
Environment and sound management system of E-waste in India

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INTRODUCTION

Waste Electrical and Electronic Equipment (WEEE) or e-waste is the term used to describe unwanted old electronic parts and discarded appliances using electricity.

Classification of e-waste

E-waste encompasses ever growing range of obsolete electronic devices such as computers, servers, main frames, monitors, TVs & display devices, telecommunication devices such as cellular phones & pagers, calculators, audio and video devices, printers, scanners, copiers and fax machines besides refrigerators, air conditioners, washing machines, and microwave ovens, e-waste also covers recording devices such as DVDs, CDs, floppies, tapes, printing cartridges, military electronic waste, automobile catalytic converters, electronic components such as chips, processors, mother boards, printed circuit boards, industrial electronics such as sensors, alarms, sirens, security devices, automobile electronic devices.

The major source of e-waste is the disposal of the hardware and electronic items from formal and informal sectors like Government offices, public and private sectors, academic and research institutes. Household consumers are also contributing significant volume of end-of-life electronics products.

Table No.-1.1
Penetration of Consumer Durables
(No. of Households Owning Goods per thousands of Households)

Particulars	1995-96	2001-02	2005-06	2009-10 (E)
Cars	16.1	30.0	50.2	91.4
Motocycles	29.3	70.8	147.6	282.6
Colour TV	72.0	145.6	213.0	314.0
Refrigerators	86.1	134.0	160.7	224.9
White Goods	149.4	247.1	319.1	451.7

Source: NCEAR

Indian Scenario

Throughout the world electronic industry is largest and fastest growing manufacturing industry (Radha, 2002; DIT, 2003). In India domestic generation which is the imported e-waste volume is growing substantially, though, import is prohibited. Like as throughout the world, India is also facing serious crisis due to growing generation of e-waste. In India main challenge is to create awareness of the environmental, social and economic aspects of e-waste among the public, consumers, producers, institutions, policy makers and legislators.

In India there is no separate collection of e-waste, there is no clear data on the quantity generated and disposed of each year and the resulting extent of environmental risk

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. The management of solid waste, which is already enormous task in India, is becoming more complicated by the attack of e-waste, particularly computer waste and upgrading electronic technology.

The situation is not so unattractive in the developed countries, as the laws are adequate to take care of the stocking, disposal and land filling of the discarded electronics products. The availability of skilled recyclers and adequate technologies in those countries make the e-waste recycling a profitable business. The business sector is estimated to account for 78% of all installed computers in India (Toxics Link, 2003). It is estimated that the total number of obsolete personal computers emanating each year from business and individual households in India will be around 1.38 million. According to a report of Confederation of Indian Industries, the total waste generated by obsolete or broken down electronic and electrical equipment in India has been estimated to be 1,46,000 tons per year (CII, 2006).

E-waste also contains valuable materials including metal, plastics and glass, which are of the 95% of the total e-waste by weight. The populated PCBs/ connectors are of 3 - 5% of the total e-waste (Gao et al., 2004; http://www.ewasteindia.in/environment.asp) contain valuable metals like gold, silver, copper, and other precious metals like palladium, tantalum etc. In developed countries, well established processes are available for processing PCBs to extract the precious metals with highest yields (Gao et al., 2004; Xuefeng et al., 2005; Mou et al., 2004; Hanapi and Tang, 2006; Hyunmyung and Yong-Chul 2006). In India estimated that 95% of the e-waste recycling has been carried out in non-formal units (Report on "E-waste Inventorisation in India", MAITGTZ Study, 2007).

E-Waste Generation in India
Annual E-waste generated
(3, 32, 979 MT)

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Available for recycling
(1, 44, 143 MT)

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E-waste processed
(19,000 MT)

(Source: MAIT; http://www.ecoreco.com)

At present Bangalore alone generates about 8000 tons of computer waste annually and in the absence of proper disposal, they find their way to scrap dealers (Joseph K., 2007). The E-Parisara, an eco-friendly recycling unit on the outskirts of Bangalore plant which is India's first scientific e-waste recycling unit will reduce pollution, landfill waste and recover valuable metals, plastics & glass from waste in an eco-friendly manner. India as a developing country needs simpler, low cost technology keeping in view of maximum resource recovery in an environmental friendly methodology.

E-WASTE RECYCLING

Environmentally sound recycling of e-waste requires sophisticated technology and processes, which are not only very expensive, but also need specific skills and training for the operation. Guidelines are to be developed for environmentally sound recycling of E Wastes. Many discarded machines contain usable parts which could be salvaged and combined with other used equipment to create a working unit. It is labor intensive to remove, inspect and test components and then reassemble them into complete working machines. Institutional infrastructures, including e-waste collection, transportation, treatment, storage, recovery and disposal, need to be established, at national and/or regional levels for the environmentally sound management of e-wastes. These facilities should be approved by the regulatory authorities and if required provided with appropriate incentives. Establishment of e-waste collection,

exchange and recycling centers should be encouraged in partnership with governments, NGOs and manufacturers.

Recovery and reuse

This technique could eliminate waste disposal costs, reduce raw material costs and provide income from a salable waste. Waste can be recovered on-site, or at an off-site recovery facility, or through inter industry exchange. A number of physical and chemical techniques are available to reclaim a waste material such as reverse osmosis, electrolysis, condensation, electrolytic recovery, filtration, centrifugation etc. The recycling of hazardous products which has little environmental benefits by the processes the hazards into secondary products that eventually has to be disposed of. Unless the goal is to redesign the product to use nonhazardous materials, such recycling is a false solution.

Current recycle steps in India

The accrued electronic and electric waste in India is dismantled and sorted manually to fractions printed wiring boards (PWB), cathode ray tubes (CRT), cables, plastics, metals, condensers and other, nowadays invaluable materials like batteries, LCDs or wood. The valuable fractions are treated in refining and conditioning processes

The dissimilar e-waste fractions are processed to directly reusable components and to secondary waste materials in a variety of refining and conditioning processes. Final Disposal of the e-waste is deposited and disposed with solid waste with a municipal landfill. In India e-waste "recycling" involve small enterprises that are numerous, widespread, and difficult to regulate. The advantage of low labor cost high unemployment rates, internal migration of poor peasants, and the lack of protest or political mobilization by affected villagers who believe that e-wastes provide the only viable source of income or entry into modern development pathways. Sometimes educational institutes or charitable institutions receive old computers for reuse.

Benefits of Recycling: The end-of-life electronics recycling raw material is the most effective solution to the growing e-waste problem. Metal materials from electronic devices can be recovered. By segregation and providing reuse possibilities, intact natural resources are conserved and air and water pollution caused by hazardous disposal is avoided. Additionally, recycling reduces the amount of greenhouse gas emissions caused by the manufacturing of new products. It simply makes good sense and is efficient to recycle and to do our part to keep the environment green.

Management system of e-waste: Despite a wide range of environmental legislation in India there are no specific laws or guidelines for electronic waste or computer waste (Devi et al., 2004). But the electronic waste is included under List-A and List-B of Schedule-3 of the Hazardous Wastes (Management & Handling) Rules, 1989 as amended in 2000 & 2003. The import of this waste therefore requires specific permission of the Ministry of Environment and Forests.

CONCLUSION

Electronic and electrical waste management, which is already a huge task in India, is becoming more complicated by the incursion of e-waste, particularly computer waste. There exists an urgent need for a detailed assessment of the current and future scenario including quantification, characteristics, existing disposal practices, environmental impacts etc. At the formal and informal level like institutional and commercial sector including e-waste collection, transportation, treatment, storage, recovery and disposal, need to be established, at national and regional levels for the environmentally sound management of e-wastes.

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