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GREEN TECHNOLOGY: A PERSPECTIVE APPROACH FOR E-WASTE MANAGEMENT

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Abstract: **In the recent past Electrical and Electronic sector has witnessed remarkable progression and is considered as the leading drivers of economic expansion around the globe. There has been significant increase in Information Technology industry in the last 10 years in both developed and developing countries. This growth, united with fast growing product obsolescence and consumer options, has carved way to Electronic waste. This escalating waste has very intricate properties which require an multifaceted set of effectual technology and practices to manage it. The paper provides a terse overview of minimization of e-waste using green technology. Challenges faced in current Indian scenario is being discussed and remedial measures are suggested.**

Keywords: Green Technology, Electrical Electronic equipment, E-waste

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I INTRODUCTION

Electrical and Electronic Equipment's (EEE) are redundant electrical or electronic devices. It has been indicated that by 2020, electronic-waste (e-waste) from old computers in India will increase by 500%. According to, UN e-waste report, 2011, the e-waste produced from discarded mobile phones will be 18 times more, 1.50 to 2.0 times more for TVs and double or triple more from refrigerators in comparison to the year 2007.

The total annual e-waste is expected to cross 40 million metric tons mark. The primary reason for this escalating progression in e-waste is due to reduction in life of EEE, increase in consumerism, decrease in recycling rates and unlawful transboundary movement of EEE across countries globally [1].

EEE has been widely used in both rural and urban sector and also those economically backward areas where there is very less or negligible provision of electricity legally. Consumers in such places make use of batteries for EEE operations. Increase consumption means Increase production and Increase production means increased quantities of e-waste. E-waste has now become a very critical and swiftly penetrating problems of the world. It is impacting human health and is a potential hazard to environment due to lack of awareness of people with respect to its production, consumption and re-use.

Outdated and non-functional electronic appliances comes under the category of E-waste which includes computers, Printer, laptops, Fax machine, TVs, mp3 players, DVD and DVD players, CD and CD Players, Computer Scrap , Control Pane, mobile phones, Electronic Scrap, Secondary Computers Circuit Board, Floppy Disk, Magnetic Tapes, Wires, Pen drives, CAT5 / CAT6 Cables , Fans , Tube lights and Bulbs, PCB , EPBX , Refrigerators , Entertainment Devices, Telephones, Air Conditioners, Lithium ion Batteries made up of Nickel, Cadmium, Lithium, Lead and Acid, SKADA/PLC Systems, Compressors, Logic Controllers, that has been disposed by consumers [2].
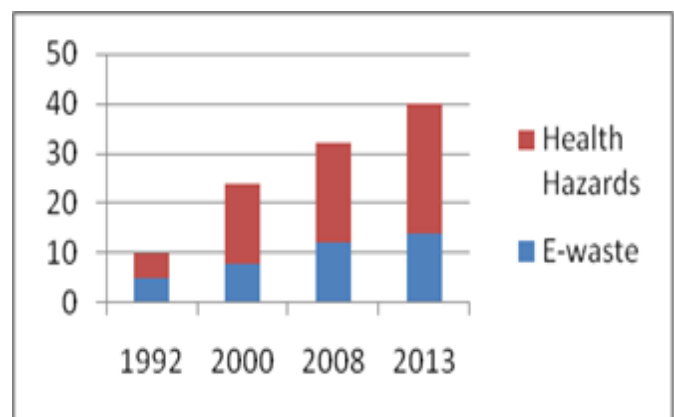

Figure 1 Year wise distribution of Health Hazards & E-waste [2]

Increased E-waste has become a threat to human health. Hence in order to minimize it, we first need to understand the source of generation of Electronic wastage. Its source can be put into 3 categories namely E-waste through Large Household Appliances, E-waste through Information Technology and Telecommunication and E-waste through Consumer Equipment. Washing machine and Refrigerator etc. comes under large household appliances; Personal Computers, Computer Screens, and laptops etc. is E-waste from IT and Telecom industry, while TV is a Consumer Equipment. The e-wastage produced from IT based and Telecommunication based companies are maximum these days due to increased usage of Personal Computers, laptops, and infinite number of electronic and electrical appliances and gadgets used daily.

This paper focuses on minimization and management of E-waste through green technology. Current Indian scenario is been looked upon in the subsequent section. Counteractions are suggested followed by conclusion.

II CURRENT SCENARIO OF INDIA

India has a big Producer level which varies from very small scale producer to very large scale producer. Small scale producers are involved in produce of EEE parts for repair purpose and unbranded EEE for assembly purpose. Therefore, it becomes a very critical physical and financial challenge to include these small scale producers for management and quantification of e-waste [3].

At the consumer level, primary barrier is lack of awareness in consumers for the purchase and usage of products which are eco-friendly designed. Appropriate handling of EEE is also minimalistic in this case.

There are different economic classes in India which is another major problem. Outdated EEE from upper economic classes reach lower economic class. The economically lower class is the second consumers or third consumers of the product. Hence, usage of eco-friendly product is of least importance to these lower income groups. There major concern is cheap pricing and increased profit. Thirdly, households and small scale enterprises generate obsolete EEE which is further handed over to the agencies who are either second-hand dealers or are scrap dealers. They offer maximum profit or keep scrap in storage. Due to this profit centric disposal of EEE approach, the e-waste flow chain witnesses greater challenge.

At dismantling and recycling level, manual handling of E-waste takes place by using cheap labor. Entrepreneurs or businessman at small level have penetrated in the market due to their small investment driven business model which is also their means of livelihood. Their approach is purely profit-centric with little or negligible attention to the environmental

cause. Therefore either recycling and management measures carried out are the ones which minimize expenditure or they are not carried at all. Hence, as a result, they employ elemental or out of date methods for the purpose of dismantle and recycle of goods.

This causes a grave danger to environment and mankind. E-waste management in is self maneuvered in our country. Compliance rules are escaped by many such stake holders as the prime agenda is to maximize profit and not environment.

III GREEN TECHNOLOGY FOR E-WASTE MANAGEMNET

Green Technology also named as Green Computing refers to usage of computers and related resources in an environmentally responsible and eco-friendly manner. It is described as the study of design, manufacture, use and disposal of technological waste in a means that minimizes its negative affect on environment.

The importance of green technology took 10 years to come into proper shape and existence. There has been advent of hot green information and communications technologies (ICTs) which includes green radio-frequency identification, green machine to machine network, green cloud computing green wireless sensor network and green data center [4]. Green Technology conceptualizes on reduction of greenhouse gases emission for which high-end equipment such as Top Recovery Turbine etc. are employed. Power can be generated using such equipment dedicated for Green technology especially in Iron and Steel industry [5].

Environment taxes and competitions in market is also an aspect taken into consideration by profit maximization firms which promote green technology [6]. Alternate green technology such as solar energy, wind energy and hydro-electrical energy can also be used as it causes less pollution but it is complex to fit these in a traditional electricity grid system [7]. Sustainable development of small scale and medium scale enterprises can be achieved to protect environment through making use of green technology [8]. Green Technology can be promoted by setting up centers of sustainable and renewable energy and masses can be encouraged to work on this model of sustainable and renewable energy [9]. The need of the hour is to develop business indicators that contribute to strategic development for small scale, medium scale and large scale business companies through in coherence with principles of green technology [10].

Mangaokar et al. suggested two ways in which Green Technology is implemented. This includes first the awareness about green technology and e-waste management in companies that are Information Technology based. Second step is implementation of Green Technology.

First step is to spread awareness about green technology using the following:

- Conduct of Seminars about Green Technology at the workplaces.
- Live display/demo of usage of efficient use of energy.
- Emphasis on Green technology may begin at the time of induction of employee of the organization or can be included as a part of fresher's course for induction and orientation.
- Self realization of importance of Green Technology by the Employer.
- Employees can be informed about Green Technology using Intranet as a strong medium.
- Emphasis on Green Technology can be highlighted in Emailing, Newsletter, and Magazines in Office Campuses.
- Company website should present information about Green Technology.
- Employees can be made habitual about green technology if a message is prompted on their display screens requesting to shut down the monitors when not in use just before the completion of task.

Involvement of employees so that Green Technology is successfully and effectually implemented is another major issue in an organization. The vital aspect lies in how the energy can be saved and the offices more economical. Following are some of the ways discussed.

- Computer Screen and Printers/Scanners: Pixels of the computer screen consumes a lot of energy. The
- Computer screen should be put off if not in Print on paper can be taken on double sides instead of single side. Also rough sheets may be used wherever possible. Printouts can be taken on double-sides.
- Use of Internet: E-mailing of documents should be preferred over use of paper. This would result in saving of lot of carbon and heat generated during taking printouts from a printer.
- Online Learning: Travel cost and carbon dioxide emission can be decreased by using online learning medium such as video conferencing etc instead of classroom teaching.
- Power Saving Settings: A sleep mode of 10-12 minutes can be kept for system and computer screens if the system is not in use. This will also help in saving energy.

IV SUGGESTION

- There is a need for revamping rules regulations and policies on e-waste and implementation of the rules

should be ensured.

- Complete listing of E-waste inventory should be done and it should be made public in order to make consumers aware. Also the list has to expanded and updated as necessitated in order to include greater number of products.
- E-waste flow chain involves many stakeholders. The responsibility matrix of each stakeholder involved should be clear and unambiguous.
- Financial implications should be defined at each step and release of funds should be done timely for the purpose of e-waste management implementation.
- Recycling of e-waste goods should be promoted.
- Special locations and centers should be dedicated and established for of municipal collection of e-waste.
- Recycling rates should be minimized and should be defined.
- Time line should be laid for disposal of e-waste and proper checks should be made on routine basis.
- Hazardous substances should be identified in EEE and should be treated timely. It can also be mentioned in the official document released by the government on E-waste. These harmful substances should be separately collected. Waste treatment plants and practices that do not comply with safety standards should be strictly prohibited.
- Producers should be made responsible of the product produced by them. Assurance in the form money or blocked accounts should be imposed before the product is launched in the market.
- Strict penalties should be imposed in case of violation of rules.

V CONCLUSION

Management of E-waste is the major threat to human health, mankind and environment. Energy resources are getting depleted or degraded due to generation of E-waste from various sources. The method of how to resolve it is discussed in various sections of this paper. Green Technology is a potential solution to this problem. The need of the hour is the effective and correct implementation of Green Technology on grounds. This will reduce the hazardous materials affecting environment and maximize the energy efficiency of any product. The same can be conceptualized for larger scale. Energy specific application can be developed. A statistics report for manufactures can be generated reflecting those EEE which conserves energy or is eco-friendly can be used. Hence by incorporating such measures, Green Technology can be implemented.

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