

# E-Waste – A Comprehensive Challenge

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## ABSTRACT

In summary one can clearly grasp and understand the e-waste problem is of global concern because of the nature of production and disposal of waste in a globalized world. Although it is difficult to quantify global e-waste amounts, we do know that large amounts are ending up in places where processing occurs at a very rudimentary level. This Paper is written to provide to awareness amongst the people about the effects of hazardous waste on human health and environment. People should know that there should be proper treatment of E-Waste so that it will not adversely affect on environment and life. They should be conscious while disposing off their EEE . Either they can donate it to a needy person or can send it to an organization that provides proper recycling of these products. If each person will become responsible soon we will be able to overcome this problem.

## 1. Introduction

E-waste is a term used to cover almost all types of electrical and electronic equipment (EEE) that has or could enter the waste stream. Although e-waste is a general term, it can be considered to cover TVs, computers, mobile phones, white goods (e.g. fridges, washing machines, dryers etc), home entertainment and stereo systems, toys, toasters, kettles – almost any household or business item with circuitry or electrical components with power or battery supply.

The rapid pace of technological change in the field of electronics has made appliances for homes and office equipment both affordable and widely used. The extreme growth rates but also ever increasing obsolescence rates result in large quantities of electrical and electronic equipment being added to the waste stream. This Waste Electrical and Electronic Equipment (WEEE) or e-waste for short, includes computers, entertainment electronics, telecommunication equipment, but also cooling appliances, tools etc. that are discarded.

To manufacture a computer 240 kg of fossil fuel, 22kg of chemicals and 1500kg of water are needed. Once the computers are thrown out they may leads to many serious problems. Burning of fossil fuels leads to global warming and green house effect occurs. Thus the temperature of the atmosphere is getting increased, just think off if 240 kg of fossil fuel burnt per computer. Carbon dioxide content is made maximum with the burning of fossil fuels. Carbon dioxide is one of the greenhouse gases that enhances radioactive forcing and contributes to global warming.

Moreover E-waste is growing exponentially simply because the markets in which these products are produced are also growing rapidly as many parts of the world cross over to the other side of the 'Digital Divide'.

## 2. E-Waste Different from Municipal Waste

Instead of normal recycling materials E-waste consists of large amount of hazardous substances and some valuable

substances too. So these can't be destroyed as normal waste . These substances should be treated separately to avoid the loss of valuable materials and also to save the environment from hazardous substances. Using the personal computer (PC) as an example – a normal Cathode Ray Tube (CRT) computer monitor contains many valuable but also many toxic substances. One of these toxic substances is cadmium (Cd), which is used in rechargeable computer batteries and contacts and switches in older CRT monitors.

### Recycling Technologies:

E-Waste management practices comprise of various means of final disposal of end-of-life equipment which have different impacts on human health and the environment. It can be distinguished between state-of-the-art recycling technologies, which comply with high environmental and occupational health standards and hazardous technologies that bear a great risk for both health and the environment and are often applied in countries, where no strict standards exist.

### Hazardous Technologies

- **Incineration:**  
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.
- **Open Burning:**  
Since open fires burn at relatively low temperatures, they release many more pollutants than in a controlled incineration process
- **Landfilling:**  
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.

process, to three flows of materials is paid attention: Metals, plastics and glass.

**State-of-the-art Recycling Technologies**

- **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

**3. Impact of Electronic Waste**

The processes of dismantling and disposing of electronic waste in the third world lead to a number of environmental impacts as illustrated in the graphic. Liquid and atmospheric releases end up in bodies of water, groundwater, soil, and air and therefore in land and sea animals – both domesticated and wild, in crops eaten by both animals and human, and in drinking water.

One study of environmental effects in Guiyu, China found the following:

- Airborne dioxins – one type found at 100 times levels previously measured
- Levels of carcinogens in duck ponds and rice paddies exceeded international standards for agricultural areas and cadmium, copper, nickel, and lead levels in rice paddies were above international standards
- Heavy metals found in road dust – lead over 300 times that of a control village’s road dust and copper over 100 times
- The environmental impact of the processing of different electronic waste components

E-Waste Component	Process Used	Potential Environmental Hazard
Cathode ray tubes (used in TVs, computer monitors, ATM, video cameras, and more)	Breaking and removal of yoke, then dumping	Lead, barium and other heavy metals leaching into the ground water and release of toxic phosphor
Printed circuit board (image behind table - a thin plate on which chips and other electronic components are placed)	De-soldering and removal of computer chips; open burning and acid baths to remove final metals after chips are removed.	Air emissions as well as discharge into rivers of glass dust, tin, lead, brominated dioxin, beryllium cadmium, and mercury
Chips and other gold plated components	Chemical stripping using nitric and hydrochloric acid and burning of chips	Hydrocarbons, heavy metals, brominated substances discharged directly into rivers acidifying fish and flora. Tin and lead contamination of surface and groundwater. Air emissions of brominated dioxins, heavy metals and hydrocarbons
Plastics from printers, keyboards, monitors, etc.	Shredding and low temp melting to be reused	Emissions of brominated dioxins, heavy metals and hydrocarbons
Computer wires	Open burning and stripping to remove copper	Hydrocarbon ashes released into air, water and soil.

E-waste recycling has direct and indirect effects on human health conditions.

Direct impacts on human health may be caused by:

- Dust in indoor air generated in manual and mechanical dismantling processes (e.g. when processing plastics or CRT);
- Filter dust generated in the mechanical dismantling process;

- Noise emissions during the manual and mechanical dismantling process (conveyor belts, hammering, shredders etc.);
- Deviations from occupational safety standards;

Indirect impacts on human health may be caused by:

- Air pollution related to (HT) incineration (however the situation has been very much improved since waste gas purification systems are a common standard);
- Emissions due to transportation of materials;

- Contamination of water systems and soil near landfills.
- The indirect impacts on human health are difficult to quantify, among others because of synergistic effects and the time-lag between exposure and reaction.

#### 4. E Waste Management Tips:

Don't throw the waste cell phones, dumped systems into the landfills. Properly, deliver them to the organizations where recycling is carried out.

- Get the electronic goods from the vendors who can take back for recycling.
- Take care of the lifetime of your hardware equipments and so that e waste can be efficiently decreased
- Big Industries may buy recyclers that can be used for long time.
- Support green engineering.
- Citizens should turn their interests to use the recycled products
- Waste minimization in industries involves adopting following methods for efficient waste management:
  - inventory management,
  - production-process modification,
  - volume reduction,
  - Recovery and reuse.

#### 5. E-Parisaraa in India

E-Parisaraa Pvt. Ltd, India's first Government authorized electronic waste recycler started operations from September

2005, is engaged in handling, recycling and reusing of Waste Electrical and Electronic Equipment (WEEE) in eco friendly way. .

E-Parisaraa provides Electronic-Waste collection and disposal services to its customers who are IT majors, Public sectors, NGO's etc. We also have written agreements with our customers and have been approved by the EHS audits conducted by our customers and their counter parts from abroad

#### 6. Conclusion

In summary one can clearly realize that the e-waste problem is of global concern because of the nature of production and disposal of waste in a globalized world. Although it is difficult to compute global e-waste amounts, we do know that large amounts are ending up in places where processing occurs at a very basic level. This raises concerns about resource efficiency and also the immediate concerns of the dangers to humans and the environment.

The purpose of writing this article to create awareness about recycling the e wastes properly. It is the duty of every citizen to take care of their own electronic equipment and to recycle them in appropriate manner. With the invasion of technologies, life is becoming comfortable but the nature is getting highly degraded .So Green Technologies should be welcomed for the future world.

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