



“INDIAN GOVERNMENT INITIATIVE TOWARDS ELECTRONIC WASTE”

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ABSTRACT

The increasing volume and complexity of waste associated with economic growth are posing serious risks to ecosystems and human health. Every year, an estimated 11.2 billion tonnes of solid waste are collected worldwide and decay of the organic proportion of solid waste is contributing to about 5% of global Greenhouse Gas (GHG) emissions. Of all the waste streams, waste from electrical and electronic equipment containing new and complex hazardous substances presents the fastest-growing challenge in both developed and developing countries.

More than 5, 00,000 tonnes of e-waste is generated in India each year while some developed countries also ship their waste. But most of the e-waste is not being handled properly and is threatening the environment and human health. This is only because we are not implementing appropriate and effective methods for the collection of e-waste. Considering the intensity of the issue the Government of India, The Ministry of Environment and Forest (MOEF), Central Pollution Control Board (CPCB) has notified the e waste management rules (2011) for the first time. In this paper attempt has been made to provide overview of India's present E waste scenario, its impact on the human health and environment, health hazards, recycling, Government's initiatives, organizations working for reducing and recycling electronic waste.

KEYWORDS: *CPCB, E-waste, Environment pollution, Government, Hazardous substances, Human health, MOEF, Recycling.*

INTRODUCTION:

In recent decades, the use of electronic and electrical devices has increased significantly, leading to rapidly rising amounts of waste electrical and electronic equipment (WEEE), called e-waste. Currently, around 20-50 million tonnes of E-waste are generated worldwide. The rate increases by as much as 3-5% each year, making e-waste one of the fastest-growing hazardous waste streams on a global level. The factors behind this development are the rapid obsolescence and replacement of electronic products caused by technological innovation and aggressive marketing. These aspects will contribute considerably to the dimension of e-waste quantities in the future.

As per the CPCB (Central Pollution Control Board, India) Guidelines, 2008 e-waste is defined as waste generated from used electronic devices and household appliances which are not fit for their originally intended use and are destined for recovery, recycling and disposal. Generally, e-waste comprises of old, end-of-life electronic appliances such as computers, laptops, TVs, DVD players, refrigerators, freezers, mobile phones, MP3 players, etc. The unauthorized e-waste dismantling, recycling, resource recovery has become a global concern because many components of the above equipment are toxic and non-biodegradable and the processes applied for material recovery are hazardous.

ELECTRONIC WASTE IN INDIA:



In India, estimated e-waste generation was 1,46,180 tonnes/year in 2005, which is expected to grow at 9, 00,000 tonnes by 2015. The west region in India generates highest

amount of e-waste i.e., 35%, whereas north, south and east regions generate 21%, 30% and 14% respectively. As far as sales of computers and mobile phones are concerned, sale of computers and laptops has been grown at 26% in 2014-15 whereas, mobile subscriber base is concerned; the total wireless subscribers (CDMA & GSM) have reached 491.76 million. In growing economy like India these sales are estimated to grow alarmingly in future but e-waste management is not being developed accordingly. Proper facilities have to be developed accordingly which is an impending challenge.

REASONS FOR HIGH E-WASTE GENERATION IN INDIA:

There are different assumed life spans of computers and mobile phones. The average life span of computers is three to five years and in case of mobile phones, it is only two to three years. Due to innovative products and offers, the life cycles of products are shrinking. Attractive market offers push customer to buy new product rather than upgrading new one. The customers, who like to replace their computer and mobile as they see a new product with improved and innovative features, contribute to more e-waste generation. Customers these days don't upgrade the computer; they prefer to replace it. Moreover, some of the new software present in the market can be run smoothly on new operating systems. Therefore new operating systems and changing software in computers are also a major reason for more e-waste generation. The components of the mobile and computers are so costly that customers prefer to buy new products. So, customers don't think to replace the component and prefer to replace the product with new one.

E-WASTE MANAGEMENT: INDIAN AND GLOBAL SCENARIO:

In India, Ministry of Environment and Forests (MoEF) and Central Pollution Control Board (CPCB) are responsible for proper management of hazardous waste. The e-waste management was first included in the List-A and List-B of Schedule-3 of "Hazardous Wastes (Management & Handling) Rules, 1989". Then the law was amended in 2000 and 2003. Finally, after amendments in 2007 and 2008, e-waste has been included in "The Hazardous Materials (Management, Handling and Transboundary Movements) Rules, 2008". As far as global e-waste management is concerned, *Switzerland* is the first country to implement the organized e-waste management system in the world. Extended Producer Responsibility (EPR) and Advance Recycling Fee (ARF) are the backbone of e-waste management system in Switzerland and other developed countries.

There are many countries that have already started the ‘take back’ system for electronic products and they also have dedicated laws on e-waste management. In USA, National Electronics Action Plan has been initiated by US Environment Protection Agency to address the various issue related to electronic waste. Two very important frameworks for protecting environment from e-waste have been put forward by *European Union i.e., WEEE* Directives and Restriction of use of Certain Hazardous Substances (RoHS), which are also implemented by other countries. According to *EU* directives (2003), it is mandatory for all 27 countries of European Union to recycle their e-waste. Basel Convention is also nice step taken by UNEP to control the international trading of hazardous waste and India is also signatory to this.

In India, rag pickers pay some amount to the customer from whom they are collecting the waste and on the other hand, recycling fee is charged from customers to manage waste effectively in developed countries. Most of the activities, like collection, transportation, segregation, dismantling, recycling, disposal, etc., are carried out by informal sector. E-waste is mostly handled by unskilled workers and they do not take proper safety measures. Moreover, proper place is not used for e-waste handling. The operations to treat e-waste are carried out within the cities and slums. Recycling and disposal is not properly done due to lack of appropriate technology. Also, very few companies are there which have implemented ‘take back’ system voluntarily. Hence, there is an urgent need of implementation of proper e-waste management system in India.

IMPACT OF HAZARDOUS SUBSTANCES ON HEALTH AND ENVIRONMENT:





The waste from electronic products include toxic substances such as cadmium and lead in the circuit boards; lead oxide and cadmium in monitor cathode ray tubes (CRTs); mercury in switches and flat screen monitors; cadmium in computer batteries; polychlorinated biphenyls in older capacitors and transformers; and brominated flame retardants on printed circuit boards, plastic casings, cables and PVC cable insulation that releases highly toxic dioxins and furans when burned to retrieve copper from the wires. Many of these substances are toxic and carcinogenic. The materials are complex and have been found to be difficult to recycle in an environmentally sustainable manner even in developed countries. Listed in the table below are the harmful elements in the compositions of electrical and electronic appliances that can be hazardous to health and environment.

Sr. No.	Pollutant	Occurrence	Danger / Disease
01	Lead	Batteries, solar system, transistors, stabilizers, lasers, LEDs, thermoelectric elements, circuit Boards, TV screen	Affects the kidneys, reproductive system, mental development, and fumes causing respiratory problems.
02	Plastic	Circuit boards, cabinets and cables,	Brominated flames contain Dioxins harm reproductive and immune systems. Water pollutant.
03	Chromium	Used to protect metal housings and plates in a computer from corrosion.	Inhaling chromium can damage liver, kidneys and cause bronchial maladies including asthmatic bronchitis and lung cancer and DNA Damages.
04	Mercury	Batteries in clocks and pocket calculators, switches, LCDs	Affects the central nervous system, kidneys and immune system. It

			impairs fetus growth and harms infants through mother's milk. Methylated mercury is toxic and can enter the human food chain through aquatic. It can trigger depression and suicidal tendencies and cause paralysis, Alzheimer's disease, speech and vision impairment, allergies, hypo spermia and impotency.
05	Beryllium	Electron tubes, filler for plastic switch board and rubber, lubricant additives	It is carcinogenic and causes lung diseases. Causes damages to heart level and spleen.
06	Cadmium	Batteries, pigments, solder, alloys, circuit boards, computer batteries, monitor cathode ray tubes	Causes severe pain in the joints and spine. It affects the kidneys softens bones and neural damages. 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.
07	Acid	Circuit boards	Sulphuric and hydrochloric acids are used to separate metals from circuit boards. Fumes contain chlorine and sulphur dioxide, which cause respiratory problems. They are corrosive to the eye and skin.
08	Arsenic	Semiconductors, diodes, microwaves, LEDs (Light-emitting diodes), solar cells	Causes lungs cancer.
09	Brominated flame-proofing agent	Casing, circuit boards (plastic), cables and PVC cables	Causes the problem of inhaling.
10	Cobalt	Insulators	Problems to eyes and skin
11	Copper	Conducted in cables, copper ribbons, coils, circuitry, pigments	Excessive use causes harm to immune system, stomach pain
12	Liquid crystal	Displays	Nausea irritant
13	Lithium	Mobile telephones, photographic equipment, video equipment (batteries)	Damage nervous cells and system
14	Nickel	Alloys, batteries, relays, semiconductors, pigments	Nausea , irritant and sensation of vomiting
15	PCBs (polychlorinated biphenyls)	Transformers, capacitors, softening agents for paint, glue, plastic	Causes respiratory problems
16	Selenium	Photoelectric cells, pigments, photocopiers, fax machines	Damage eyes and eyesight
17	Silver	Capacitors, switches (contacts), batteries, resistors	Causes burning sensation in body
18	Zinc	Steel, brass, alloys, disposable and rechargeable batteries, luminous substances	Respiratory and lungs disorder.

E-WASTE CONTROLLING AGENCIES IN INDIA:



MINISTRY OF ENVIRONMENT AND FORESTS (MOEF):

MOEF of Government of India is responsible in identification of hazardous wastes and provides permission to exporters and importers under the Environment (protection) Act, 1986.

CENTRAL POLLUTION CONTROL BOARD (CPCB):

CPCB was constituted under the Water (Prevention and Control of Pollution) Act, 1974. CPCB coordinates activities with the State Pollution Control Boards and ensures implementations of the conditions of imports. It also monitors the compliance of the conditions of authorization, import and export and conduct training courses for authorities dealing with management of hazardous wastes and to recommend standards for treatment, disposal of waste, leache and specifications of materials and recommend procedures for characterization of hazardous wastes.

STATE POLLUTION CONTROL BOARDS (SPCB):

SPCB constituted under the Water (Prevention and Control of Pollution) Act, 1974 to grant and renew authorization, to monitor the compliance of the various provisions and conditions of authorization, to forward the application for imports by importers and to review matters pertaining to identification and notification of disposal sites.

DIRECTORATE GENERAL OF FOREIGN TRADE:

DGFT was constituted under the Foreign Trade (Development & regulation) Act 1992 to grant/ refuse license for hazardous wastes prohibited for imports under the Environment (protection) Act, 1986.

PORT AUTHORITIES AND CUSTOMS AUTHORITIES:

Under the customs Act, 1962 verify the documents and inform the Ministry of Environment and Forests of any illegal traffic and analyze wastes permitted for imports and exports and also train officials on the provisions of the Hazardous Wastes Rules and in analysis of hazardous wastes.

CONCLUSION:

Electronic waste accumulation in the country if not disposed-off properly may become a serious challenge for the human health and environment in the coming future. From the Government side the enforcement of the laws needs to be stricter than ever with an intention to reduce this problem as soon as early before it becomes a threatening hazard for the country. This emphasize the immediate efforts on the part of Government ,corporate , environmentalists to manage the Electronic waste through implementing a proactive and protective protocol for the agencies working in E waste reuse, recycle and disposal properly. Need is also felt to educate the general public about this critical issue which can become a major threat for the health of the public and the environment if not handle with care and consciousness.

SUGGESTIONS:

- **PROPER E-WASTE DISPOSAL:**

In modern day, our life and living standard, all are going to digitalized, which on one hand, is making our life much simpler but then it is creating a different kind of problem. So there is an urgent need for proper handling and disposal of e-waste with utmost sincerity. The need for e-waste disposal arises from the fact that, old and useless electronic items are not biodegradable. The most common practices adopted for disposal of e-waste are acid baths, land filling and open air burning. When electronic equipments are burned, they release abundant fumes which are dangerous for environment way beyond our imagination and estimation. Stewart & Lemieux (2003) suggested that incineration may be a viable option for electronics waste disposal, provided an appropriate particulate control device is used to control metal emission. A lot needs to be done to make disposal of e-waste a safe process.

MANAGEMENT ASPECTS:

- **BASIC PRINCIPLES:** The principle of “Reduce, Reuse and Recycle” applies here. Reduce the generation of e-waste through smart procurement and good maintenance.

Reuse still functioning electronic equipment by donating or selling it to someone who can still use it. Recycle those components that cannot be repaired.



- **PUBLIC EDUCATION:**

Public education and outreach may well be the most important component. That is because no matter what infrastructure is available and developed, what the laws are, and what the options are, no one will be aware of it without public education.

HAZARDOUS E-WASTE SOLUTIONS:

- Waste Management: Minimize impact
- Waste Prevention: Minimize the volume
- Reduce waste and pollution
- Reuse as many things as possible
- Recycle and compost as much waste as possible
- Chemically or biologically treat or incinerate
- Bury what is left

INTERNATIONAL E-WASTE SOLUTIONS:

- Ban hazardous waste exports
- Get the poisons out
- Exercise precaution-no new poisons
- Make the producer responsible

- Require producers to take back
- Design for longevity, upgrade, repair and reuse

REFERENCES:

- Abhijeet Mitra, “Electronic Waste Management” - Indian Context International Journal of Management, IT and Engineering, volume 13, Pg. 358-366, January,2013.
- Ammons, J and Sarah, B. 2003. “Eliminating E-Waste: Recycling through Reverse Production” at www.lionhrtpub.com.
- Anon (2002) EU government to enforce E-waste recycling: newrules make producers pay. Waste Age 33(12):14
- Babu, B.R., Parande, A.K. and Basha, C.A. (2007), “Electrical and electronic waste: a global environmental problem”, Waste Management and Research, Vol. 25 No. 4, pp. 307-318.
- Billingham, B. M. “E-Waste: A Comparative Analysis of Current and Contemplated Management efforts by the European Union and The United States.”
- Cairns, C.N. (2005), ‘E-waste and the consumer: Improving options to reduce, recycle and reuse’, Proceedings of International Symposium on Electronics and the Environment, May 16-19, New Orleans, US.
- Chaturvedi, A., Arora, R., Khatter, V. and Kaur, J. (2007), “E-waste assessment in India-Specific focus on Delhi”, MAIT-GTZ study, prepared by BIRD and GTZ, p. 66.
- CPCB (Central pollution Control Board) (2008), ‘The Hazardous Materials (Management, Handling and Transboundary Movements) Rules.
- CPCB (Central Pollution Control Board) (2010), ‘List of Units Registered with MoEF/CPCB as Recyclers/ Reprocessors having Environmentally Sound Management Facilities (e-waste Reprocessors).
- Dr. B. J. Mohite _Issues and Strategies in Managing E-Waste in India’ IJRMBSS I I Vol. 1 I Issue 1 I Mar. 2013.
- Dr. S Chatterjee. S, “Electronic Waste and India”,Department of Information Technology, Electronics Niketan, 6, C.G.O.Complex, New Delhi-110003, 2012.
- E-waste (Management and Handling) rule 2012.
- Indian market Research Bureau (IMRB) survey of _E-waste generation at Source’ in 2009.

- Ministry of Environment and Forest, Government of India, Central Pollution Control Board, Delhi, 2011, “Implementation of E-Waste Rules 2011 Guidelines”.
 - Ravinder Pal Singh, India: A Matter of Electronic Waste; the Government Initiatives ,Journal of Business Management & Social Sciences Research (JBM&SSR), Volume 2, No.4, April 2013.
 - Rajya Sabha Website, http://rajyasabha.nic.in/rsnew/publication_electronic/E-Waste_in_india.pdf
 - Saoji, A., “E-Waste Management: An Emerging Environmental and Health Issue in India”, National Journal of Medical Research, Volume 2, Issue 1, Pg. 107-110, Jan-March 2012
- UNEP Press Release, 'Basel Conference addresses Electronic Wastes Challenge', 27 November 2006 <http://www.unep.org>.



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