

## **E -WASTE - A POTENTIAL RISK TO THE ENVIRONMENT**

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### **ABSTRACT**

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**In the Current Global Scenario, Electronic wastes have undoubtedly caused an enormous Potential risk to the Environment. This paper deals with the existing Global Trends in E-wastes ,its adverse consequences on the Environment ,recycling Practices commonly adopted in the world particularly in Asian Countries,Various Treatment Techniques & Environmental Legislations, Acts& regulations so as to suggest these Industries to effectively Implement their Treatment Technologies leading to the creation of pollution free Zone in & around these Electronics based Industries.**

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### **INTRODUCTION**

Now a days the whole world is passing through an advanced stage of computer and communication technology. Undoubtedly the fast growing scientific and technology. Undoubtedly the fast growing scientific and technological advancement has transformed the whole world into a global village. On the other hand it has also created a potential hazard to our environment Disposal of computer has become a global concern as there is a growing problem of a lack of infrastructure to deal with it effectively. Although there are some recycling firms but they generally pick up computers from commercial centres only. Practically computer become obsolete within a period of 18 months or even less. In U.S. alone manufactures are selling nearly 40 million new computers every year, about 80% of them are utilized for domestic consumption. This has made presence of millions of millions old computers, printers and related equipments every where. A scientific study by the national safety council has estimated that 20.6 million Pc's has become

obsolete in 1998 in the United States alone but only 11% that is about 2.3 million units were subjected to recycling. Definitely this problem may create grave situation if we don't take suitable steps towards its effective recycling and management. Rapid population growth and uncontrolled industrial development are seriously degrading the urban & semi urban environment in many of the developing countries in the world thus causing an enormous strain on natural resources and undermining efficient and Sustainable development.

E- Waste is one of the fastest growing waste streams with people changing their computers, TV, sets and mobile phones more frequently than ever before. Every year these computers and mobile phones are either dumped in land fills or burnt in smelters. According to an Estimate, about 20-50 million tones of e-waste is being generated annually worldwide. In India, this figure stands at nearly 4,00,000 tonnes per year.

Now a days, E- Waste make up 5% of all municipal solid waste world wide, more or less the same

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amount as general plastic waste,, but much more hazardous. The Govt. of India's plan to increase the penetration of personal compute (PCs) into villages, illegal import and the ever increasing consumption of Electrial and Electronic products are bound to cause e-waste management more difficult. The Urban waste scenario in Major Indian Cities is shown in Table 1.

**Table 1.** Urban waste scenario in major indian cities

Major Cities	Garbage Generated (Tonnes/day)
Delhi	5922
Mumbai	5320
Chennai	3036
Kolkata	2653
Ahmadabad	1302
Surat	1000
Patna	511
Lucknow	475

(Source :- NEERI, Report, 2005)

### Growing Electronic Industry : Its Consequences

Undoubtedly the IT Industry in our country is growing up very fast. The Deptt. Of IT has planned to provide Internet connectivity to all villages and increase the Internet penetration to 75 Subscribers/1000 by the year 2012. As per Manufactures Association for Information Technology (MAIT) Projection, India, by 2008, should achieve a PC Penetration of 65 per 1000 from the existing 14/1000. As estimated presently India has 15 million computers, the target being 75 million computers by 2010. If all these goals are really attained, they will result in manifold increase in e-waste in India.

Electronic products are, in fact, a complex mixture of several hundred tiny components, may of which contain hazardous chemicals, most of the components in Electronic devices contain, lead, cadrum, Mercury, PVCs. Brominated flame retardants (BFR's) Chromium, beryllium and Ph. Thalates. Long exposure to these Substances can damage the nervous system, kidney and bones and some of them are even carcinogenic.

As much as as 1000 tonnes of BFR's were used to manufacture 674 million mobile phones, BFR's have been directly linked to neurotoxicity. Indiscriminate dumping and of these components car pollute the ground water to or great extent.

A general survey conducted by Greenpace in 2005 in Electronic recycling in Delhi has clearly indicated the presence of hazardous Chemicals in high levels

in the investigated area.

### Adverse Effects of E - Pollution

Infact, hundreds of millions of pieces of Electronic Equipment will reach the end of their useful life span over the next five years, equipments that is land filled, crushed, broken or incinerated can potentially release toxins and care inogens intor the environment e.g. an estimated 40% of lead in landfills comes from leaded glass of CRT monitors, lead soldering on circuit boards and other discarded Electronics. Among other toxins are Mercury in flat panel monitors, printed circuit boards, mobile phones, batteries, and suritches; cadmium in semi conductors, chip resistors and infrared detectors and Brominated flame retardants (BFRs) in circuit board and plastics. Undoubtedly the indiscriminate use of these hazardous chemicals in our fast growing Electronic Industry can cause irreparable damage to the human life and Environment.

### Recycling Practices in Asian Countries

In India, most of the recycling happens in the informal sector where poor people tear apart the various components with their bare hands without any safety measures. The technology is not only is not only rudimentary but very dangerous. In fact People are being exposed to toxins 24 hrs. or day as they live, cook and sleep in the same place, where hazardous waste is being recycled.

A study conduct in China in 2007 has confirmed the generation of neurotoxin gases such as dioxins and furans from the burning of cables and other Electronic Component. They recycling practices adopted in the informal sector are also highly ineffici ent, as the technology used don't yield a high percentage recovery of valuable metals viz. Gold, Silver, Platinum, Copper etc.

Though, E-waste in being recycled in all the metros in India, Delhi seems to the suitable metro, where the illegal and dangerous prachices of recycling are being adopted. According to an estimate, about 35,000. People are directly or Indirectly in involved in this business. The situation in our country is alarming because of the illegal import of products and adoption of unethical practices. India has become the dumping ground of all kinds of waste from the developing countries.

The collection & recycling system in India is nearly inefficient, if not no-existent. In order to improve the efficiency of the collection systems, corporates have to initiate a voluntary take-back scheme of their end-of-

life products. These corporates should also bear the cost of responsible recycling.

Since the major uses of PC's in India are still the big corporates, the Public sector and BPO's. It is easy for IT Producers to have an in-house system to facilitate the collection system. Besides, the recycling industry needs to the development and upgraded to the international level.

As the composition of e-waste consists of diverse items like ferrous non-ferrous metal, glass, plastics, Electronic components and other items and it has also revealed that e-waste consists of a no. of hazardous elements.

Therefore, The major approach to treat e-waste is to reduce the concentration of these hazardous chemical and elements through recycling and recovery. The recycling and recovery includes the following unit operations :

- (a) Dismantling
- (b) Segregation of ferrous metal, non-ferrous metal and plastic.
- (c) Refurbishment and reuse.
- (d) Recycling/disposal of dangerous materials and waste.
- (e) Recycling / Recovery of Valuable Materials.

### Treatment and Disposal Options

The presence of hazardous elements in e-waste offers the potential of increasing the intensity of their discharge in the environment due to land filling and incineration. The potential treatment/ disposal options based on its composition include the following :

- \* Land filling
- \*\* Incineration

The literature review reveals that degradation process in land fills are very complicated and run over a wide time span. At present it is not possible quantity environment impacts from E-waste in land fills due to various reasons. However, the incineration option is generally advantageous as compared to land fillings. The main advantage of incineration of e-waste is the reduction of waste volume and the utilization of the energy content of combustible materials. By incineration, some environmentally hazardous organic substances are converted into less hazardous compounds.

Disadvantage of incineration are the Emission to air of substances escaping flue gas cleaning and the large amount of residues from gas cleaning and combustion.

### Global Trends in e-waste

Most Electronic devices are toxic in nature due to the cocktail of deadly Chemicals used in their production. Global initiatives to phase out Chemicals from Electronic devices commenced in 2006 with the launching of ROHS (Restriction of Hazardous substance Directive) in Europe. This directive bans the use of six deadly Chemical substances used in the manufacturing process Viz. Pd Cd. Hg, Cr and two brominated flame retardants (BFRs). Therefore many other countries have use the directive or taken other initiatives to control and regulate these industries. In India, HCL and Wipro are already complying with the ROHS direction alongwith the multinational brands.

The overall trend of going green and clean and manufacturing products free from chemicals is slowly catching up. Recent initiatives taken up by Nokia to provide PVC free mobile phones is definitely a welcome step. Motorola has lots of products in the market which are BFR- free. This clearly shows that it is possible to manufacture clean green products and thus remain environmentally profitable.

### Environmental Legislations, Acts and Rules

The Indian IT industry is growing fast and the govt. needs to ensure that it is competitive at an International level. However India currently has no any specific regulatory frame work to govern the use of toxings in the Electronic industry. In the absence of a proper legislation, initiative taken by NGO's and other stake holders lack effectiveness. Although in our country several Acts/Rules and legislations have been enacted by the parliament Viz. The Environment (Protection) Act. 1986 as amended in 1991, The Environment (Protection) rules 1986 and the Environment (protection) (Third Amendment) Rules, 2002. The Hazardous waste (management and Handling) Rules, 1989. The manufacture storage and import of Hazardous chemical Rules, 1989, The Bio-Medical waste (Management and Handling) Rules, 1998. but these Acts. and Rules are not so effective to contact potential risks to the human health and the environment. The Govt. of India should take step to enact legislation based on the principle of extended producer responsibility (EPR) which Empowers the electronic industry to manufacture clean products. The Govt. must enforce a ban on the import of e-waste for recycling and also Put restrictions on the import of second hand computers for reuse. The Govt. must look out for the key issues, while enacting any

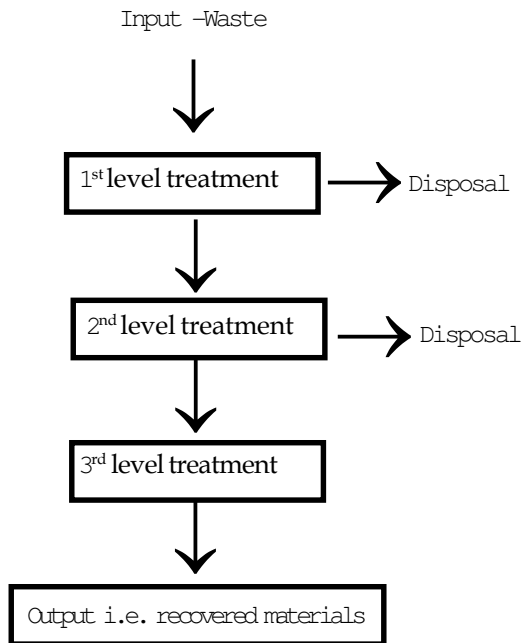
legal measures to counter the challenges of e-waste & its dangerous effects on the environment.

### Environmentally sound E-waste treatment technology (FST) -

Environmentally sound E-waste treatment technologies are used at three levels as given below :-

- 1 1st level treatment
- 2 2nd level treatment
- 3 3rd level treatment

In fact, All the three levels of e-waste treatment are based on material flow. The material flows from 1st level to IIIrd level treatment. Each level treatment consists of unit operations, where e-waste is treated and output of 1<sup>st</sup> level treatment Serves as input to 2<sup>nd</sup> level treatment. After the 3<sup>rd</sup> level treatment, the residues are disposed of either in TSDF or INCINERATED. The efficiency of operations at the first and the second level determines the quantity of residues going to TSDF or incineration. The simplified version of all the three treatment steps is shown in the following Figure.



### CONCLUSION

It is a well established fact that an expanding Electronic Industry has adverse Environmental consequences. The solution to this e-waste crisis lies not in its strict management but in preventive measures. The handling of e-waste is dangerous due to Hazardous chemicals present in the products and therefore, the only positive step to tackle this problem is for manufacturers to design clean products free from chemicals with comparatively longer life spans. Manufacturers of electronic products must stop using hazardous chemical and substitute them with safer alternatives.

Besides, the Govt. of India should enforce effective legislations based on the Principle of extended producer responsibility (EPR), which empowers the electronics industry to manufacture only clean products. Also, Environmental Scientists and Technologists should try their best to develop E-friendly cost effective Treatment Technologies especially for e-waste.

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