



E-WASTE: INVENTORIZATION AND HIGHLIGHTS OF E-WASTE (MANAGEMENT) RULES, 2016

1. **Anuradha**, Scientist 'A'

2. **Sh. Vasu Yadav**, IFS,
Member Secretary, J&K SPCB,

ABSTRACT

Revolution of IT, new and innovative technologies and globalization of economy have made new electronic products available and affordable. But on the other hand, it has also led to unrestrained resource consumption and e-waste generation.

e-waste has been one of the fastest growing waste streams in the world. UNEP estimates that upto 90 percent of the world's electronic waste worth nearly US \$ 19 billion, is illegally traded or dumped each year and upto 41 million tonnes of e-waste is generated from goods such as computers and smart phones that is forecasted to reach 50 million tonnes by 2017 (Shereen and Michal, 2015, "a"). India's production is likely to increase by nearly three times, from existing 18 lakh MT to 52 lakh MT / annum by 2020 at a compound annual growth rate of about 30% (Pandit, 2016). E- waste generation in the State has been calculated to be app. 7372.2 Tons for FY 2014-15.

As inventorisation is the first step to formulate effective management strategy for any type of waste, present study has been made to throw light on effective implementation of E-Waste (Management and Handling) Rules, 2011 in J&K State and inventorisation of E-waste generation and collection.

Key words: E-waste, EPR (Extended Producer Responsibility), EEE (electrical & electronics equipment), WEEE, Obsolescence rate, collection centres, refurbishers and Dismantlers.

Introduction

The term 'e-waste' is generally understood to refer to any old, obsolete, end-of-life appliances using electricity which have been disposed off by their owners. E-waste thus would include discarded old computers, television sets, refrigerators, telecommunication equipment, laboratory equipment, and other handheld gadgets – basically any electrical or electronic appliance that has reached its end-of-life.



Figure 1: E-waste

'e-waste' means waste electrical and electronic equipment whole or in part discarded as waste by the consumer or bulk consumer as well as or rejects from manufacturing, refurbishment and repair process as per E- Waste Management Rules, 2016.

The growing volumes of e-waste, municipal waste, food waste, discarded chemicals and counterfeit pesticides, all contribute to increasing pressure on the environment. Export of hazardous waste from European Union (EU) and organisation for economic co-operation and development (OECD) member States to non-OECD countries is banned; therefore it is not subject to notification or licensing. Instead, thousands of tonnes of e-waste are falsely declared as second-hand goods and exported from developed to developing countries, including waste batteries falsely described as plastic or mixed metal scrap, and cathode ray tubes and computer monitors declared as metal scrap. Both small and large scale smuggling techniques can be observed all over the world, from organized truck transport across Europe and North America to the use of major smuggling hubs in South Asia, including widespread container transport by sea (Shereen and Michal, 2015, “b”).

Why important to know about e-waste collection and disposal strategy

- ★ Currently, Europe and North America are the largest producers of e-waste, though Asia's cities are catching up quickly. Africa and Asia are key destinations for large scale shipment of hazardous wastes for dumping and sometimes for recycling. Ghana and Nigeria are among the largest recipients in west Africa, although high volumes of e-waste are also transported to cote d'Ivoire and the republic of Congo. In Asia, China, Hong Kong, Pakistan, India, Bangladesh and Vietnam appear to bear the brunt of illegal e-waste shipments (Shereen and Michal, 2015, "c").
- ★ While e-waste contains valuable materials such as aluminium, copper, gold, palladium and silver, it also contains harmful substances like cadmium, lead and mercury. In the absence of suitable techniques and protective measures, recycling e-waste can result in toxic emissions to the air, water and soil and pose a serious health and environmental hazards. Valuable materials which include some rare earth metals are lost due to inefficient recycling technologies adopted in informal sector.
- ★ Safe and scientific collection and channelization of e-waste has various benefits, viz.,
 - Economic:*
Revenue generation from recovered materials such as metals, copper, aluminium, iron, steel, lead, plastic and glass etc.
 - Environmental:*
Conservation of natural resources by reduction, reuse and recycling lead to reduction in pollution.
 - Social:*
Employment generation as E-waste can be a secondary source of raw material.



Figure 2: Dismantling being carried out by skilled workers using safety gadgets at Earth Sense Recycling Facility at Hyderabad

Table 1: A comparative evaluation of formal & informal recycling

Comparative Parameters	Informal Recycling	Formal Recycling
Level of Technology	Poor	Good
Collection Network	Excellent	Poor
Manpower	Low skilled	High Skilled
Major Activities	Collection, Dismantling, Segregation, Refurbishment & Reuse	Collection, Dismantling, Segregation & Disposal
Level of Hygiene	Poor	Excellent

Source: Anon, 2010

E-Waste management strategies:

- i. The best option for dealing with e-waste is to reduce the volume.

- ii. Designers should ensure that the product is built for re-use, repair and/or upgradeability. Stress should be laid on use of less toxic, easily recoverable and recyclable materials which can be taken back for refurbishment, remanufacturing, disassembly and reuse.
- iii. Recycling and reuse of material are the next level of potential options to reduce e-waste. Recovery of metals, plastic, glass and other materials reduces the magnitude of e-waste. These options have a potential to conserve the energy and keep the environment free of toxic material that would otherwise have been released.
- iv. Sustainability of e-waste management systems has to be ensured by improving the effectiveness of collection and recycling systems (e.g., public-private-partnerships in setting up buy-back or drop-off centres) and by designing-in additional funding e.g., advance recycling fees.
- v. The e-waste trade value chain as depicted in Figure 3 shows the complexity of the e-waste flow. Not only does the e-waste has a number of different points of origin, but the different stakeholders involved in the value chain are also interlinked with each other. Accordingly, the e-waste does not follow one set path.



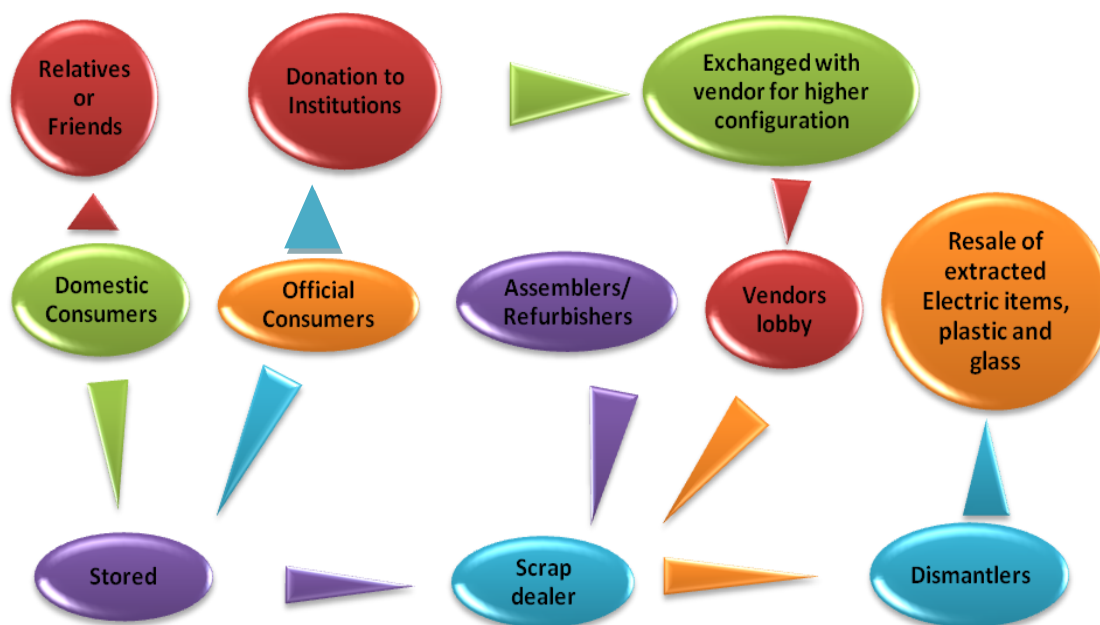


Figure 3 : Flow of E-waste as per market survey

Status of implementation of e-waste (Management and Handling) Rules, 2011 in J&K

As per provisions laid under implementation of Extended Producer Responsibility (EPR), number of Producers have complied under Rules and collection mechanism has been established both individually and collectively

- i. Common Collection Centre has been established by M/s Auctus E-Recycling Solutions Pvt. Ltd. as per agreement with LG company and M/s FedEx TSCS” by Bluestar Ltd. besides local small scale industrial units.
- ii. Common Collection Centre in the name and style of “M/s Attero Recycling Pvt. Ltd.” as per agreement with Producers such as Samsung, Videocon, Haier, Acer, HCL, IFB, Intex, PE Electronics Ltd., P.P. Electronics & Voltas.



Figure 4: E-waste stored in Common Collection centres

- iii. Collection points have also been identified by other Producers, viz., HP, NOKIA, Whirlpool, Carrier AC & Refrigeration Ltd. & Sony.
- iv. Followed by two workshops conducted by J&K SPCB, awareness drive was initiated by **Bluestar Ltd.** in association with **Earth Sense Recyclers**, supported by **J&K SPCB, Jammu** and Hewlett Packard India sales pvt. Ltd. after directions were issued to the Producers to conduct awareness regarding EPR implementation in the State.



Figure 5: Mobile collection van being flagged off at J&K SPCB, Jammu

Survey methodology:

Objectives of survey

The survey on inventorization of E-waste sales, generation, collection and disposal in J&K was carried out with following objectives:

- (i) To study the status of implementation of E-waste (Management and Handling) rules, 2011 in the State.
- (ii) To compile data on the approximate number of dealers dealing with sales of electrical and electronic equipments (EEE) and refurbishers dealing with repair of waste electrical and electronic equipments (WEEE).
- (iii) To study the status of sales, generation, collection and disposal of E-waste in the State.

The study was carried out for the whole State.

Survey Methodology

Market Supply Method, considered to be most suitable assessment method for developing countries as per UNEP manual for assessment of E-waste (2007) has been applied for the assessment of E-waste generation in the State of J&K .

Under ‘Market Supply Method’ the estimation of WEEE is made from sales data, together with typical lifespan. Mathematically, the market supply method can be expressed as:

$$\text{WEEE generation (t)} = \text{sales (t - d}_N) + \text{reuse (t - d}_S)$$

Where,

d_N - Average lifetime of new items

d_S - Average lifetime of second-hand items

The average lifetime of new items has been taken from survey results as carried out by UNEP, 2009. Data on sales, no. of authorized dealers / authorized refurbishers of respective companies was collected from the Producers. The data from all Producers was collected through structured questionnaire specifically prepared for the survey. Quantity of waste in tons is calculated by multiplying the total sales figures by the default weight for each equipment (Table 4). The survey aimed to collect data for various aspects of EEE during its flow through various stages as Manufacturing, Sales, Refurbishment, collection and Disposal

mechanism in the State of J&K besides inventorization of dealers and refurbishers in the State.

Results and Discussions

Manufacturers

There are negligible numbers of only small and medium scale assembling units in J&K.

Dealers

The list of dealers associated with various Producers was collected from respective head offices and is compiled & tabulated as below

Table 2: Number of Dealers in J&K

Name of the Producers	No. of dealers
M/s LG Electronics India Pvt. Ltd	28
M/s Videocon Industries Limited	51
M/s Blue Star Ltd.	4
M/s Samsung India Electronics Pvt. Ltd.	22
Haier Appliances	13
Voltas Limited	03
Hewlett- Packard India Sales Pvt. LTD	13
IFB Industries Ltd.	22
Carrier AC and Refrigeration	05

Carrier Midea	10
Whirlpool of India Ltd	43
NOKIA India Sales Pvt. Ltd.	06
Dell International Pvt. Ltd.	02
Godrej	26
Oppo Mobiles	30
Micromax Pvt. Ltd.	02

Whereas number of computer dealers has been estimated to be app. 206 in the State as per data collected from market survey and Producers.

Sales Data:

Sales figures were collected for all the EEE under survey from various companies selling their products in the State and authorized by State Pollution Control Board for implementation of EPR as under Rules. As per the survey carried out for the year 2014-15, total no. of Refrigerators, LCDs / LEDs, washing machines, Computers, A.Cs and cell phones sold in the State are approximately 77202, 42785, 29142, 54990, 730768 and 14,62,934 respectively.

Refurbishers:

Refurbishers authorized by various Producers in the State of J&K are listed as in Table 3.

Table 3: Total No. of authorized Refurbishing / Service centres associated with respective Producers

Name of the Producers	No. of dealers
M/s LG Electronics India Pvt. Ltd	11
M/s Videocon Industries Limited	No authorized service centre, service through outsourced agencies
M/s Blue Star Ltd.	3
M/s Samsung India Electronics Pvt. Ltd.	27
Haier Appliances	04
Voltas Limited	15
Hewlett- Packard India Sales Pvt. LTD	02
Acer India Pvt. Ltd.	02
Lenovo (India) Private Limited	02
Intex Technologies (India) Ltd.	13
IFB Industries Ltd.	06
Carrier AC and Refrigeration	09
Carrier Midea	01
Whirlpool of India Ltd	09

NOKIA India Sales Pvt. Ltd.	07
Dell International Pvt. Ltd.	No authorised service centre in J&K
PE Electronics Ltd.	02
Godrej	10
Panasonic India Pvt. Ltd.	05
Micromax Pvt. Ltd.	15

There are app. 143 no. of authorized service centres operating in the State.

E-waste Generation:

Data on E-waste generation was calculated from the sales data of previous years collected from various companies and by applying average lifespan and default weight of EEE items. As such, E-waste generation in the State has been estimated to be app. 7372.2 tons for the year 2014-15 (Table 4).

Table 4: Quantities of E-waste generated under different categories of EEE.

Appliance	Lifetime (in years)	Weight applied (default wt. In Kg)	Quantity of E-waste (Tons)
Refrigerator	10	48	2030
T.V./L.C.D.	8	36.2	2325.6
Computer	5-8	29.6	1902.6

Washing machine	10	40 to 47	874
Mobile Phone	4	0.080 to 0.100	130
Air conditioner	5-8	20	110
Total			7372.2

Percent contribution of selected WEEE items has been worked out from the data on category wise e-waste generated and presented as below in table 5.

Table 5: Percent contribution of WEEE towards Potential Annual E-waste generation

S. No.	Name of EEE	Percent (%) contribution towards WEEE (by wt.)
1.	Refrigerator	20.61
2.	T.V./ L.C.D.	56.68
3.	Computer	4.6
4.	Washing machine	12.78
5.	Mobile Phone	2.55
6.	Air conditioner	2.76

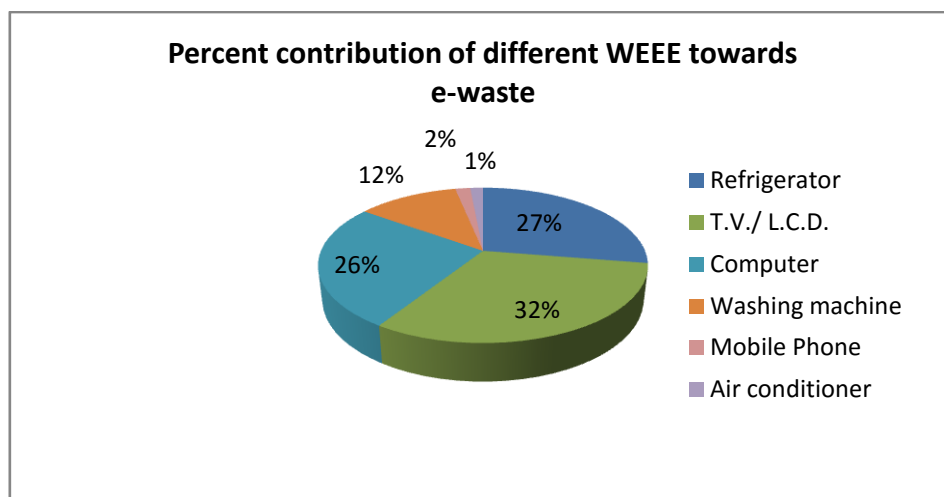


Figure 6: Composition of WEEE

E-waste collection

E-waste collection in the State for Financial year 2014-15 is approximately 60 MT of which IT & TE equipments and Consumer Goods contribute 3.02 % and 96.97 % respectively.

Table 6: Average quantities of e-waste collected on monthly basis

S. No.	Category of E-waste	Total Quantity collected during 2014-15 (Kgs)	App. Quantity (Kgs /month)
1.	IT and TE equipments	1811.22	151
2.	Consumer electrical and electronics	58,054.65	4,837.89
	Total	59,865.87	4,988.89

Scrutinization of annual reports as submitted by respective collection centres data on E-waste indicates that quantity of e-waste contributed by IT equipments has fallen abruptly as compared to the previous year while Consumer goods have shown a slight rise in their collection. Number of Compressors and A.C. motors entering the waste stream is

comparatively high as compared to other products covered under E-waste as reported by M/s Attero Recycling Pvt. Ltd. whereas number of colour televisions entering the waste stream have surpassed the no. of compressors as reported by M/s Auctus E-Recycling Solutions Ltd., authorized collection centres in J&K.

Discussions

Consumer durables account for more than 40% of end consumer spending in India. Annual turnover of more than INR500 billion and contributes more than INR150 billion to revenue of Centre and State governments. Demand for flat TVs, refrigerators, washing machines and air conditioners is on a rise with reduced penetration of products vis-a-vis global levels, rising disposable income and urbanization of consumers. Market for white goods (AC, refrigerators and washing machines) and consumer electronics (televisions) has been growing at close to 14% p.a., and is expected to accelerate to close to 17% in the coming years. (Anon, 2015). India has emerged as the fifth largest producer of e-waste as per survey conducted by Associated chambers of commerce and Industry of India (Indiatoday, 2016).

The State Pollution Control Board has taken strict steps to ensure implementation of EPR in the State for sale of branded products by respective Producers and 27 no. of Producers have been authorized till March, 2016. There are two Common Collection Centres (CCC) authorized by the board for direct transport of e-waste so collected to respective recycling facilities and collection points have been identified by few Producers who are not in agreement with CCC for channelization of e-waste to company's ware house / collection centre located in other States.

Monthly average collection of E-waste is estimated to be app. 151 kg for IT & TE equipments and 4,837.89 kg for Consumer equipments as per the annual reports submitted by authorised Collection Centres (Table 6) which is very negligible due to lack of awareness among consumers / Bulk consumers being created by Producers and lack of will on the part of individual consumers to hand over waste at company's collection points in view of less money offered and therefore possible leakage of E-waste from source to informal sector directly.

References

1. Anonymous. (2010). “Report on Baseline study on the legal status of the profit making registered entity of the group of informal sector workers”, Advisory services in Environment management, GTZ, Gulmohar Park, New Delhi. Pp. 4.
2. Anonymous. (2007). “Guidelines for assessment of WEEE / E-waste Market”, Inventory Assessment Manual, United Nations Environmental Programme, Division of Technology Centre, Osaka / Shiga, pp. 32,54.
3. Anonymous. (2015). “Study on Indian electronics and durables consumer durables segment (AC, refrigerators, washing machines, TVs)”, Ernst & Young LLP. India.
4. Zorba, Shereen and Szymanski, Michal. (2015), “Inconsistency in cross-border regulations challenge to effective control of illegal waste trafficking”, available at: <http://www.unep.org/newscentre/default.aspx/> (accessed 12 March, 2016).
5. Pandit, virendar. (2016). “India’s e-waste growing at 30% annually”, available at: www.thehindubusinessline.com (accessed 16 July, 2016).
6. PTI. (2016). “ India fifth largest producer of e-waste in world”, available at: indiatoday.indiatoday.in (accessed 16 July, 2016).