Electronic Waste Management through EPR Initiatives

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ABSTRACT

The advancement in technology and growing dependence on electrical electronic equipments and after use ongoing mammoth growth of Electronic Waste (E waste) needs redressal for health and hygiene Protection. The e waste are main sources of toxic hazardous pollutants if these are left unattended for disposal. The huge requirements of physical or financial aspects for recycling reuse and disposal with the initiative of take back policies through the Extended Producers Responsibility (EPR) can lead to better technology use, developed product durability and of increase in life cycle. Developed or developing countries are ill-equipped to manage the e waste and only passing the responsibility in name of advancement can be evident from the survey. The initiatives from the technology rich manufacturers in terms of producers responsibility popularly known as EPR is an alternative to the management of e waste solutions. The situation demands strict legislation and endeavor for tackling the e-waste management with the EPR initiative. Often it is seen that the developed nations are passing the buck on the developing countries in names of providing assistance and shipping old and obsolete products liable for recycling, reuse and or even disposal in name of technology transfer and provision for best technological product availability. The EPR approach is a lead towards overall product innovation, cost savings, reduced environmental liabilities and increased customer satisfaction.

KEYWORDS: *WEEE , Recycling , Reuse , E waste , ERP , Product stewardship, Take-back , IPR.,*

I. INTRODUCTION

The use of Electrical and Electronic equipments (EEE) is growing in volumes to many folds in the recent years in name of advancement in the technology and dependence of human kind on these for day to day affairs. Due to massive industrialization and urbanization, the quantity of EEE waste (WEEE) which results from the after use of EEE has increased manifold resulting in higher amount of hazardous toxins in this garbage pile of waste.

India as developing country having diverse population is on the pathway of accelerated industrial activities in EEE and is equally facing this growing Electronic waste (E waste) problem. There are many alternate solutions for addressing WEEE including the widely being accepted approach of **Extended Producer Responsibility (EPR)** principle. The EPR principle for new generation of pollution prevention policies primarily focuses on reuse of reusable remains of the product systems instead of entire new production facilities and aims at scientific disposal of hazardous and toxic pollutants i.e. wastes which cannot be used by manufacturers. EPR imposes accountability over the entire life cycle of products and packaging introduced in the market. It fixes the responsibility of producers for their products till the post-consumer stage and emphasizes that the producer must be concerned with making the product, maintenance for its functionality and the concept that what will result to the product at the end of its life.

EPR extends the traditional environmental responsibilities of producers and distributors (worker safety, prevention and treatment of environmental releases from production, financial and legal responsibility for the sound management of production wastes) to include management at the post-consumer stage. The manufactures /importers / sellers of products are made responsible financially or physically for products after their useful life either by taking back spent products to reinsure their usability through reuse, recycling or in energy production, or delegate this responsibility to a third party which can be termed as *Producer Responsibility Organisation* (PRO) on long term basis. The EPR in other words shifts responsibility for waste from government to private industry, making it

mandatory for producers, importers and/or sellers to internalize waste management costs in their product prices. EPR can be seen as an approach to reconcile environmental protection and economic growth.

II. CONCEPT

EPR is a strategy for protection of environment with objective of decrease in environmental impact of a product consisting of toxic and hazardous intent which when its life cycle ends, it is subjected to disposal by common user produces environment hazards and to overcome this evolving mechanism by making the manufacturer of the product responsible for the maintenance of product for entire life-cycle and making arrangement even for the take-back, recycling and final disposal of the product by manufacturer itself. The first instance of this concept came in evidence in th***e*** report for the Swedish Ministry of the Environmental and Natural Resources by Lindhqvist in 1990. Often people confuse with the term Product Stewardship (PS) which is not true. The PS is initiative of the producer which comes about when producers decide that they need to take responsibility with the aim and feeling that they know best how to manage the end of life recycling of propacks and recycle them. The companies may choose to set up their own system physically or subletting it to other agencies for capturing the propacks and recycling them. Clearly it must kept in mind that Product stewardship (PS) systems are different from EPR as they are not created by laws and the producers itself decides what to do, how long to keep doing it, and how they measure its success. In process they may consult the government or agencies.

L***ife cycle is*** the complete time span involved in producing the material, its turning into a product/package, its distribution, it's selling, it's use and cessation of utility i.e. the situation of discard i.e. disposal.

III. AIMS AND OBJECTIVES

The basic aim of EPR is to encourage producers to reduce pollution and optimize resource and energy use in each stage of the product life cycle through changes in product design, reuse of components and refinement in process technology i.e. producers bears a degree of responsibility for all the environmental impacts of their products by optimizing the choice of raw materials, its reuse and manufacturing process to the use, reuse, increase in life span by recycling and disposal of products. Manufacturers responsibility for product is broadened beyond the emissions and effluents generated by the extraction or manufacturing processes along with or extends to the management of the product once it is discarded or becomes liable for disposal. EPR is based on the principle of primary responsibility of the producer of the product for waste generated during the production process (including extraction of raw materials) and after the product use when it is to be discarded.

The long-term aim of EPR is to motivate for development of more environment friendly product which requires optimal resources, reuse of resources, use of fewer harmful substances easier to reuse/recycle for extension of life cycle or span. The ultimate goal is sustainable development through environmentally responsible product development and product recovery by waste prevention, maximum use of non-toxic materials and processes, development of feedback based control of material cycles, production and choice of durable products, encouragement of production of more reusable and recyclable products, development of technology for increased reuse, recycling and recovery and transfer of waste management costs from used products.

In EPR the emphasis is on use of materials and technology suitable for products with and for

- Less toxic emissions
- Resource-intensive
- Less likely to produce pollution on disposal
- Easier and more feasible to repair
- Simpler structure & Easier to dismantle at end of life cycle
- Re-use after their original purpose i.e. extension of life span
- Traceable back to the specific brand or manufacturer to assure responsibility
- Environment protection in for sustainable development
- Optimal use of resources for maximum user friendly product and production and efficient for transportation

Easier to separate at source and provision for directly handing over to recycler, refillable, re-usable and recyclable.

The above objectives can be incorporated into product design, which is most crucial for optimal resource use and product development and production. The goal of EPR is to arrive at optimal, efficient and cleaner product cycle design & development supported by possibility of set up a reuse / recycling system. The environmental regulations have focused on controlling pollution from each individual facility. Till date they are not able to address the pollution arising at stages of product life cycle. Consumers would welcome more durable, reusable, recyclable and repairable products for maximum output of their products value. Improving utilisation or product-life of products reduces the need of products, its raw materials & energy and reduces the amount of post-consumer waste. This is only possible with optimizing and improving the existing technology with possibility of lowering price to the consumer by batch production.

IV. BACKGROUND & NEED

The development of Information Technology and Communication (ITC) techniques led to the growth of Electronics Industry as the world's largest and fastest growing sector. The last decade has registered tremendous growth in the field of information technology worldwide and as a consequence has resulted in product obsolescence / discarded EEE products namely e-waste. The crisis deepens many folds by the presence of toxic ingredients such as lead, mercury and cadmium etc. in electronic products and poses occupational and environmental health & environmental threats which will not be limited to individuals but to entire mankind and nature. Some of the basic principle of environmental justice such as ‘precautionary principle’ and ‘polluter pays’ are the factors to be kept in mind for finding solution. Polluters Pay principle is the father of the EPR.

One can say that EPR is perceived to be the most appropriate framework that attempts to amalgamate all the principles of environmental justice. The framework shifts the responsibility of safe disposal on the producers in light of the fact that they better know the technology and hazardous effects of the substances used in their products. In the limited span of time it has proved to be effective tool for promotion of sound environment management technology which aims at use of better raw material and cleaner production technology. Few instances where producers have shirked their responsibility due to various formal/informal reasons can be observed.

The available literature are indicator of the concept of EPR being first formally introduced in Sweden in 1990 in a report to the Swedish Ministry of Environment for their waste management for addressing such situation.

Initiative of EPR adoption by Germany under its Packaging Ordinance of 1991 as a legal and government national effort in wake of reduction upto 50 % piled waste and acute shortage of landfill to address this at that time is also evident. The ordinance introduced the Duales System Deutschland (DSD) and popularly known as Green Dot label concept. The producers of packaged products were expected to take back their packaging and were responsible for handling the packaging wastes. DSD charged for its green dot label to producers, which then printed green dots on plastics, metals and composites, which were collected in yellow bins/bags located at households. The effectiveness can be marked by registering down fall of 13 % in per capita consumption of packaging in the 90s decade.

Since then, the EPR concept has been introduced in many other European countries in varied forms. In 1994, the European Commission developed Packaging Waste Directive aimed to reduce packaging waste generation by 50 % throughout Europe by 2001. The approach for possible reduction in waste spread to North America and Asia, including Japan which passed the EPR legislation for packaging in 1995.

Thomas Lindhquist, is referred as father of EPR .The term ’Extended Producer Responsibility is defined as “the extension of the responsibility of producers for the environmental impacts of their products to the entire product life cycle, and especially for their take-back, recycling, and disposal”.

The five basic responsibilities of producers under EPR are Liability, Economic responsibility, Physical responsibility, Ownership and Informative responsibility

Policies of EPR can be classified under the following ways with notional areas as :

a. Regulatory instruments of the nation’s produces and bodies which includes Mandatory take-back, Minimum recycled content standards, Secondary material utilisation rate requirements, Energy

efficiency standards, Disposal bans and restrictions, Material ban and restrictions and Product bans and restrictions.

b. Economic considerations that embody EPR to include Advance disposal fees, Material taxes and removing subsidies for virgin materials, Deposit/refund and environmentally preferable products procurement.

c. Information considerations that embody EPR. Information can be provided through labeling which can be in form of seal-of-approval types of environmental labeling, environmental information labeling, product hazard warnings, product durability labeling, product environmental profiles for the whole life cycle of materials etc.

V. INITIATIVES FOR E WASTE IN SELECTED UNIONS AND COUNTRIES

a) European Union EPR directives

The world as a collective responsibility seen the consolidated effort from the European Union. (EU) The EU has mainly adopted centrally two EPR directives namely: 1) The Waste from Electrical and Electronic Equipment (WEEE) and 2) Restriction on Hazardous Substances (ROHS).

The directives/Legislations/ Regulations main aim are to establish individual responsibility for all EEE products put on the market specially after said date in 2005. The member state's responsibility requires the producers to handle their e waste decisions and disposal problems by promoting incentive for greener design by closing the feedback loop between front-end designs. Broad range of e products consisting of computers to electronic home appliances, toys to Electrical equipments and appliances are covered in the ambit of these directives.

European Union main components of EPR Directives:

Labeling: All products must be clearly labeled for informing the consumers about product and e-waste handling in special manner and prohibition from mixing with the municipal wastes.

Design of Product: Directive of WEEE clearly stipulates that products must be properly designed for careful dismantling and recovery. The target to have facility for recycling upto 50 % of the old EEE must be developed by 2006 and thereafter rates for remaining and incoming products in coming days.

E waste equipment Financing : Producers have to arrange for collection of e wastes and users i.e. consumers are free to return the used products at points specified by manufacturers free of cost and the cost of disposal, recycling and reuse of products they float in market after 2005 have to be borne by the manufacturer / producer / importer. The manufacturer / producer / importers can charge some front end fee in this name from the consumers at time of purchase. The option to the customers to return old electronic products to retailers if they are buying the same type of item can be seen as additional feature of the directive.

Phasing out of hazardous substances: The use of hazardous substances such as lead, cadmium, mercury, hexavalent chromium, certain brominated flame-retardants etc to be phased out by July 1, 2006 has been mandated by the directives.

Targets for Collection and Recovery of E Waste : The directive has provisions about system f take back and means of collection facilities for EEE. Every member state has to ensure that minimum initial target of 4 kg/person/year must be attained. This target will be re-fixed with increase in time.

The main purpose for such directives are to create a uniform EPR system enabling industry to avoid setting different set of requirements for member states. Provision for further stringent requirements by individual members is available. European environmental bodies / organizations / units and EEE producers /importers /manufacturers have agreed to the European Commission to support the e waste directives.

Apart from the initiatives of the EU for e waste the state members individual steps to address these issues has been witnessed through available literatures. Some of individual members initiatives are as follows:

Belgium : EU directive on WEEE is fully implemented in Belgium. The manufacturers, producers and importers of EEE with the active control & guidance of local government have formed a no profit organization named "Recupel" to take care of such activities. The provisions find their implementation from July 1, 2001. The Recupel is responsible for collection, sorting, processing and recycling of e wastes. The present directives covers almost three fourth of Belgium territory with meeting the required 4 kg collected/inhabitant on annual basis. The common users / consumer are to

contribute pay fee as a part of EPR incentive at time of purchasing a new EEE. The financial expectation ranges between 9 to 20 Euros for large appliances and 0.1 Euro for smaller products. Member Producers / retailers or importers of Recupel contribute towards recycling on appliance basis put in market.

Germany: Apart from the famous first ever legislative initiative of EPR in packaging there is a Act governing the sale, return and environmentally sound disposal of EEE (Electrical and Electronic Equipment Act, or ElektroG) which combines WEEE and ROHS (EU). Germany has initiated the concept of Elektro Altgeraete Register (EAR). All together 10 categories of products has been adopted by Germany in the list for the EPR initiatives. The most used very small cost items such as light bulbs etc have not been included in the list. Producers / manufacturers by paying annual financial guarantee i.e. fees are expected to finance the take-back system by registering with the EAR, or State clearinghouse. The finance collected from guarantee fees are used to pay for collection and recycling of household goods to municipal collection points in case the producer becomes insolvent after March 24, 2005 and the local municipal authority has to undertake the recycling / disposal action. E wastes and households & businesses products are distinguished by the Act. The collection of e wastes by household users can be done at municipal collection centers free of charges by the municipal authorities but the corporate or business users must arrange their own transport to hand over the wastes to the collection point.

Greece :EPR concept was introduced to the national legal system via the Law 2939/2001 (amended by Law 3854/2010) on" Packaging and the Alternative Management of Packaging and Other Products" , which set the basis for the transposition of future EPR directives on different products through Presidential Decrees (PD) and after L3854/2010, through Ministerial Decisions. Formally the WEEE Directive applicable to EU states was introduced into national legislation with the Presidential Decree 117/2004.

The latest addition is "National Organisation for Alternative Management of Packaging and Other Waste "(NOAMPOW), recently renamed as Hellenic Recycling Agency (HRA- L.4042/2012). In wake of EU directives the first e waste Producers Responsibility Organisation (PRO) in the country was established in 2004 and second in 2009. Till 2012 the two e waste PROs functions as per legal requirement of country on a no investment no profit basis. The developed network has over 9000 collection points through Municipalities, retailers of EEE and super market chains. The collected e wastes are treated in 8 processing facility units in country where as the wastes of fluorescent lamps are treated in Germany as per agreement.

Practically even though state has made provision of wide collection point network, citizens are still disposing off small appliances directly to the Municipal Solid Waste (MSW) bin. Citizens often make replacement purchase for large electrical items or these items are found left in the street next to the MSW bins.

Ireland : The concept of "WEEE Ireland" a not-for-profit organization, established by producers of electrical and electronic appliances to comply with the legal obligations imposed by the WEEE Directive 2002/96/EC is the first initiative.. The Irish government implemented the WEEE Directive 2002/96/EC from 13 th Aug.2005 which mandates all the all producers and distributors (retailers) of EEE to comply with the WEEE Regulations.

The compliance of regulations mandates or requires the users / consumers to bring their unwanted EEE or e waste to local civic amenity centre for forwarding it to recycler or authority for disposal. The consumer / user is also at liberty to take EEE directly to retailers when they purchase new equipment for further reuse / reconditioning / recycling /disposal. Collection rate of nearly 7kg/person / year against target of 4kg/person/year set by EU directives have already been achieved by the targeted date.

Millions of household appliances have been taken out of the waste stream and recycled since the implementation of regulation. WEEE Ireland undertakes the activities for the treatment and recycling of e wastes from authorised collection points, on behalf of its producer members. WEEE Ireland has presently 360 members which approximates 80 per cent of the total weight of EEE. The bulk of material collected are processed and recycled and the wastes not fit for recycling is disposed. The selected electrical items like refrigeration unit's processing facilities are not available in Ireland , hence these finds place in other European member states with which Ireland has made arrangement.

Netherlands: The Netherlands enacted its own EPR legislation prior to EU directives expecting manufacturers and importers of large and small-scale electronic products to create take back systems with retailers, local governments and repair shops serving as collection centers. After the EU directive came, it was fully implemented met the recycling targets and the drop out points were plugged through its own initiatives.

In Netherland users i.e. consumers pay incentives for take back or end-of-life costs through invisible fees as these are included included in the price of the product and visible fees in terms of advanced disposal fees to the manufacturers / retailers or importrs for EPR efforts. The charges ranges from 5-17 Euros for large EEE appliances.

Netherlands Association for Disposal of Metal Electro Products (NVMP)and ICT-Milieu for organizers have been formed by leading manufacturers for white metal products and gray goods consisting of IT equipments, paper printing equipment and telecommunication goods respectively. The two organizations gathers or receives the discarded products from consumers either through official courier or from Regional Transfer Stations, retailers and repair companies and forwards it to specified recycling centers and partners.

Norway

In 1998 Norway, "The Ministry of the Environment" legislated on WEEE which is said to have been a model for Directive 2002/96/EU WEEE directive and goes beyond the EU-directive by opening up for all types of electronic machinery including consumer electronics.

The producer / manufacturer /importer /distributor/ seller or reseller of EEE Products and the municipalities are to accept e waste free of charge at his place of business as per regulation. The distributor/ sellers or resellers are bound to accept recyclable / disposable EEE free of charge against new purchases of equivalent quantity of new products irrespective of the brand. The regulation further puts the burden on distributor of EEE Products to ensure that all EEE waste are sorted, properly stored and forwarded to authorised collection point from where it will find way to recycler or disposer.

The manufacturer/ producer and importer of EEE Products, in turn, is to arrange for the collection free of charge the e waste from distributors and municipalities in geographical areas of the country corresponding to those in which their EEE products are sold / were sold / were supplied The consumers are expected to pay visible advance recycling fees which range from nil charges for small products to 17 Euro for the white and brown goods.

Sweden: Prior to the EU directive the state member has record of EPR initiatives since 1997 for e waste when the take-back pilot project for cell phones was initiated and later it gained status of program after monitoring its success. Manufacturers/ retailers / importers impaneled recycling centre and after receiving the scraps or discarded cells were forwarded it disassembled and separated components for reuse, recycling and proper disposal.

In 2001, Sweden enacted the Ordinance on Producer Responsibility for Electrical and Electronic Products which requires manufacturers, importers and retailers to take back wide range of electronic products free of charge from the consumer through third party which are nonprofit agencies. The participation fees is paid by the manufacturer depending on the number and type of products placed in the market which intern is transferred to the consumers through invisible costs of the product.

In 2001, 20 industrial organizations formed a service based company "El-Kretsen" for undertaking the activities and resolving producer responsibility for e waste. The activities funding is covered by the manufacturers. It runs national system in collaboration of local municipalities which already have collection centers for the house hold wastes. The consumers are expected to pass e waste at these collection centers and these are then forwarded to the specified recycling or disposal centers meant for electrical and electronic products. The financial aspects are liability of the member organisations.

The target set by the EU directive has been overwhelmingly achieved by the efforts and proper collection system arrangement. Against the set target of 4 kg / person / year by Aug 2005 the state collected e wastes around 14 ky / person / year.

Switzerland : The history of such initiative goes back prior to 1990 when it was dealt by Individual Systems (Producers) , Refrigerators in 1991 , SWISCO Recycling Guarantee (Gray) in 1994 , ORDEA ordinance in 1998 , Cellular Phones 1999,Graphical Industry 2000,Telephone equipment 2001, Consumer Electronics (Brown) 2002 and House Hold Appliances (White) in 2003. As first internationally and dedicated organized effort, the Swiss Federal Council passed a directive that

regulates the take-back and recycling of electrical and electronic appliances "**Ordinance on the Return, the Taking back and the Disposal of Electrical and Electronic Appliances" (ORDEA) on 1-7-1998** itself. The directive puts complete ban on disposal of defective/obsolete electronic devices with the usual domestic waste. The recyclable or discardable i.e. disposable EEE must be returned to manufacturers / retailers or importers directly or through specialised disposal facility centers or public collection points. Manufacturers / retailers and importers of the EEE are mandated to accept old items back from their users or customers, for proper re-use, recycling or disposal in an environmental friendly and tolerable way so that the toxic hazards and environment protection can be properly addressed.

To fund such activities the "Swiss Information and Communications Technology Industry Association" (SWICO) has been formed. The consumers are invisibly charged recycling or disposal fee while purchasing new appliances as these are added to the cost of products. This ranges from 10 to 20 Euros for TV and 1.37 Euros for portable products. The SWICO Recycling Guarantee has been in place since 1994. It guarantees that used equipment will be taken back comprehensively from the informatics; office electronics, consumer electronics, tele-communications, graphics industry and other industrial sectors. Used equipments will be handed over free of charge for recycling.

b) US Initiatives

The openness among the union in the working and factors affecting business makes the US most effective region in the development and addressing of such issues. In management of waste after promising start with almost first ever initiatives as Container Deposit Legislation in the 1970s, 1980s decades and scattered state take-back legislations in the early 1990s the legislated EPR initiatives with physical and or financial producer responsibility, was evident but this lacked transparency and accountability until the environmental NGO community began to take charge of the initiatives and agenda and organize public campaigns for such. The development of EPR initiatives in the US can be traced chronologically, identifying three periods of roughly five years each as mentioned herein.

1. Industry mobilizes against EPR1988–92. As a result during this period a spate of federal and state legislative activity on waste issues (US EPA 2004c) was seen. Some laws mandated manufacturer responsibility (popularly then known as producer responsibility) but more legislation was aimed at increasing municipal responsibility. State legislatures imposed obligations on local governments to reach specified waste diversion targets by specified dates—typically between 25% and 50% recycling or waste diversion by 2000.
2. EPR is co-opted during1993–98and
3. Environmental NGOs put EPR back on the US agenda during1999–2004.

Still one can see that the EPR as a union basis has not gaining much importance. The members are mostly dependent on local bodies initiatives.

c) EPR Initiatives in Asia Leaders

Japan

The Electronic product manufacturer leader, and the father of use and throw technology is producing nearly 70 % worldwide produces. The obsolesce and changing technology and increased dependence on machines and tools led to mammoth amount of hazardous and toxic e waste. This initiated the need of such initiatives for safeguard of environment and sustainable growth.

As an initiative to combat e waste even in terms of EPR in 1998, Japan enacted the Specified Home Appliance Recycling Law (SHARL) requiring producers to take back EEE products. The law requires recycling rates between 50-60 % by weight, which could be addressed by reusing and recycling product and its components. Consumer/ user pays a collection/recycling fee when they leave the product and the recycling ticket (compulsory collection fees) is obtained /bought from the post office or the retailer or at the collection point or retailers. If one purchases new appliance he is at liberty to return the old product with the requisite fees payment in either form. Retailers or collection centers, collects / take back discarded appliances and pass them to manufacturers along with the recycling ticket i.e. recycling fee for further treatment.

The Waste Treatment Law was enacted to address the hazardous substances. The country advocates heavily on incineration and continued use based on cost comparisons to material recycling.

Japan enacted the Revised Law for Promotion of Effective Utilization of Resources requiring manufacturers of e products including computers and similar items, large electrical home appliances, which were not covered under SHARL to design for disassembly, recycling and waste reduction and longevity of use. Recent amendments of the law mandate producer take back for business computers and appliances which is the aim and objective of EPR. Manufacturers are at liberty to charge consumers for end-of-life waste management costs.

Under the Japanese legislation retailer / manufacturer have the discretion to decide the amount of the recycling fee.

Most Japanese EPR laws require physical take back of e products allowing financial costs to be passed onto consumers. Japanese manufacturers develop and manage their own recycling programs for their brand name products and create stronger feedback loops among the actors of upstream and downstream.

China

China being world fastest growing economy is contributing in every sphere including the EEE. Iconic symbolization of China and Taiwan product is that they are of use and throw quality. The products are very cost effective and often give rise to extremely faster obsolesce i.e. the e waste generation rate is also very fast. The provision for recycling and reuse is very limited.

The first dedicated effort in China was Rules on the Administration of Recovery and Disposal of Discarded Electronic and Electrical Products promulgated in 2009 were made effective in 2011 deals with the EPR specially.

The management and legislation of WEEE mainly focus on the area of waste household electrical and electronic equipments.

On Jan.1, 2011, the State Council signed law into effect called the "Waste Electrical and Electrics Equipment recycling regulations" ("Regulations"). TV, air conditioning, refrigerators, washing machines and micro computer became the first formal 5 categories in accordance with national standards for recycling and dismantling. The law also makes the recycling of many other discarded appliances regular and has some vague stringent provisions and regulations to abide by. Regulations have very general sections putting the responsibility of all related aspects in very general terms making the "Regulations" full of loopholes and imperfect.

There are almost 80% WEEE from the all over the world which come to Asia, and 90% of that comes into China.

Korea

Continuous efforts for redressal and minimizing E Waste have been undertaken by promoting recycling, reuse and disposal. The crude or unscientific recycling or disposal gives rise to environmental problems. As newer initiative to address these through EPR, the Korea has undertaken the Producer Deposit System from 1992. The producers of home appliances, tires, lubricants, batteries, paper goods and metal cans are expected to pay deposits to government to receive refunds proportional to the amount of recycled products and product wastes. This system is limited in promoting recycling as it did not adhere to recycling responsibility entirely on the producers. EPR was first introduced as part of government aim to establish an economic system of cyclical resources, where waste generation is minimized through resource conservation and efficient resource reuse. In this system, product manufacturer which has the better knowhow of technology takes responsibility for recycling and disposal of their products which includes the EEE products also.

Pilot project for the EPR was launched in 2002 for home appliances and fluorescent light bulbs where the three major manufacturers firms collected and recycled their products after the life time. The result showed minimization of waste and improved recycling technology. EPR was extended to include product packaging, batteries and tires. The list of recyclable materials prepared in 2003 further expanded the list for take back system.

d) Indian Initiatives:

India being the developing economy and emerging leader of the world is unfortunately becoming leaders in the WEEE also. The mammoth growth of e waste requires the initiatives of EPR in most effective way and is yet to explore its full potential.

Till date the national regulatory framework in India which has some say for waste management and preservation of environment and combating pollution can be listed as

The Water(Prevention and Control of Pollution) Act, 1974
The Air (Prevention and Control of Pollution) Act, 1981
The Environment (Protection) Act, 1986
The Public Liability Insurance Act , 1991
Biomedical Waste (Management & Handling) Rules, 1998.
The Municipal Solid Waste (Management and Handling) Rules,2000
The Batteries (Management & Handling) Rules, 2001
Environment Impact Assessment Notification,2006
Hazardous Waste (Management, Handling and Transboundary) Rules, 2008
The National Green Tribunal Act, 2010
Plastic Waste (Management and Handling) Rules, 2011
e-waste (Management and Handling) Rules, 2011

Besides these many state governments through their assembly such as Maharashtra, TN, Delhi etc. have also come up with legislations and regulations limited to their region which are also good examples in combating the e wastes and have some elements of EPR in one form or other.

The concept addressing the environmental issues in form of legislation, which has marked component of EPR concept can be put as **"Batteries (Management and Handling) Rules, 2001"**. The dedicated take back concept for the first time was introduced in the unstructured manner. The rule assigns the responsibility of ensuring that the used batteries are collected back to the manufacturer (includes manufacturer, importer, assembler and re-conditioner). This makes it mandatory for the manufacturers to set up collection centers for collection of used batteries form consumers or dealers and fixes responsibility for ensuring safe transportation, creating public awareness, and confirming / ensuring that the collected used batteries are sent to the authorized / registered recyclers.

Still in India milk and soft drinks are sold in returnable, refillable glass and plastic bottles where producers take back the empty containers. This can also be seen as example of producer responsibility extending beyond the sale point.

A committee set up by the Ministry of Environment and Forest in 2001 for 'Plastic Waste Disposal' under the guidance of Shri Ranganath Misra submitted its report and this report contained elements of EPR by recommending a buy back policy in "The Recycled Plastic Manufacture and Usage Rules, 1999". Under this, the plastic industry was to be made responsible for retrieving empty packaging material and have proper disposal system. The committee also proposed establishment of collection centres with 90 per cent recycling targets for Polyethylene terephthalate (PET) bottles. The recommendations are yet to be implemented.

The most recent **" E Waste Management and Handling Rules 2011"** effective from 1st May 2012 has various sections which deal with the Extended Producers Responsibility (EPR) in most efficient and effective way.

As on date clearly one could say that for the E waste disposal and preservation of environment and disposal of e wastes in justified manner is being taken care off despite the fact that still a long distance has to be covered in India.

VI. CONCLUSION

Environmental concerns and provision for tackling growing e wastes with the aim at organized producers is of main concern. The production of EEE and disposal & recycling of e wastes have given rise to number of environmental issues. The after use i.e. life cycle of the products, when they lose their utility, the disposal in a planned manner has to be seen as national and international issue as the EEE has often hazardous elements which pollute the environment if disposed in unscientific manner. The increasing volume and growing scarcity of landfills in the long term, or recycled in crude manner is of concern. WEEE contains significant amounts of toxic constituents, which may present hazards to public health and environment if disposed unscientifically.

EPR emerges to be a useful policy initiative for combating the e wastes. Application of this initiative will help in managing this rapidly growing waste and encourage manufacturers / producer to redesign their products and optimally use the resources. EPR can be seen as a tool to ensure responsibility with best dedicated ability and means to overcome or reduce hazardous and toxic environmental and

human health impacts of products During the product conception and design stage manufacturers are at liberty to select the raw material and have the option of selecting environment and hazard safe materials for minimizing environmental hazards and toxic waste throughout the life cycle, increase the useful life of the product and facilitate disassembly, reuse or dispose the product at the end of its life in safe manner.

EPR can optimize resource utilization and consumption. In newer policies with increasing repairing cost and maintenance costs, the consumer products are typically designed for one time use fit to be thrown out by consumers at the end of life and disposed off in landfills and incinerators. This has led to unsustainable consumption patterns that are depleting the world's stock of available raw materials at faster rate. EPR policy is opposed to this use and encourages producers to create products to last longer and manage materials so they are continually reused and recycled in a closed loop system.

The concept of producers paying for managing product waste at end of life, forces the EPR to use as a tool for better design and advancement of technology which in turn can lead to reduction in environmental degradation. It will lead to less toxic radiations, less over-packaged products suitable for increased life cycle and designed for reuse and recycling providing best values of the finance put in.

Every time disposal of WEEE can be viewed as loss of large amounts of valuable resources, in particular metals and plastics. The EPR encourages for these to be recycled which would divert the waste from disposal reduce the need to use virgin raw materials.

In many countries the nonprofit agencies are being involved for the ERP but it seems that Government-enforced targets and deadlines for phasing out of hazardous materials and collection, reuse and recycling of designated products are achieving more positive changes. The countries progress in implementing the EPR and E waste handling is far from satisfactory in some cases. The developed nations are passing the buck on the developing countries in names of providing assistance and shipping old and obsolete products liable for recycling, reuse or even disposal.

The EPR approach can be summed up as leading towards product innovation, cost savings, reduced environmental liabilities , use of optimal resources , increased life cycle , reuse of parts and resources from the disposable units, self help groups development , increased NGO and governmental agencies interaction , awareness creation about health and hygiene and increased customer satisfaction in general and particular and as a tool for employment generation in the developing planned disposal organization which has many potential threats for health and hygiene.

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