-waste workshop in Delhi, hosted by MoEF

2. Improved stakeholder engagement:

- Formation of the e-waste Agency (EWA) brings together industry, government and NGO to work

on a sustainable e-waste management strategy for Bangalore

- First national e-waste workshop held, defined a way forward
- First national workshop on ewaste guidelines held, organised by MoEF

3. Improved estimates of e-waste:

- Rapid assessments in Delhi and Bangalore of the quantities being

generated, and identification of the e-waste recycling hot-spots

- National-level desk study to assess e-waste quantities

What should be done

- Proper laws and policies should be made
- Awareness among consumers and manufacturers
- Recycling should be preferred
- Products should be made recyclabale
- Make usage of recycled products
- Do not throw any old equipment

THANK YOU !!

Bharti Trivedi
PhD, MSc
bhartiapex@yahoo.co.in