

E- Waste: Fastest Growing Hazardous Waste (A review)

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Abstract

Waste of electronics/ electrical goods that have reached their end of life. Electronic products often contain hazardous and toxic materials and should not be dumped with other wastes. Along with China, India is largest importer of E-waste from developed countries like US; UK and Japan. In India 90% of mobile equipment are imported. The rate of e-waste generation is increasing by 10% every year¹.

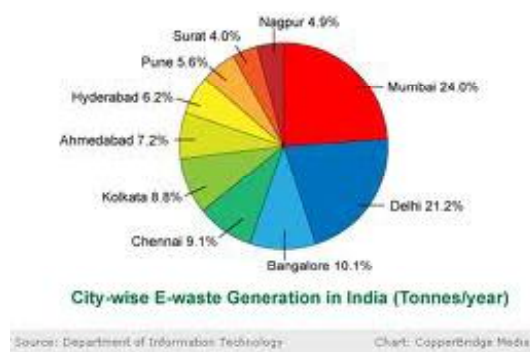
What is e waste?

E wastes, as it derives meaning from its name include the broad spectrum of electronics/Electrical appliances, products, components, and accessories that due to malfunction. Exhaustion (batteries, light bulb) or obsolescence have been discarded. This new form of waste is now one of the fastest growing wastes around the world & needs serious action today waste is technological revolution. When disposed off in a landfill, it becomes a conglomeration of plastics & steel casting, circuits boards, glass tubes, wires & materials. It is valuable as a source of secondary raw materials. It is toxics if treated & discarded improperly.

Projected e waste generation :

According to a recent report from

center for science & Environment India is guilty of generating 350000 tones of electronic waste every year and imports another. Madhya Pradesh & Uttar Pradesh



Literature survey in the world :

E waste & electrical equipment is a major environmental issue that is faced by

developing countries even though they produce a small amount of electronics products. These waste contain several harmful pollutants like larger quantities of epoxy, resins, fiberglass, PCBs, PVC, thermosetting plastics, lead, tin, copper, silicon beryllium, carbon, iron, aluminum and also elements found in small amounts like americium antimony, arsenic, titanium vanadium & yttrium etc

E waste overview:

South Africa has a population of 50.8 million and generates an estimated 2000000 tons of e waste annually. formal recycles process approximately 20%. The rest is either stored by the owner, recycled informally, added to the domestic waste stream or dumped illegally.

Disadvantages of e-waste :

Disposal of e-wastes is a particular problem faced in many regions across the globe. Computer wastes that are land filled produces contaminated leachates which eventually pollute the groundwater. Acids and sludge obtained from melting computer chips, if disposed on the ground causes acidification of soil. For example Guiyu, Hong Kong a thriving area of illegal e-waste recycling is facing acute water shortages due to the contamination of water resources¹⁻⁴.

Electrical & electronic equipment are made up of a multitude of components, some containing toxic substances which can have an adverse impact on human health and the environment if not handled properly. Often, these hazards arise due to the improper recycling and disposal processes used. For

example cathode ray tubes have high content of carcinogenic such as lead, barium, phosphor and other heavy metals. When disposed carefully in a controlled environment, they do not pose any serious health or environment risk. However, breaking, recycling or disposing CRT in an uncontrolled environment without the necessary safety precautions can result in harmful side effects for the workers and release toxins into the soil, air and groundwater.

The government, industry users and NGOs have taken notice of the growing hazards of e waste and there is consensus that recycling and resources recovery has to be environmentally compatible and we at 360 solvers have joined hands with several organizations to recycling and disposal of e waste³⁻⁴.

The changing lifestyle of people and urbanization has led to increasing rates of consumption of electronics products. This has made electronic waste management an issue of environment and health concern².

Huge amount of locally generated and internationally imported waste have posed a serious threat to human health and the environment. The complexity of the issue of e waste in India, given its vast geographical and cultural diversity and economic disparities, makes management challenges in India quite unique³.

Some facts on electronic waste:

Disposal and e waste recycling is a dangerous process not only in developing countries but also in developed nations like U.S. The technology needed to recycle e-Waste is

| e-waste sources | Constituents | Health effects |
|--|--------------------------------------|--|
| Solder in printed circuit boards, glass panels, and gaskets in computer monitors | Lead | <ul style="list-style-type: none"> • Damage to central and peripheral nervous systems, blood systems, and kidney damage • Adverse effects on brain development of children; causes damage to the circulatory system and kidney |
| Chip resistors and semi-conductors | Cadmium | <ul style="list-style-type: none"> • Toxic irreversible effects on human health • Accumulates in kidney and liver • Causes neural damage |
| Relays and switches, and printed circuit boards | Mercury | <ul style="list-style-type: none"> • Chronic damage to the brain • Respiratory and skin disorders due to bioaccumulation in fishes |
| Galvanized steel plates and decorator or hardener for steel housing | Chromium | <ul style="list-style-type: none"> • Causes bronchitis |
| Cabling and computer housing | Plastics and PVC | <ul style="list-style-type: none"> • Burning produces dioxin that causes reproductive and developmental problems |
| Electronic equipment and circuit boards | Brominated flame-retardants | <ul style="list-style-type: none"> • Disrupt endocrine system functions |
| Front panels of CRTs | Barium, phosphorus, and heavy metals | <ul style="list-style-type: none"> • Cause muscle weakness and damage to heart, liver, and spleen |
| Copper wires, Printed circuit board tracks. | Copper | <ul style="list-style-type: none"> • Stomach cramps, nausea, liver damage, or Wilson's disease |
| Nickel-cadmium rechargeable batteries. | Nickel | <ul style="list-style-type: none"> • Allergy of the skin to nickel results in dermatitis while allergy of the lung to nickel results in asthma |
| Lithium-ion battery | Lithium | <ul style="list-style-type: none"> • Lithium can pass into breast milk and may harm a nursing baby • Inhalation of the substance may cause lung edema |
| Motherboard | Beryllium | <ul style="list-style-type: none"> • Carcinogenic (lung cancer) • Inhalation of fumes and dust causes chronic beryllium disease or berylliosis |

not available everywhere, which results in rudimentary methods of recycling by family run workshops leading to various health hazards and environmental contaminants⁴.

- 50 million tons of e-Waste is produced each year, which is enough to fill a line of garbage trucks across half the globe.
- According to EPA, the volume of e-Waste is increasing 3-5% each year, which is almost 3 times quicker than any other form of waste.
- The amount of e-waste the world throws away annually equals to trashing 125000 Boeing 747s each year.
- Recycling one million laptops saves energy equivalent to electricity used by 3657 US homes in a year.
- For every 515 cell phones recycled, it saves enough energy to power one home for a year. There is now one Mobile Phone for every 2 Humans on Earth i.e. 3.3 billion active Mobile Phones of approx. 6.6 million people.
- The average life span of a Computer and Mobile Phone is 2 Years.
- The USA dumps approx. 30 million computers annually and 100 million phones are dumped each year in Europe.
- Electronic waste is estimated to reach 8.5 Lakh MT by 2014 in India

Top Ten E-Waste Producing states in India are Maharashtra, Tamil Nadu, Andhra Pradesh, West Bengal, Delhi, Karnataka, Gujarat, Madhya Pradesh, Uttar Pradesh and

Punjab.

Conclusions

This paper discusses the status of e-waste practices prevailing at the various stake holders of the system and indicating absence of broad system. There existed half hearted efforts of Government and some organizations managing only a small percentage of the total e-waste generated. The various issues and their relationship in a comprehensive e-waste management system were discussed. The author opinion is that concerted efforts by various players in electronic field academic community and the government are required to evolve and implement e-waste management system in India.

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