



# E-waste Management

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**Abstract:** Electronic waste or E-waste contains disposed electrical or electronic devices. Electronic scrap components include CPUs, Phones, Chips, TV's etc. These contain hazardous components like lead, cadmium, beryllium, or brominated flame retardants. Due to these hazardous components, developing countries are facing enormous challenges related to generation and management of E-waste. In hither paper, a path is made as far as calculating the current status of E-waste management in India over and above worldwide, because the current rules and guidelines. It is found that great part of recycling of E-waste is being handled by unconventional part that has less/no knowledge about the effects of exposure to hazardous substances.

**Keywords:** E-waste, Hazardous waste, effects, management.

## I. INTRODUCTION

It is a callous actuality that with the considerable rise in usage of ICT (information and communication technology) devices to linkup the gap between demographics and regions, there is also an rapid increase of E-waste all over world. E-waste can be described as dumped junk of electronic and electrical devices, which are designated for reuse, resale, salvage, recycling or disposal are considered as E-waste. There is a lack for E-waste management as E-waste components will cause serious biological hazards and environmental destruction, when raw and informal methods are put for recovery of useful components. Recycling and discarding of E-waste may involve remarkable risk to labors and communities in developed countries. Many of the developing countries are upset with the fast growing problems of E-waste and have to need healthy E-waste management systems to end, ICT (information and communication technology) devices to escape the threat on environment and humans.

- Upgrade in technology
- Change in living Style, Status and Fashion
- Nearing the end of their useful life
- Not taking safety measures while handling them

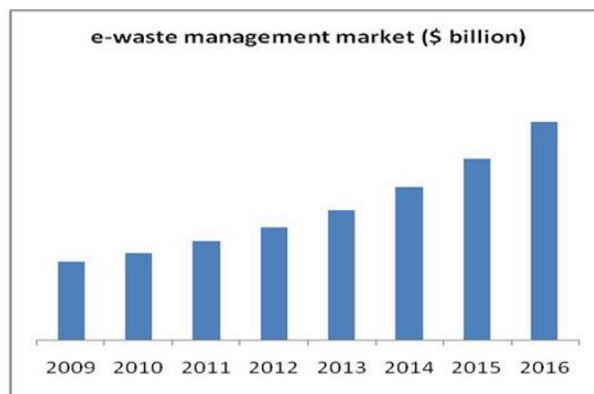


Fig 1: Statistics of E-waste Management

## II. AMOUNT OF E-WASTE WORLD-WIDE

Due to voluminous change in technology, changes in media, decreasing prices have resulted in fast-growing surplus of electronic extravagance around the world. A calculated 50 million tons of E-waste are produced is every year.

USA disposes 30 million computers per year and 100 million phones are disposed in Europe per year.

Environmental protection agency measured that only 15 to 20% of E-waste is recycled, the remaining of these go straight into garbage and incinerators, which are causing an heavy impact on human life and environment. UNEP calculates awful E-waste is raising through 40% per year around world and E-waste is the swift-rising type of waste. Reasons behind swift growth of E-waste are:

An intermediate of 20 to 50 million metric tons of E-waste are produced around world each year, depicting large household appliances of 42%, IT Communication Technology of 34%, Consumer Electronics 14% and others 10%. An ASSOCHAM-Kinetics study found that volume of E-waste generated worldwide is expected to reach from 93.5 MT in 2016 to 130 MT in 2018 at a CAGR of 17.6 percent during the period.

## III. INDIAN SCENARIO IN E-WASTE PRODUCTION

India emerges Hub for E-waste. Growing of information and communication technology as enhanced usage of electronic exponentially. Faster obsolescence and up-



gradation for forcing consumers to discard old products demand for e-waste began to grow when scrap yards found they could extract valuable substance such as copper, iron and gold. Scarp yards in India are New Delhi, Meerut, Firozabad, Chennai, Bangalore and Mumbai. India has appeared as the worlds second largest mobile market and Fifth largest producer of E-waste, disposing roughly 18.5 lakh tonnes of electronic waste every year ,a study says[8]. The study on ‘Electronic Waste Management in India,’ directed to mark World Environment Day, said as India become richer and spend more on electronic materials and appliances, computer equipment esteem for almost 70% of E-waste concrete, accompanied by telecommunication equipment(12%), electrical equipment(8%), and medical equipment(7%)[7] .Other apparatus , containing household E-crap account for the remaining 4% .Indian E-waste is growing 30% annually. 65 cosmopolis in India produce more than 60% of total E-waste generated in India 10 states generate 70% of the E-waste generated in India. Refer Table no.:01

**According to WEEE (Waste Electrical and Electronic Equipment) amount of waste produced in Indian states**

| STATES/UT              | WEEE (TONNES) |
|------------------------|---------------|
| Andaman and Nicobar    | 92.2          |
| Andhra Pradesh         | 12780.3       |
| Arunachal Pradesh      | 131.7         |
| Assam                  | 2176.7        |
| Bihar                  | 3055.6        |
| Chandigarh             | 359.7         |
| Chhattisgarh           | 2149.9        |
| Dadra and Nagar Haveli | 29.5          |
| Daman and Diu          | 40.8          |
| Delhi                  | 9729.2        |
| Goa                    | 427.4         |
| Gujarat                | 8994.3        |
| Haryana                | 4506.9        |
| Himachal Pradesh       | 1595.1        |
| Jammu Kashmir          | 1521.5        |
| Jharkhand              | 2021.6        |
| Karnataka              | 9118.7        |
| Kerala                 | 6171.8        |
| Lakshadweep            | 7.4           |
| Madhya Pradesh         | 7800.6        |
| Maharashtra            | 20270.5       |
| Manipur                | 231.8         |
| Meghalaya              | 211.7         |
| Mizoram                | 79.2          |
| Nagaland               | 145.1         |
| Orissa                 | 2937.8        |
| Puducherry             | 284.2         |
| Punjab                 | 6958.5        |
| Rajasthan              | 63276.9       |
| Sikkim                 | 78.1          |

|               |          |
|---------------|----------|
| Tamil Nadu    | 13486.2  |
| Tripura       | 378.3    |
| Uttar Pradesh | 10381.1  |
| Uttarakhand   | 1641.1   |
| West Bengal   | 10059.4  |
| Total         | 146180.7 |

**IV. POLLUTANTS IN E-WASTE**

Pollutants or hazardous components in E-waste are generally condensed in circuit boards, batteries, plastics, and LCDs (Liquid Crystal Displays). Given below in a table no:2 displays the substantial pollutants occurring in extravagance electrical and electronic equipments:

**Pollutants and their occurrence in waste electrical and electronic equipment**

| Pollutant                         | Occurrence  |
|-----------------------------------|---|
| Arsenic                           | Semiconductors, microwaves                                  |
| Barium                            | filler for plastic and rubber, lubricant additives          |
| Brominates flame-proofing agent   | PVC cables  |
| Cadmium                           | Batteries, pigments, solder, alloys                         |
| Chrome                            | Dyes/pigments switches, solar                               |
| Cobalt                            | Insulators  |
| Copper                            | Conducted in cables, copper ribbons                         |
| Lead                              | Lead rechargeable batteries, solar                          |
| Liquid Crystal                    | Displays  |
| Lithium                           | Mobile telephone, photographic equipments, video equipments |
| Mercury                           | batteries in clocks and pocket calculators, switches, LCDs  |
| Nickel                            | Alloys batteries, relays, semiconductors                    |
| PCBs (Polychlorinated by phenyls) | capacitors, softening agents for paint, glue                |
| Selenium                          | Photo electric cells, pigments                              |
| Silver                            | Capacitors, switches, batteries                             |

**V. CONSEQUENCES OF E-WASTE ON HUMAN HEALTH AND ENVIRONMENT**

E-waste is fully compound to grip considering of its opus. It is formed by collaborative components few of which include harmful substances that have an unfavorable effect



on biological health and surroundings if not griped properly that is if improper recycling and discarded methods are deployed. So there is a requirement of suitable technology for handling and disposal of these chemicals.

### Effects of Hazardous components of E-waste

#### 1. Arsenic

Effects skin and can decline nerve conduction velocity. Constant openness to arsenic may lead lung cancer and sometimes be fatal.

#### 2. Lead

May affect kidneys, reproductive systems, nervous connections. Causes blood and brain disorders, few times may be fatal.

#### 3. Barium

Affects heart muscle.

#### 4. Chromium

Can damage liver, kidneys and may lead to asthmatic bronchitis and lung cancer.

#### 5. Beryllium

Causes lung disorder.

#### 6. Mercury

Nervous system is affected, kidneys and immune system, it impairs foetus growth

#### 7. Cadmium

Cause severe pain in the joints and spine.

#### 8. BFR (Brominated flame retardants)

Effects reproductive and immune systems, may cause hormonal disorder.

#### 9. Chlorofluorocarbon (CFC)

Can affect the ozone layer. It may cause skin cancer in human and genetic damage in organisms.

#### 10. Polychlorinated Biphenyl (PCB)

Can lead to cancer in animals, can affect the immune system, reproductive system, nervous system, endocrine system. PCBs persistently contaminate in the environment and cause severe damage.

#### 11 Polyvinyl Chloride (PVC)

Dangerous to respiratory system.

#### 12 Dioxin

These are awfully toxic to animals and may cause malfunction of foetus

life of electronic device by anyone else and **recycle** those elements that cannot be repaired.

E-waste management contains the activities:

- Collection of E-waste
- Sorting of E-waste
- Procedure of E-waste
- Servicing of E-waste
- Recycling of E-waste
- Dismantling
- Component recovery of E-waste
- Residual disposal of E-waste



Fig 2 Ways of treating E-waste

Fig2 explains the ways of treating E-waste. Their are two ways we can find interesting for proper treatment of E-waste are recycling and refurbishing.

Basic Principles of E-waste is Reduce, Reuse and Recycle.

Reduce: electronic and electrical equipment quantity

Reuse: when the device is still functional, it can be sold, thus continuing the functionality of the product.

Recycle: the equipment is disassembled and components recovered and used to manufacture new products.

The main features to be taken into consideration while framing ICT waste management guidelines for developing countries are:

- Strategy and rules curtaining import and export of EEE and WEEE in conformance with the rules of each country and with international legislation.
- Describing responsibilities of prime stake holders at the degree of government, supply chain, consumers of ICT equipment and entities for disposal of waste.
- Extended producer responsibility (EPR) the manufacturer's responsibility for its ICT devices draw out throughout the different stages of that equipment's life cycle with making important the cost of handling the equipment at end of life.
- Accountable information system to have data on ICT equipment in market, disused EEE management and WEEE management and to have control on the monitoring and future planning.

## VI. MANAGEMENT OF E-WASTE

A sharp E-waste management system for growing countries have to estimate the E-waste status, recognize that E-wastes are a complex alloy of hazardous and non-hazardous substances and substance and need to define the integral E-waste management system taking into consideration the EEE market perforation , ICT equipment life cycle, financing mechanisms etc.

Environmentally sound management acknowledge three Rs i.e. reduce, reuse and recycle of WEEE. The goal would be to **reduce** the production of E-waste among spruce manufacturing and preservation, **reuse** till end of



- Advancing employment and training for the informal sector engaged in recycling.

## VII. CONCLUSION

E-waste is relatively new part in the global problem of E-waste removal. It is also fastest growing segment worldwide in disposed extravagance. This increasing problem in the world is mainly ignored. Most of the nation in the world has laws and regulations requiring that E-waste not be disposed of in landfills or be incinerated. Most of the cities and states have set up programs across the United States where the consumers can drop off used Electronic devices to be properly disposed off. The best method of disposal is to recycle this equipment. There is a popular mantra used by many recycling experts, “Reduce, Reuse and Recycle” this watchword has been advanced with plastics and glass, but its message is also applicable to disposal of E-waste.

ITU has coincided that there is nowise idiomatic or conceptual model in developing countries for E-waste management, each of which is characterized by their own particular conditions of surroundings, social, technological, lucrative and cultural. Government policies should inspire the reuse of EEE aiming to minimize and **Waste Electrical and Electronic Equipment (WEEE)** recycle. The **Extended Producer Responsibility (EPR)** do need to have luculent regulations to mandate the ‘take back’ activity of companies rigidly.

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