

HEALTH HAZARDS OF E- WASTE AND ITS MANAGEMENT

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ABSTRACT

E-waste is one of the fast adding up problems of the world. Human civilization witnessed rapid changes from time to time with the technological advancement. E waste is becoming the primary concern due to their health hazards and environment pollution. The high obsolescence rate of e-products has led to a corresponding increase in the generation of e-waste. E-waste contains both valuable recyclable and highly toxic materials. E waste consist of electronic goods which are not fit for their originally intended use, and irrepaialarable Which includes TVs, computers, washing machines, mobile phones etc. E-waste covers a wider range of components where some of it containing toxic substances that can have an impact on human health and the environment as well if not managed efficiently. Various organizations, bodies, and governments of many countries have adopted and/or developed the environmentally sound options and strategies for E-waste management to tackle the ever growing threat of E-waste to the environment and human health. The processes of recycling and disposing of e-waste involve several practices, including collection; sorting and temporary storage; transport and handling; and dismantling of end-of-life appliances. All these should be conducted according to the principles of ESM. This paper presents E-waste composition, categorization, Indian E-waste scenarios, prospects of recoverable, recyclable, and hazardous materials found in the E-waste and its impact on human health.

Keywords: *E-Waste, Environmental Hazards, Health, Recycle, Reduce, Reuse*

INTRODUCTION

Industrial revolution followed by the advances in information technology during the last century has radically changed people's lifestyle "E-waste" is a popular, informal name for electronic products nearing the end of their "useful life.

"E-wastes are considered dangerous, as certain components of some electronic products contain materials that are hazardous, depending on their condition and density.

Electronics technology has rapidly developed over the last half century.

Current Scenario of E-waste in India

Large quantities of electronic products (e-products) have been manufactured and made available virtually all communities.

E-products have helped us perform various important activities and tasks and have provided us with entertainment. In short, they have made our daily life easier.

The hazardous content of these materials pose a threat to human health and environment.

Recycling e-waste can be dangerous if not done using suitable techniques and measures Discarded computers, televisions, VCRs, stereos, copiers, fax machines, electric lamps, cell phones, audio equipment and batteries if improperly disposed can leach lead and other substances into soil and groundwater.

Many of these products can be reused, refurbished, or recycled in an environmentally sound manner so that they are less harmful to the ecosystem.

This paper highlights the hazards of e-wastes, the need for its appropriate management and options that can be implemented.

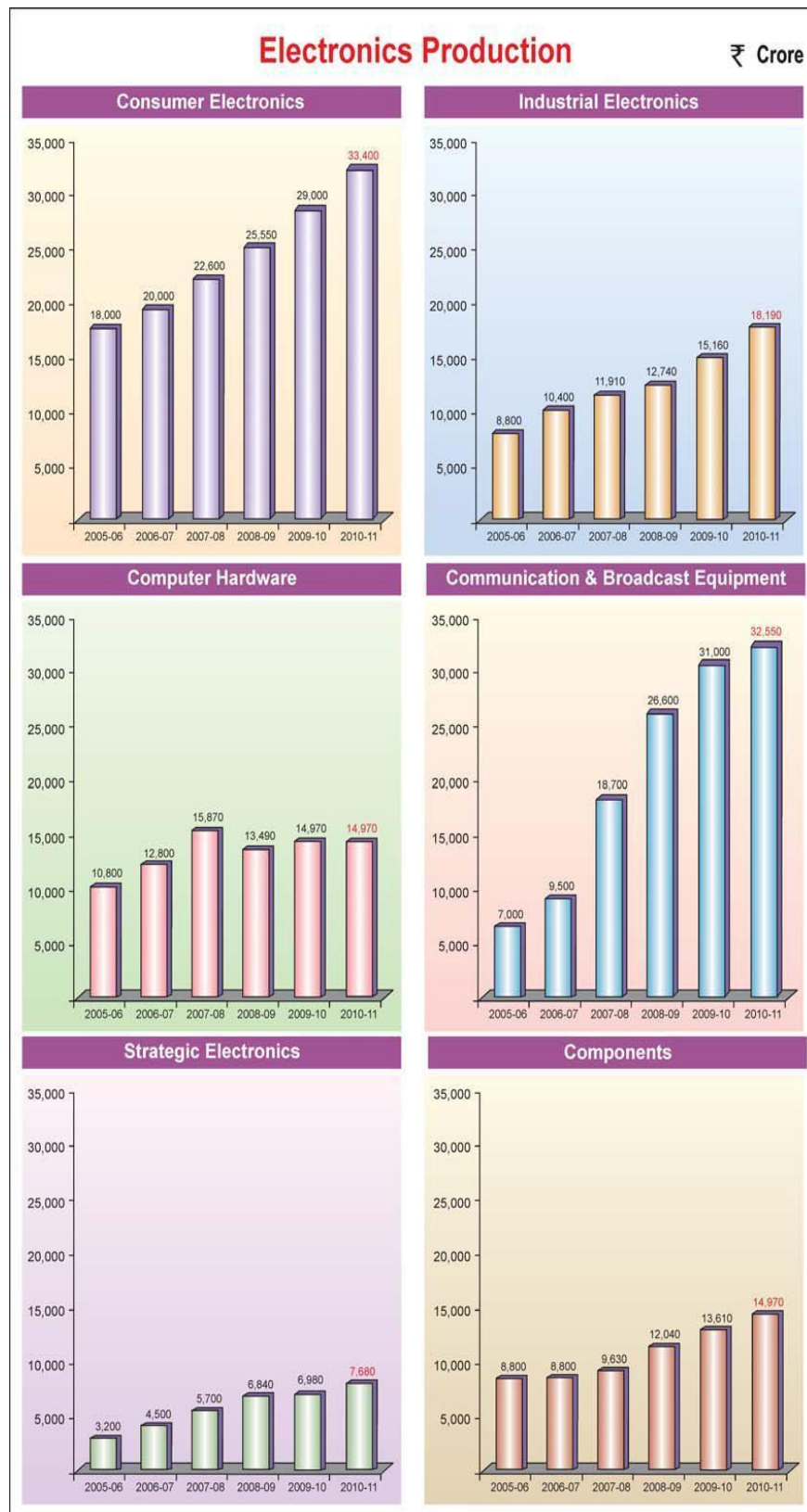


Figure 1: The growth of EEEs in India. Source: Annual Report, 2010-2011, Department of Information Technology, Government of India, n.d.

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The Forming of e-waste

Main Reasons are

- The availability of cheap products makes it profitable to buy another similar product instead of repairing the old one.
- The onrush of products with new technology and value addition makes the old ones outdated, the plight of Black and White T.V with the entry of color T.V
- When a product with less electricity consumption enters the market, others are discarded.
- The craze for consumerism is another prominent factor. The competition in the market for leads: The consumer at least towards, an exchange.
- Technical obsolescence or damaging any part of the equipments might result in the object being discarded. The difficulty or impossibility of the equipments being opened and repaired is another reason. For example: Compact Fluorescent Lamp, Mobile Phone charger, Laptop power adapter etc.

Import of E-waste into India

The country has been one of the main destinations of used EEE and WEEE from OECD countries with an estimated 50 K tonnes of WEEE imported every year (Manomaivibool, 2009). Same figure was depicted by GTZ-MAIT (2007) which estimates that about 50,000 tones of WEEE were imported to India every single year. India is becoming a big market for imported E-waste. It is estimated that approximately 80% is imported from the US, while the remaining 20% is predominantly imported from the EU (Skinner, 2010).

In a report by Toxics Link (2004), at the recycling units in New Delhi (India) itself, 70% of the total electronic waste collected was actually exported or dumped by developed countries (Toxic Link, 2004). Developed countries dump e waste to india due to the availability of cheap labor (Chaterjee and Kumar, 2009).

Basel Convention

Many countries and organizations have demonstrated serious attention to these e-waste issues by entering into multilateral agreements, establishing policies and regulations, and arranging guidance and programmers for managing e-waste properly.

The Basel Convention, one of the three conventions under UNEP, includes e-waste on its lists of hazardous waste.

The 6th Conference of the Parties (COP) of the Basel Convention in Geneva, Switzerland, 2002, also identified e-waste as priority waste stream in The Strategic Plan for the Implementation of the Basel Convention to 2010 (www.basel.int).

According to Article 13 of the Basel Convention, the Parties to the Basel Convention should transmit information and reports through the Secretariat. BCRC-SEA can facilitate the implementation of the Basel Convention by providing information, consultation, and training on waste inventories as well as compiling national inventory databases for various purposes (BCRC-SEA's Technical Guidelines for Inventory of E-Waste – 2007).

Effects on Environment and Human Health

Disposal of e-wastes is a particular problem faced in many regions across the globe. Acids and sludge obtained from melting computer chips, if disposed on the ground causes acidification of soil. Computer wastes that are land filled produces contaminated leachates which eventually pollute the groundwater.

If these electronic items are discarded with other household garbage, the toxics pose a threat to both health and vital components of the ecosystem.

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Table 1: Effects of E-Waste constituent on health

Source of wastes	e-Constituent	Health effects
Solder in printed circuit boards, glass panels and gaskets in computer monitors	Lead (PB)	• Damage to central and peripheral nervous systems, blood systems and kidney damage. • Affects brain development of children.
Chip resistors and semiconductors	Cadmium (CD)	• Toxic irreversible effects on human health. • Accumulates in kidney and liver. • Causes neural damage. • Teratogenic.
Relays and switches, printed circuit boards	Mercury (Hg)	• Chronic damage to the brain. • Respiratory and skin disorders due to bioaccumulation in fishes.
Corrosion protection untreated galvanized steel plates, decorator or hardner for steel housings	Hexavalent chromium (Cr) VI	• Asthmatic bronchitis. • DNA damage.
Cabling computer housing	Plastics including PVC	Burning produces dioxin. It causes • Reproductive and developmental problems; • Immune system damage; • Interfere with regulatory hormones
Plastic housing of electronic equipments and circuit boards.	Brominated flame retardants (BFR)	• Disrupts endocrine system functions
Front panel CRTs	Barium (Ba)	Short term exposure causes: • Muscle weakness; • Damage to heart, liver and spleen.
Motherboard	Beryllium (Be)	• Carcinogenic (lung cancer) • Inhalation of fumes and dust. Causes chronic beryllium disease or beryllicosis. • Skin diseases such as warts.

Envis Journal of Human Settlements, March 2004

Status of E-Waste Management in India

Despite a wide range of environmental legislation in India there are no specific laws or guidelines for electronic waste or computer waste (Devi *et al.*, 2004). As per the Hazardous Waste Rules (1989), e-waste is not treated as hazardous unless proved to have higher concentration of certain substances. Though PCBs and CRTs would always exceed these parameters, there are several grey areas that need to be addressed. Basel Convention has Waste electronic assemblies in A1180 and mirror entry in B1110, mainly on concerns of mercury, lead and cadmium. Electronic waste is included under List-A and List-B of Schedule-3 of the Hazardous Wastes (Management & Handling) Rules, 1989 as amended in 2000 & 2003. The import of this waste therefore requires specific permission of the Ministry of Environment and Forests. As the collection and re-cycling of electronic wastes is being done by the informal sector in the

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country at present, the Government has taken the following action/steps to enhance awareness about environmentally sound management of electronic waste (CII, 2006):

Management of E-Wastes

1. The e-waste liberated with this too has to be given priority. It's high time to switch over to alternatives. What could be a solution to this Extended Producer Responsibility.
2. Researchers and engineers should come up with new manufacturing techniques that might not contain hazardous chemicals, example bio degradable resin based computer by IBM, the battery less radio by Philips etc.
3. Organizations or institutions that scientifically process e-waste should be promoted like e-parisaraa,
4. The importing of the hazardous e-waste should be banned completely. A labeling mechanism (like BEE star rating for appliances which are energy efficient) should be brought into force.
5. While buying new equipments, those with long life span should be selected.

CONCLUSION

Solid waste management, which is already a mammoth task in India, is becoming more complicated by the invasion of e-waste, particularly computer waste. There exists an urgent need for a detailed assessment of the current and future scenario including quantification, characteristics, existing disposal practices, environmental impacts etc.

Institutional infrastructures, including e-waste collection, transportation, treatment, storage, recovery and disposal, need to be established, at national and/or regional levels for the environmentally sound management of e-wastes. Establishment of e-waste collection, exchange and recycling centers should be encouraged in partnership with private entrepreneurs and manufacturers.

An effective take-back program providing incentives for producers to design products that are less wasteful, contain fewer toxic components, and are easier to disassemble, reuse, and recycle may help in reducing the wastes.

It should set targets for collection and reuse/recycling, impose reporting requirements and include enforcement mechanisms and deposit/refund schemes to encourage consumers to return electronic devices for collection and reuse/recycling. End-of life management should be made a priority in the design of new electronic products. E waste is posing environmental and health problems. Developing countries are dumping the e waste in India due to the availability of cheap labor, it should be banned. The e waste should be reused, recycled in a scientific manner.

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