

# Inventorization of E-Waste

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**Abstract :** *E-Waste is very informal name as well as popular for electronic products looming end of their life. The electronic products are containing materials that are hazardous, and pose a threat to environment as well as human health. Many of electronic components can be recycled recovered or reused so that their effect on the human health as well as environment can be reduced. This aim is based on the problem of E-Waste as well as its treatment which is related to Bhopal city of Madhya Pradesh, environmental management system as well as its framework presenting in nature also focus the hazards of e-waste and management options overcome hazards of e-waste, in Bhopal city to scale up the e-waste collection and management from 5 wards to 30 wards in Bhopal city. E-Waste management is not new in Bhopal, recycle, reuse and reduce, related to e-waste. The use of lesser amount of toxic materials are reducing better way to manage e-waste but to reduce all these materials are difficult also not effective cost to replace.*

**IndexTerms -** *E-Waste,recycle,reuse,disposal.*

## I. INTRODUCTION

E-waste is an electronic device as well as electrical equipment which is generated at the point of no future usage for original purpose but recovered is the most eco efficient way without harm our health and environment. They are refrigerators, telephones, mobile phones, discarded computers and office electronics equipment etc.

The world's fastest and largest growing industry is electronic industry and Now days Computer is become the most common and most extensively used device, which parts are summarize in circuit boards are called the E toxic components, which heavy metals like containing cadmium and lead cathode rays tube with lead oxide and batteries containing cadmium. Barium brominated flame retardants which is used on print circuit boards, plastic computer casing and poly vinyl chloride coated copper cables which release toxic gasses which is harm our health or environment also. Information technology (IT) is also responsible. Waste Electrical and Electronics Equipment (WEEE) plays main role to generate bulks of e-waste in India.



**Fig. 1** E-waste collection

## II. INDIAN SCENARIO

There are 10 states in India, which contribute 70 percent of total generated e-waste; although more than 60 percent of total e-waste is generated by 65 cities. E-waste generated top 10 largest states first is Maharashtra, Utter Pradesh, Andhra Pradesh, West Bengal, Delhi, Gujarat, Karnataka, Madhya Pradesh and Punjab as well as Mumbai, Delhi, Bengaluru, Chennai, Ahmedabad, Kolkata, Hyderabad, Pune, Surat and Nagpur these are the top 10 largest cities Mumbai is first in rest of them.

In India e-waste is growing as a major west stream, e-waste generation of India in year 2005 is 145000 tons per year is estimate as well as which in 2011 which is to exceed 400,000 tons per year. Bhopal as an evolving market, 2 million people is generating 650-800 tons of e-waste per day in Bhopal state out of which 14% e-waste which is dumped in 30 acres at Bhanpur, at Vidisha road which is in Bhopal. Collection and recycling the e-waste material as well as increasing income of rag pickers and support of stakeholders, minimize the impact on the environment.



Fig.2 E-waste in world

**III. EFFECT OF E-WASTE IN ENVIRONMENT AND HEALTH EASE OF USE**

Across the globe, disposal of e-waste is major problem faced in various region, landfill computer waste which produce leachates which pollute the ground water, melting computer chips are obtain by acids and sludge. E-waste emits toxic gasses which polluting surrounding air ,if waste electronic items which emit toxic gasses discarded another household garbage which affected human health it emit lead which affected children’s brain and also emit the chromium which is responsible for DNA damage and many more given in table no.1.

**IV. E- WASTE MANAGEMENT PREPARE YOUR PAPER BEFORE STYLING**

Estimate that more than 75% of e-waste is stored owing to uncertainty of how manage e-waste, electronic product junks lie unattended in offices ,houses and mix with household waste and finally disposal at landfills. E-waste management of industries should begin at point of generation it can possible by waste sustainable product design and minimization techniques e-waste minimization techniques are

- Modification in production process
- Reduction of volume
- Inventory of management
- Recovery and reuse

Table no.1 – basic effect of e-waste on health

Component	Effect of human health	Causes of e-waste
Beryllium (Be)	<ul style="list-style-type: none"> <li>• Lung cancer</li> <li>• Skin diseases</li> <li>• Beryllicosis</li> </ul>	Motherboard
Lead (Pb)	<ul style="list-style-type: none"> <li>• peripheral nervous and damage to central and kidney damage and blood system</li> <li>• child brain development</li> </ul>	glass panels and Solder in printed circuit boards and gaskets in computer monitors
Mercury (Hg)	<ul style="list-style-type: none"> <li>• Skin disorder</li> <li>• effect on brain</li> </ul>	Switches and relays, printed circuit boards
Cadmium (CD)	<ul style="list-style-type: none"> <li>• Causes neural damage</li> <li>• Accumulates in liver and kidney</li> <li>• Toxic effects human health</li> </ul>	Resistor and semiconductor
(PVC)Plastic Including	<ul style="list-style-type: none"> <li>• Developmental problems</li> <li>• Damage immune system</li> <li>• regulatory hormones also effected</li> </ul>	Computer housing and cabling
Barium (Ba)	<ul style="list-style-type: none"> <li>• Damage to heart, spleen and liver</li> <li>• Muscle weakness;</li> </ul>	Front panel of CRTs

**Production process modification**

The production process can be change which will reduce the waste production. To make more efficient use of input materials in the productions process reduction can be accomplished by changing the materials used to make the products. E-waste minimization techniques can be divided into three categories.

- Maintenance procedures and Improved operating
- Change raw material
- Modification in process- equipment

Flow chain

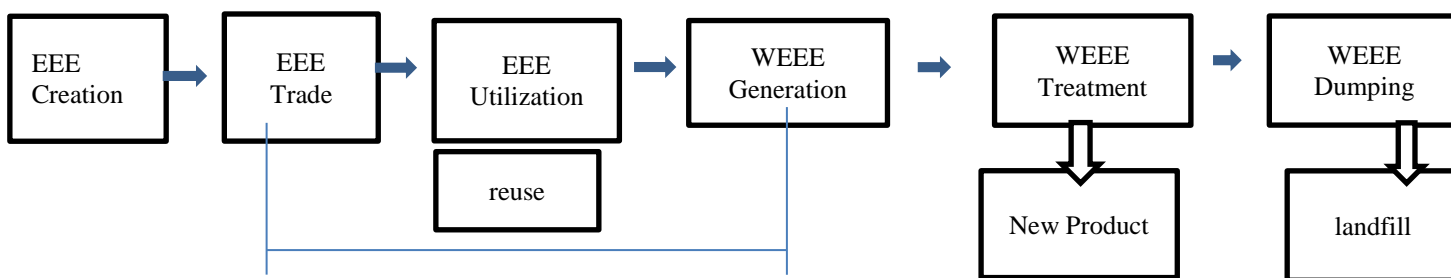


Fig.3 E-Waste material flow chain

I. RESEARCH METHODOLOGY

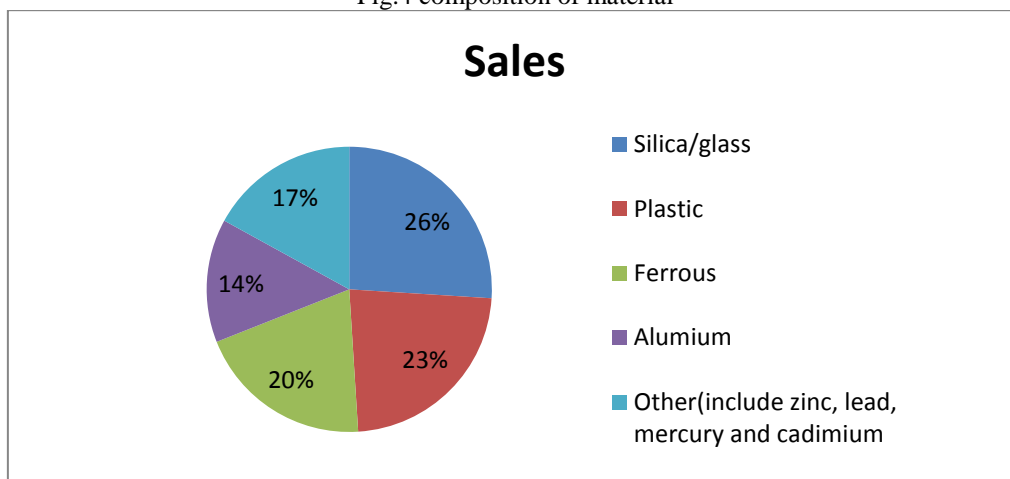
Methods	Requirements	Limitations	Advantage
Time step technique	Instrument stock for house holder Domestic sales' information Levels of industrial stock	Predetermined levels have based on house hold saturations levels. Industrial levels are difficult to obtain so assume in the calculations	Technique gives good saturation market It gives very easy calculations
The marketing supply technique	Domestic sales' information New and second hand items of average life	The average life large and extend because electric and electronics equipment's in developed countries are often disposed or replaced before it reaches end of life	Easy calculations It gives very large number of products and sales data is drive form market statics research institutes

1.1 E-waste inventory assessment required data

Methodology /data required	Saturation Level		House holder number	Calculated cells			Stock data			Average life			
	House hold	Industry		Import Data	Export Data	Manufacturing data	Private	industry	Storage data	Recycle	Reuse	Landfill	
Data require													
Time step	Yes	yes	yes	yes	yes	Yes	yes	yes					
Market supply				yes	yes	Yes							
Carnegie				yes	yes	Yes			yes	yes	yes	Yes	

Material composition of personal computer

Fig.4 composition of material



### 1. Reduction of volume

Those method which subtract the hazardous parts of a waste materials from a non-hazardous parts, includes in volume reduction these method are basically use for capacity reduction also price of depositing of e-waste also reduce waste steam capacity and divided into two parts.

Waste concentration

Source segregation

The technique for waste reduction can be simple and economical by segregation of wastes. Different types of metal are present in waste material can be treated singly which can improve the metal value of sludge. Waste can be recycled by the technique of vacuum filtration also gravity or inverse osmosis or ultra-filtration etc.

#### Reuse and recycle

In this method we can reduce the price of waste removal and raw materials also deliver profitable waste income. Repair facility of waste materials can be provided onsite as well as off site. Reverse osmosis, condensation, electrolytic repair, filtration are the physical and chemical method which is use to recover and reuse of the waste material.

#### Recoverability of materials

Elements	Content	Content (% of total)	Efficiency of recycling (%)	Recoverable weight of element (kg)
lead	1.71	6	5%	0.08566368
Aluminum	3.85	14	80%	3.08389248
Gallium	0.00	0.0013	0%	0%
Plastic	6.25	23	20%	1.25069408
Copper	1.88	7	90%	1.69614576
Tin	0.27	1	70%	0.19188512
Nickel	0.23	0.8503	0%	0
Terbium	0	0.00	0%	0

### 2. Sustainable product design

Product design stage for minimization of hazardous e-waste

#### 2.1 Redesign the product:-

hazardous material use in less amount to design the product example redesign the new computer which have flatter lighter and integrated materials

#### 2.2 Use of renewable materials and energy

plant based chemical are used to made bio based plastics example as possible as solar cooler but they are expensive.

#### 2.3 Use nontoxic and non-renewable materials:-

Material which are non-renewable use such that they can recycle then reuse example some parts of processor product as dell and Gateway lease.

### 3.1 Suggestions

There are some suggestion for the government public and industries.

#### 3.2 Accountability of government towards e-waste management

There should be system of regulatory agencies in every district which are vested with regarding hazardous substance, the responsibility of coordinating and consolidating the regulatory purpose of the numerous government authorities.

Government must also provide an adequate scheme of laws for hazardous waste material should have control along with administrative technique. A hazardous law required proper disposal and regulation and management which is in the comprehensive law. In this law

The materials from making collect basic information from computer and importers to keep inventory of these materials.

Control risk from creating, distribution processing discarding and use of electronic waste.

Educate of reuse and recycle option.

### 3. Accountability of citizens towards e-waste management

Any other waste management option including recycling Waste prevention is perhaps more preferred. The lives of products also keeps them out of the waste management system for extends time, donating electronics for reuse extends but care should take when giving items is working condition.

- Use content which should be recycled.
- Use fewer toxic constituents
- Energy efficient
- minimal packaging utilize
- take back options or offer leasing
- Also certified by regulatory authorities.

### CONCLUSIONS

India faces many problems to tackle electronic and electrical equipment problems, Indian authorities have to struggle to solve these problems from management policy aspects as well as technical aspects and management policies will be implemented and product design, e-waste collection recycle and disposal process will be implemented these management policies will play sustainable development to the economy as well as society

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### REFERENCES

- [1] Environmentally Sound Options For E-Wastes Management \*Ramachandra T.V  
Center For Ecological Sciences, Indian Institute Of Science, Bangalore. Published By : Envis Journal Of Human Settlements, March 2004
- [2] E-Waste In India Research Unit (Larrdis) Rajya Sabha Secretariat New Delhi
- [3] Ministry of forest and environment notifications on E-Waste handling
- [4] Strategic waste Action Plan, Blue Mountain City Council, Canada
- [5] Implementation of E-Waste Rules 2011, Ministry of Environment and Forest, Govt. of India, Central Pollution Control Board, New Delhi
- [6] Electronic waste management Ronald E. Hester, Roy M. Harrison
- [7] [www.enviroment.gov.au](http://www.enviroment.gov.au)
- [8] [www.ewasteguide.info](http://www.ewasteguide.info)
- [9] [www.ec.gc.ca](http://www.ec.gc.ca).
- [10] [www.usepa.gov/epaoswer/hazawaste/recycle/ecycling/index.html](http://www.usepa.gov/epaoswer/hazawaste/recycle/ecycling/index.html)
- [11] [www.basel.int](http://www.basel.int)
- [12] Singh R.P. India: A Matter of Electronic Waste; the Government Initiatives. *Journal of Business Management & Social Sciences Research*. 2(4): 15-20 (2013).
- [13] <https://en.wikipedia.org/wiki/Bhopal>
- [14] <http://wgbis.ces.iisc.ernet.in/energy/paper/ewaste/ewaste.html>
- [15] <https://olceseservices.com/wp-content/uploads/2015/09/ewaste1.jpg>