STUDY AND ANALYSIS OF DISPOSAL OF ELECTRONIC WASTE AND ITS EFFECT ONTHE ENVIRONMENT

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Abstract- "Electronic-waste" or "E-waste" is a popular name for electronic products nearing the end of their useful life or just dumped due to the availability of new and advanced products in the market. Rapid changes in technology, changes in media (tapes, software, MP3), falling prices, and planned obsolescence have resulted in a fast-growing surplus of electronic waste around the globe. The E-waste has become a matter of concern because of the presence of toxic and hazardous substances present in electronic goods and if not properly managed, it can have adverse effects on environment. This paper deals with impact of E-waste on the Environment and solutions to tackling this issue.

Keywords-E-Waste, Cyber Warming, E-waste disposal, Global Warming, Recycling.

I. INTRODUCTION

Electronic Waste or E-waste for short is the term used to describe old, end-of-life or discarded appliances using electricity. It includes computers, consumer electronics, fridges etc. which have been disposed of by their original users.Such wastes encompass wide range of electrical and electronic devices [5]. Some of the electronic devices such as discarded computers, televisions, VCRs, stereos, copiers, fax machines, cell phones, audio equipment and batteries if improperly disposed can leach lead and other harmful substances into soil and groundwater.

India, which has emerged as the world's second largest mobile market, is also the fifth largest producer of e-waste, discarding roughly 18.5 lakh tones of electronic waste each year. In this around 12 percent of generated E-waste is Telecom equipment. With more than 100 crore mobile phones in circulation, nearly 25 per cent end up in e-waste annually.

E-waste contains a complex concoction of toxins. It contains heavy metals (such as Lead, Cadmium, Mercury, Barium, Arsenic, Beryllium, Chromium, Selenium), precious metals (such as Gold, Silver, Platinum), metals (such as Copper, Aluminum), refractory oxides (such as SiO_2, Al_2O_3) and Halogenated compounds (Brominated Flame Retardants such as Poly Brominated Diphenyl Ethers (PBDEs) and Poly Brominated Biphenyls (PBBs), Chlorinated compounds such

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as Poly Vinyl Chloride (PVC) or plastics containing Poly Chlorinated Biphenyls (PCBs) and Poly Chlorinated Diphenyl Ether (PCDEs). These metals are toxic and potentially hazardous to environment and human health.

The rest of the paper is organized as follows. Section II illustrates the findings from the work that is already done. Section III reflects out work that is done in this area, later the conclusion and finally the references.

II RELATED WORK

Electronic waste, or e-waste, is a term for electronic products that you want to get rid of (someone or something) or is no longer useful or desirable. Since the advancement in technology is growing at a high rate, within few years of use Electronic devices become trash. In fact, whole categories of old electronic items contribute to e-waste such as VCRs being replaced by DVD players, and DVD players being replaced by Blu-ray players. Any kind of Electronic devices can be used to create E-waste.

In the studies carried out [1] the authors explain about the lifecycle of the computer and the amount of CO_2 generated by the usage of computers. They further explain the various techniques of disposal of E-Waste and how it affects the environment. For example, in the process of incineration extremely toxic gases like Poly brominated dibenzo-p-dioxins (PBDDs) and Poly brominated dibenzo Furans (PBDFs) are released. These gases along with PCDDs and PCDFs are classified as "known carcinogens" and are called "Persistent Organic Pollutants" (POPs) by World Health Organization. These gases modify the DNA and cause defects to future generations. Similarly, the entire ecosystem will be destroyed because of the toxic gases generated by electronic devices. Personal Computers (PCs), Note Books and Laptops generate CO_2 during their mining, manufacture, usage and their disposal as E-Waste. This emission of CO_2 from Information Technology and computer industries is called Cyber Warming. Cyber Warming contributes to the increase in Global Warming. It causes the heating up of the earth. About 2% of the CO_2 emitted in the atmosphere comes from the Information Technology and computer industries.

In another study, [2] the authors explain about E-waste treatment in India. They explain that these days the infrastructure for e-waste treatment is a profitable business and is money intensive as recovery of metals is possible up to 99% from the e-wasted EEEs (Electrical and Electronic Equipment's). Umicore in Belgium and Attero in India are the appropriate examples of metal recovery. The patients of chronic and acute diseases are increasing exponentially as the E-waste management is becoming more and more hazardous.

Most of the E-waste is sent to Nigeria, Ghana, Pakistan, India, and China, among others for processing due to lower environmental standards [3]. In most of the cases this is done illegally. Its explained in the Figure 1. They contain valuable metals like nickel, copper, gold, iron and silicon.
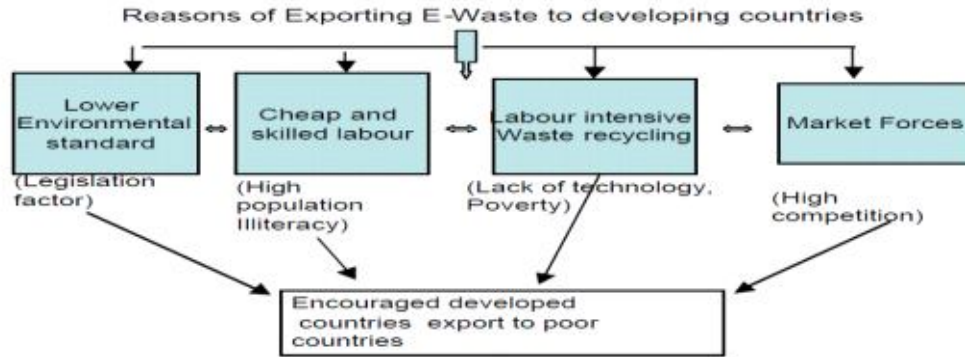
Figure 1.Reasons of exporting E-waste to developing countries.

Environmental problems are also caused due to uncontrolled burning. The labor-intensive nature of electronic waste recycling, abundant, cheap and skilled labor force and generation of huge profits for local governments causes the authorities to turn a blind eye to this practice [6]. Thus, they serve as passive encouragement to its spread. It is more convenient and also economical to export E-waste to the third world countries like India, rather than managing and incurring high environmental and economic cost. Various departments of the government including both private and public sectors fast feed old electronic appliances like computers, fax machines, telephones into waste streams.Other sources of e-waste are retailers, individual households, foreign embassies, PC manufacturing units, players of the secondary market, and imported electronic scraps from other countries. In the case of Indian households, the electronic items are either exchanged with near and dear ones or are exchanged with local retailers

In study conducted [4], The authors explain about major issues in Indian scenario like:

- Over 371 million current mobile users:

- People nowadays exchange phones every 18 months, meaning there are around 16 million phones kept somewhere in their homes

- 20 million electronic home appliances together with TV,washing machines, PCs etc) and seventy million cell phonesreach end-of-life per annum.

- Memory devices, MP3players, iPod's, iPad's etc. keep getting upgraded every year.

- 70% of the landfills are filled with heavy metals coming from the E-waste.

They explain the following points around 42.1% of E-waste comes from Large Household appliances, 33.9% comes Information and communications and 13.7% comes around Technology Equipment Consumer Electronics. The authors further proposed solutions like ban on E-waste imports, awareness on recycling, Fix duties and responsibilities to recyclers etc. The toxic gases in the atmosphere can be reduced by planting trees.

III OUR WORK

Based on the above related work we have found that E-waste is a problem which many people ignore. Even though there have been many studies people are still not aware of the impact of E-

waste. It even has an indirect contribution to Global warming. Around 22 billion electronic items are manufactured by US. According to the Department of Energy, the computer/electronics sector consumes nearly 500 Trillion BTU of energy. The total energy output per year has a carbon footprint of about 104 million metric tons. That is just for the manufacturing/assembly process.

Rare and precious metals are extracted for production of electronic items. This comes under mining, milling, processing, and transportation process. For example, if we take copper as an example, then there is approximately 100 million BTU, or 29,300 kwh of energy expended to mine 1 ton of copper. Approximately 2 million metric tons of copper is produced by US per year in which around 23% goes to electronics industry. That means copper present in electronics has around 13.4 billion kwh of energy present it, meaning 179 billion cubic feet of atmospheric CO_2 pumped out annually comes only from copper. [7].

If we take aluminum, gold, silver, platinum, palladium, rhodium, ruthenium, iridium then we can get the bigger picture of bad the impact can be on the environment. It's also very difficult to manage E-waste in India due to following reasons.

- The manufacturers/producers don't have nor they provide proper information regarding E-waste management.

- India doesn't have proper recycling plant nor E-waste management system.

- Though India's ministry of environment and forest has made import of e-waste illegal, a fair amount of e-waste is still illegally imported into India.

The following things can be done for improving the scenario of e-waste management in India.

- Ban on illegal import of E-waste.

- Setup more E-waste management plants in various states.

- Spread awareness to people about the ill effects of E-waste.

- Manufacturers/Producers should introduce take back programs.

- Manufacturers/Producers should better recyclable and less toxic materials when creating devices.

- Government should make E-waste management into a business so that many investors will be attracted in that sector.

India should take a greener approach on E-waste. The famous slogan is used when it comes to glass and paper. When it comes to e-waste this slogan should also be used. Many resources can be safely recovered, recycled and then reused. Figure II gives explanation about of Green electronics.
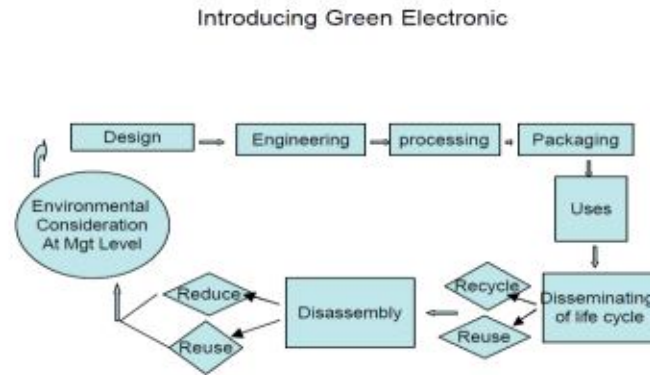
Introducing Green Electronic

Figure II. Introducing Green Electronic

Consumers should keep following points in mind while buying Electronic products:

- They should be made with less toxic materials

- They should be using recycled content.

- They should be energy efficient

- They should offer take back options

IV. CONCLUSION

E-waste is major problem which concerns the Environment.It is a growing problem in the world but majority of the people ignore it. Many people do not understand or do not care for the environment. The Three R's- "Reduce, Reuse, and Recycle" is used in the case of paper and glass. This is also applicable for electronic items. Many electronic stores offer services for proper disposal. In the above paper we conclude that e-waste is dangerous to humans and for the environment it will cause a lots of health problems. In order to avoid this problems, we can recycle the waste products and re-use the product materials for creating new products at a lesser price. This way we can at least reduce the problem of e-waste. Growing trees also can help in combating the problem.

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