



E-WASTE IN INDIA

IMPLICATIONS, ISSUES & RECOMMENDATIONS FOR HANDLING
HOME APPLIANCES AND CONSUMER ELECTRONICS



Message from President, CEAMA



***Anirudh Dhoot, President
Consumer Electronics &
Appliances Manufacturers
Association (CEAMA)***

The consumer electronics market in India has seen a phenomenal rise in recent years. The Indian consumer is purchasing more electronic appliances and technologically advanced products such as mobiles, computers, televisions, refrigerators, washing machines and air conditioners.

This also means that more and more electronic and electrical appliances are being discarded contributing to electronic waste (or E-waste). The Ministry of Environment and Forests (MoEF) and the Central Pollution Control Board (CPCB) have laid out rules and guidelines with an intention to efficiently manage E-waste in India. However, there is significant scope for the rules and guidelines to further evolve from its current form. This is because of the difference in the nature, physical attributes and most importantly the life-span of various electronic products besides the variation of consumer behavior in India when compared to that of the rest of the world. These factors pose certain operational and practical challenges in implementation of the rules for all stakeholders.

I am confident that this research paper authored by APCO Worldwide and backed by the survey will serve its purpose of highlighting the various issues and provide suitable recommendations to the government to align the existing rules to enable implementation, specifically from the standpoint of large home appliances and consumer electronics.

EXECUTIVE SUMMARY

E-waste or electronic waste refers to any discarded electrical or electronic products or appliances. There is a global debate on what constitutes E-waste as certain products in the so called E-waste segment also have a life beyond. It also depends if a producer/manufacturer (brand companies) after receiving products at the end-of-its-life from customers, prefers to end its life through recycling and disposing or continue the life of the product by refurbishing and reselling. There is, therefore, a question as to whether the term 'E-waste' should also apply to products in resale, reuse, and refurbishing industries, or only to those products which cannot be used further for their intended purposes. The biggest risk from E-waste processing in developing countries emanates from the informal sector which has greater access to electronic waste, especially the electronic devices and home appliances from individual consumers and households. Also, in developing countries like India, most electronic products are repaired, refurbished and reused rather than junked as E-waste. This also poses a challenge in collection and formalization of what constitutes E-waste as per regulations by the Government.

While the Government and the industry are unanimous on the view that E-waste needs to be efficiently managed from a social and environmental standpoint, there still is a need for them to mutually arrive at a consensus by understanding the practical and cultural realities on ground. The Ministry of Environment and Forests (MoEF) has notified the E-wastes (Management and Handling) Rules 2011, for proper management and handling of E-waste in India. This is a welcome step appreciated by the industry in the direction of making India environmentally safe from hazardous of E-waste.

However, in a country like India, since the mammoth effort of collecting E-waste cannot be possible for a single entity, there is a need for all stakeholders to undertake this jointly. The latest draft issued by the MoEF seems to identify the right stakeholders, but the operationalization of E-waste management on field may still be challenging. This is because of the large scale existence of the informal sector which has a wider reach, better efficiency, and also provides incentives and convenience, thus making consumers, naturally a part of the informal eco-system.

In a country like India, since the whole effort of collecting E-waste cannot be humanly possible for a single entity, there is a need for all stakeholders to undertake this jointly

Most formal recyclers covered in the survey found it impossible to compete with the informal sector. This is because the informal sector is not liable for many expenses like rents and legitimate wages, does not invest in modern technology, follows unscientific processes for recycling and extraction, and is not bound by any laws and regulations. Unless the informal sector is formalized or made to be part of a defined E-waste supply chain, it will automatically defeat the very purpose of what the Government and industry intends to achieve. The industry, including the electrical and electronic equipment manufacturing companies, will end up equally suffering due to their inability to comply with the regulations prescribed as per the law.

As part of this whitepaper, APCO Worldwide conducted a detailed survey and reached out to a variety of stakeholders in Tier 1 and 2 cities and towns in India, across all four regions. These consisted of producers, importers, bulk and individual consumers, recyclers in the formal and informal sectors, scrap dealers, NGOs, bilateral entities and consulting organizations working in this area. APCO also studied several government documents, research reports and white papers available in the public domain.

The survey threw up some interesting findings and trends with regards to the behavior of household consumers. It showed that more than 95 percent of household consumers were not willing to dispose of any of their electrical appliances (like ACs, refrigerators, televisions, mobiles and personal computers) at no cost to brand companies at the end of its life (EOL). Further, it showed that a majority of them preferred to sell their appliances at EOL to second hand scrap dealers and individuals (including through online portals like OLX and Quikr) or trade it in exchange for new products. Thus, it is important to bring household consumers, dealers

and retailers into the formal supply chain by further broadening their roles and responsibilities in the regulatory framework. Similarly, while the bulk consumers were required to channelise the E-waste generated by them to authorised collection centers/registered recyclers and also maintain records, the survey indicated that many of them actually preferred to dispose it to informal waste collectors (in exchange for money), donate to employees or even to NGO's (who may further distribute to schools).

It is important to bring household consumers, dealers and retailers into the formal supply chain by further broadening their roles and responsibilities in the regulatory framework

This paper provides the current scenario of E-waste management in India. It is created to serve as a guidance for decision makers and authorities to understand the holistic picture; revisit, plan, design, and make necessary changes required to practically implement the current E-waste Rules and Guidelines at the Center and State levels, specifically around large home appliances and consumer electronics.

As evidenced in the report and survey, **it is important for the Government to ensure that it takes a different view of the home appliances/white goods industry.** This is because these products not only have an enhanced end-of-life (EOL), but also are larger and heavier, which pose logistical challenges to move across eco-systems. We urge the government to consider these practical challenges, also so that consumers are not forced to junk products prematurely. It is also important for the Government to create an enabling mechanism to help bring the unorganised sector into the formal ecosystem and take necessary steps to educate and bind the end consumer as well in this endeavor.

This paper covers the entire eco-system and attempts to bridge the gap between the Government's intent and industry's commitment to reach a practical solution required to make India environmentally safe of all risks from E-waste. Considering the prevailing scenario, we have, herewith, given short and long term recommendations for the government. These have been explained in greater detail in the **'Recommendations to the Government'** section further in the report.

SHORT TERM RECOMMENDATIONS

Recommendation	Reasons	Implementation
1) Build consumer awareness and define their roles and responsibilities around E-waste disposal through a regulatory framework	<p>There is very little awareness on part of individual consumers and households around safe disposal of E-waste, which has led to growth of the informal sector.</p> <p>E-waste management in India is still at an early stage. Hence, creating consumer and public awareness at this stage will be critical for the long term success of the government's and industry's goal of efficient e-waste management in the country.</p>	<p><i>We would recommend the government to conduct a campaign around 'Duties of Consumer' for safe disposal and management of e-waste.</i> It will be important for the government to bring individual consumers under the legal framework by prescribing some deterrence for non-compliance.</p> <p>In addition, adherence to some simple do's and don'ts such as returning of E-waste only through organized channels such as producer take-back system, through accredited / authorized dealers/retailers, accredited formal recyclers/recycling firm, accredited scrap dealers/kabaadiwallahs etc.</p> <p>Stakeholders: Individual Consumers, Government, Brand Companies</p>
2) Bring bulk consumers under the legal framework through filing of records for E-waste	<p>Apart from maintaining records of e-waste, bulk consumers are not required to file returns. There is nothing that legally binds them currently. This result in many of them disposing it to the informal collectors in exchange for money.</p>	<p>It is necessary for the government to make bulk consumers liable by bringing them under the legal framework, like making it mandatory for them to file annual returns with the authorities concerned such as SPCBs/PCCs.</p> <p>Stakeholders: Bulk Consumers, Government</p>
3) Recognise End-of-Life (EOL) range for all Electrical and Electronic Equipment after due industry consultation	<p>Each Electrical and Electronic Equipment has a different EOL. Home appliances / white goods have longer EOL, in some cases about two-three times their actual life.</p> <p>As per Fig 5. in the survey, as many as 40 percent of the consumers in India intend to use most home appliances for over 12 years; while some of them have been using home appliances for over 20 years as well.</p> <p>This is in stark contrast to IT and telecom gadgets which usually get changed in about five years' time.</p>	<p>The government needs to recognize that home appliances/ white goods have a longer end of life.</p> <p>We would recommend the Government to have consultations with the industry and all stakeholders to reach consensus on a range of EOL for all EEE – home appliances/white goods and IT / telecom products.</p> <p>This classification is essential as consumers in India tend to use products till it breathes its last. Also, so that consumers do not need to dispose of products before their actual EOL just because of the rules.</p> <p>Stakeholders: Government, Consumers and Brand Companies</p>

<p>4) Treat home appliances / white goods differently from that of IT and Telecommunication Equipment</p>	<p>Home appliances such as refrigerators, washing machines, air conditioners and televisions weigh from 20 to 120 kgs as compared to technology products like mobile phones, which weigh a maximum of 200 grams and personal computers (laptops and desktops) which weigh from about 2 kgs to a maximum of 20 kgs</p>	<ul style="list-style-type: none"> • We recommend the Government to include all dealers/retailers, unorganized recycling sector (kabadiwallahs/scrap dealers) under a registered accreditation model regulated by the SPCBs/PCCs • Producers and dealers may have contractual agreements to ensure that when products reach EOL, they are given to accredited collectors/ kabadiwallahs/ recyclers only. This will further enable the informal sector to become part of the legal framework • Local recyclers/kabadiwallahs to be accredited by SPCBs/PCCs only when they follow certain safety processes • Kabadiwallahs/local recyclers may be brought into the ecosystem through franchisee agreements with the dealers/retailers • Dealer/retailer to notify brands once they receive the products back from consumers <p>Stakeholders: Dealers / Retailers, unorganised recycling sector, Government, Brand Companies</p>
<p>5) Adopt 'Informal Sector Franchisee Model' aimed to move the unorganised sector to an organised one</p>	<p>The informal sector manages more than 90 percent of India's E-waste. Low infrastructure set-up and operational costs enable them to make profit and dominate the market. They are not liable to many expenses like rents and legitimate wages, do not invest in modern technology, follow unscientific processes for recycling and extraction, and are not bound by any laws and regulations.</p> <p><i>The informal sector has maximum access to the end consumer and the generated E-waste.</i></p> <p>It is also important to note that E-waste is differently handled at various levels – from collection and segregation to dismantling and recycling.</p>	<p>Identify major informal sector clusters and prepare list of franchisees through recyclers & dealers/retailers.</p> <p><i>Define roles and responsibilities of the</i></p> <ul style="list-style-type: none"> • <i>Informal sector, primarily around collection and segregation</i> • <i>Formal sector, primarily around dismantling and recycling</i> <p><i>Registering the informal sector with authorities concerned like SPCBs/PCCs, based on their roles.</i></p> <p>Create awareness and build capacities amongst the informal sector workers on environmentally sound processes, skills up-gradation and process efficiency.</p> <p>As introduction of certain processes would change the cost structure of the informal sector, this will require government support like providing financial aid, easing access to credit, provision of financial incentives such as subsidies and insurance schemes.</p> <p>Stakeholders: Unorganised/ Informal Sector, Government</p>

LONG TERM RECOMMENDATIONS

Recommendation	Reasons	Implementation
<p>1) Option to Shift from Extended Producer Responsibility to Producer Responsibility Organisation</p> <p>EPR to PRO</p>	<p>Apart from fulfilling their responsibilities of managing EOL products individually, there is need for an option where producers can come together to form a consortium and strive to establish an organization like a PRO.</p> <p>The PRO will ensure an organization/body responsible for collection, storage, transportation and recycling of E-waste in an environmental friendly manner, in addition to being responsible for compliance and regulatory filing with CPCB/SPCBs/PCCs on behalf of member companies.</p>	<p>The PRO may be established with support from all producers, with the government also being an important stakeholder for efficient functioning. The PRO may operate as a not-for-profit organization. However, this will require producers to come together and arrive at a consensus on the participation and the division of roles and responsibilities.</p> <p>A corpus could initially be created with contribution from member companies. The PRO may take direct ownership and responsibility of collection and recycling of all WEEE generated across the country through its network of accredited collectors, dismantlers and recyclers.</p> <p>The government may include PRO and its responsibilities as part of the E-waste Rules.</p> <p>Stakeholders: Industry (Brands, Importers, Assemblers), Government, Dealers, Recyclers, Collectors, Unorganised sector</p>
<p>2) Introduce Advanced Recycling Fee – ARF</p>	<p>Introduction of ARF will help build a sound infrastructure, provide quality service for the public, and manage the backlog of old products, while placing the least financial burden on local communities.</p> <p>It ensures a fair distribution of financial responsibility amongst product brands. It is a “whole solution” that avoids creating expensive, manufacturer-by-manufacturer systems, resulting in reduced administrative and enforcement problems.</p> <p>ARF can fund the entire system including local collection, utilizing existing business and organisations and offering diverse and convenient service.</p>	<p>The government may call for industry consultation and fix the ARF for each product.</p> <p>The ARF would be based on calculations based on various aspects such as recovery rate of each type of EEE, collection and transportation costs involved and recycling costs.</p> <p>The government may look at creating an ARF corpus, which will be utilized for undertaking collection, storage, transportation and recycling of E-waste. The fund will be collected by the producers/manufacturers, and subsequent fund management and recycling services will be performed and coordinated by the PRO with a central role played by producers/manufacturers with participation from the government and other stakeholders.</p> <p>ARF component to be built into the overall PRO model covering all home appliances/ white goods and IT and telecom equipment.</p> <p>Stakeholders: Consumers, Brand Companies, PRO, Government</p>

Table of Contents

Overview	8
Introduction	8
Regulatory Framework.....	13
APCO Survey	17
Global Scenario	24
Scenario in India	25
Management of E-waste in India	27
Management of E-waste in other Countries	31
Recommendations to the Government	34
Short Term Recommendations	35
Long Term Recommendations	39
Road Map.....	40
Annex	41
Informal Sector Franchisee Model.....	41
Recommended Long-Term Market Models.....	44
Long Term Model 1- The Producer Responsibility Organisation (PRO) Model.....	45
Long Term Model 2- Advanced Recycling Fee (ARF) Model	49
Abbreviations.....	51
References	51

Overview

Introduction

E-waste is any waste electrical and electronic equipment (WEEE), in whole or part, or rejects from manufacturing and repair processes which are intended to be discarded. These could be discarded computers, laptops, tablets, mobile phones, television sets, washing machines, refrigerators, air conditioners etc. Televisions, refrigerators, air conditioners and washing machines make up the majority of E-waste by weight, while computers and mobile phones account for about 20 percent and 2 percent respectively. The increasing market penetration in developing countries, replacement market in developed countries and high obsolescence rate make WEEE/E-waste one of the fastest waste streams in the world. This is a consequence of rapid growth in consumption of electronic products due to an increase in high per capita incomes and growing technology adoption.

Globally more than 50 million tons of E-waste is generated annually, while in India, the current estimate is around 2.7 million tons per annum. WEEE/E-waste contains more than 1,000 different substances, which fall under two categories – ‘hazardous’ and ‘non-hazardous’ substances. Its components contain valuable materials such as non-ferrous, precious and semi-precious metals; and hazardous and toxic substances such as lead, mercury, cadmium, chromium, halogenated substances, polychlorinated biphenyls and poly-brominated di-phenyl ethers. Home appliances/white goods like refrigerators, air conditioners and washing machines primarily contain steel, plastics and copper wiring, along with potentially harmful substances such as chlorofluorocarbon and hydrochloroflourocarbon (CFCs/HCFC) gases which have high ozone depletion potential.

Tampering, openly disposing of and not adopting scientific environment friendly processes to recycle or recover precious metals from E-waste can result in large emissions of hazardous substances, causing serious damage to health and environment. For e.g. metals such as lead, mercury and cadmium can cause damage to the central and peripheral nervous systems, effect brain development of children and cause damage to the circulatory system, kidneys and the reproductive system. Chromium has the potential to easily pass through cell membranes and is then absorbed, leading to various toxic effects. Some studies have shown that short-term exposure to beryllium, barium, and BFRs can cause serious health implications such as cancer.

The E-waste comprising of IT & TE listed including TVs contain up to 60 different elements of which some are valuable, and some are hazardous/toxic or both. Printed Circuit Board (PCB) commonly called as motherboard, contains complex elements and needs a very careful handling for recovery of precious metals and for minimizing impact on the environment during recovery processes. WEEE/E-waste is a complex mixture of hazardous and non-hazardous waste requiring specialized collection, transportation, segregation, treatment, extraction and disposal. It is important to adopt scientific methods for treating and recycling E-waste to prevent damage to health and environment and to extract useful and valuable

materials from E-waste to conserve depleting resources. However, E-waste management in India is highly complicated due to the presence of multiple stakeholders, some of whom are not within the purview of the law. The stakeholders include individual and bulk consumers, manufacturers and producers of EEE, formal and informal recyclers, NGOs and the government.

E-waste mainly comes from several sources including but not limited to:

1. Residue of materials arising from the electronic product manufacturing process
2. Parts or spares including discarded electrical and electronic equipment generated from a repair shop or a service center
3. Obsolete goods from households, governments, institutions and other facilities

Additionally, in India there are a host of economic and social issues facing the E-waste sector. One of the major issues is the dominance of the unorganized sector which manages more than 90 percent of India's E-waste through unscientific process for dismantling, recycling and disposal.

Since there are no appropriate regulations or incentives for the public / individual consumers to be bound and responsible for their E-wastes, it is difficult for them to participate and be part of the E-waste recycling ecosystem. Even if a campaign is launched, it would not necessarily be successful unless enforcement by law and/or monetary benefits are part of the engagement.

The current regulations do not adequately address the issue around managing E-waste generated by individual consumers and households. There is no structured mechanism for managing this reverse supply chain which comprises of collection procedures and transportation of E-waste from households for further processing, especially for bulk appliances such as air conditioners, refrigerators and washing machines. There is very little awareness on part of individual consumers and households as to how E-waste should be disposed of in an environmental friendly manner. As a result, this has invited illegal collectors or the informal sector that collects the waste, and do not handle and recycle it in an environment friendly and scientific manner.

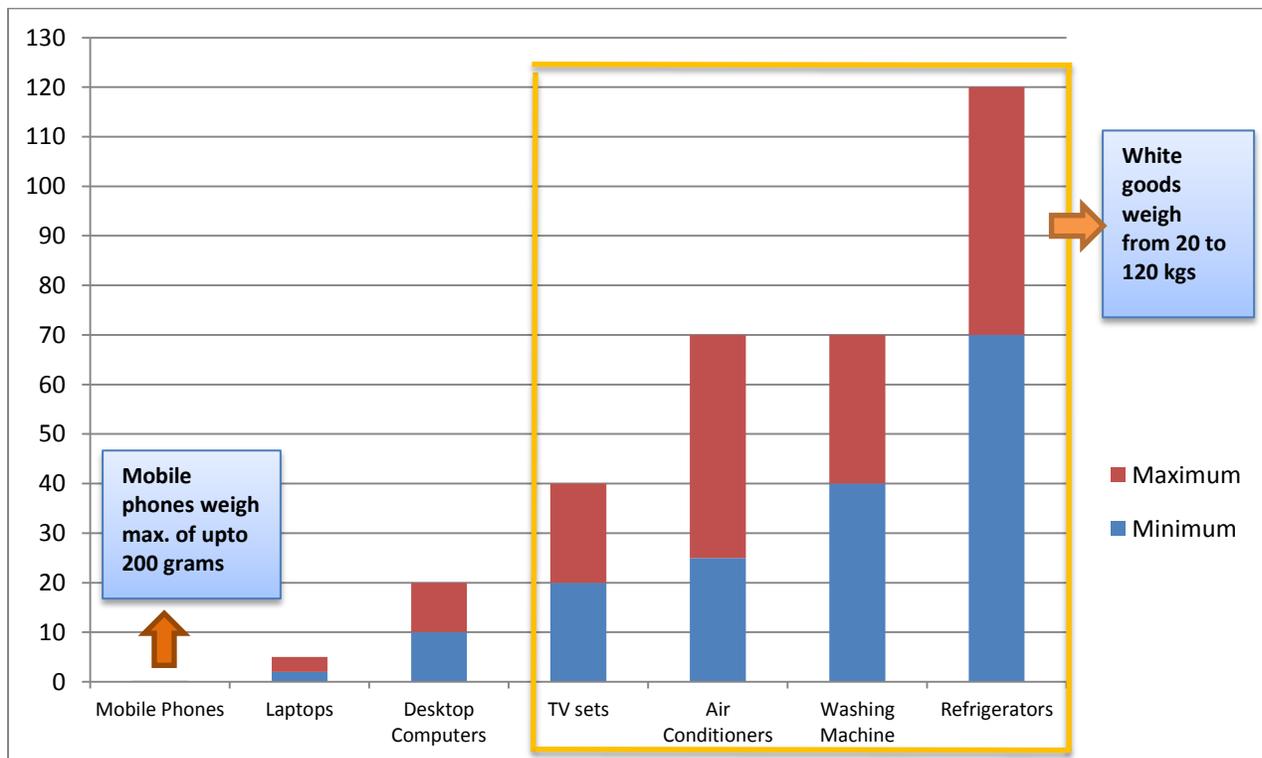
As per our survey, more than 95 percent of consumers are unwilling to give their appliances at no cost at the end of its life. They presume that they are entitled for some value for the appliance. While there is awareness on E-waste and its safe management is practiced to a certain extent at the institutional or bulk consumer level, its management and safe disposal at the household level is virtually absent. The logistics become more complex in the case of consumer electronic products and appliances like air conditioners, refrigerators and washing machines given the large size and weight of these products.

It is interesting to note that even in developed countries, private E-waste collection centers make it a point to mention that while they accept all electronic waste, regardless of brand or age, but DO NOT

accept certain types of products such as air conditioners, refrigerators and washing machines due to their size, weight and area that occupies their limited storage space. Hence, there is a need to specially look at these appliances and treat them differently. In the E-waste Rules, the **MoEF has acknowledged this fact by mentioning these separately in a different category under Schedule-I. Yet, it treats these white goods on par with any other small electronic products like mobile phones and laptops which can be conveniently carried and transported in pockets or small bags**

Given below is the weight of selected technology and consumer electronic appliances which comprise of various metal and non-metal substances such as iron, glass, plastic and other related electronic components. The chart depicts the minimum and maximum weight of each appliance. The variation in the weight is after considering the size and age for each product. Also, newer appliances are likely to be lighter than old appliance as the products used for their make are lighter.

Weight of Electrical and Electronic Appliances



The chart above indicates that electronic goods such as mobile phones and laptops weigh just about 80-200 grams and 4-8 kgs respectively. Whereas, home appliances/white goods such as air conditioners and refrigerators weigh in the range of 25-70 kgs and 70-120 kgs.

As home appliances/white goods are significantly heavier than technology products like mobile phones, laptops or personal computers, it is challenging to logistically manage them – some tasks involving the collection of these appliances from households and transferring them to recycling plants (which in most cases pass through several states) for further recycling and processing.

In terms of E-waste guidelines, there is a need for the focus to shift to bulk as well as individual consumers and households. Although the initiatives taken may have involved the public, there are no regulations which make consumers liable for unsafe disposal of E-waste. As per the current regulations, the unorganized sector which manages more than 90 percent of E-waste of the country is kept outside the legal framework. The current rules place majority of the responsibility of E-waste management on the producers of EEE through the concept of ‘Extended Producer Responsibility’ (EPR). **Whereas, there is need for the policy to consider all stakeholders and place certain amount of responsibility on each player of the ecosystem.**

The Matrix below gives a comparative table of the types of systems followed and role of each stakeholder in the ecosystem across several countries. Although operationally many of the countries may seem to have similar ground level issues, the consumer behavior and cultural diversity in India is drastically extreme. It is also important to note that in India, the government places majority of the responsibility on the producers.

Upper cell: physical responsibility Lower cell: economic responsibility		Collection from household	Logistics to collection point	Establishment and operation of collection point	Logistics from collection point to recycling plant
Japan (Home appliance Recycling Law)		Retailer (municipality / Consumer)	Mainly Retailer (Municipality and consumer too)	Producer	Producer
		Consumer	Consumer	Consumer	Consumer
EU (German statute based on WEEE Directive)		Consumer / Retailer Municipality	Consumer / Retailer Municipality	Municipality	Producer
		Retailer / Consumer	Retailer / Consumer	Municipality	Producer
China (Assumption)		Collector	Collector	Yet to be considered	Collector
		Producer (including purchasing cost)	Producer	-	Producer
USA	California	Municipality	Municipality	Municipality	Municipality
		Consumer	Consumer	Consumer	Consumer
	Minnesota	Producer (admitted to use existing infrastructures such as municipality's)	Producer (admitted to use existing infrastructures such as municipality's)	Producer (admitted to use existing infrastructures such as municipality's)	Producer
		Producer	Producer	Producer	Producer
India	Producer	Producer	Producer	Recycler	

Furthermore, enforcement and monitoring by responsible agencies is crucial in order to improve E-waste management at present as well as in the future. E-waste management in India is at an early stage, therefore, there are many challenges. The MoEF, CPCBs, SPCBs and PCCs not only need to work along with local authorities (municipalities, panchayats) to increase public awareness and promote the collection of E-waste, among the public but also bind them into the process through appropriate extended responsibilities.

This whitepaper “E-waste in India - Implications, Issues & Recommendations for Handling Home Appliances and Consumer Electronics” highlights the fundamental logic that **household appliances/white goods** due to their physical attributes such as size, dimension and weight backed by consumer and cultural behavior that is different from other parts of the world, should be viewed differently as they pose certain ground level operational, practical and logistical challenges in implementation of the rules both from a producer and a consumer standpoint.

The short and long term recommendations presented in this paper have been created after studying the ground realities and are backed by an India specific survey.

Short Term	Long Term
<ul style="list-style-type: none"> •Build consumer awareness and define their roles and responsibilities around E-waste disposal through a regulatory framework •Bring bulk consumers under the legal framework through filing of records for E-waste •Recognise End-of-Life (EOL) range for all Electrical and Electronic Equipment after due industry consultation •Treat home appliances/white goods differently from that of information technology and telecommunication equipment •Adopt an 'Informal Sector Franchisee Model' aimed to move the unorganised sector to an organised one 	<ul style="list-style-type: none"> •Option to shift from Extended Producer Responsibility to Producer Responsibility Organisation (EPR to PRO) •Introduce Advanced Recycling Fee – ARF

These models will require government’s support and collaboration with the industry, the formal as well as the informal recycling sectors, consumers, and all the other stakeholders to jointly work and achieve efficient management of E-waste in India.

Regulatory Framework

E-waste (Management and Handling) Rules 2011 and Implementation Guidelines

The E-waste (Management and Handling) Rules 2011 from MoEF and Guidelines issued by CPCB were effective from May 1, 2012, have been notified with a primary objective to channelize the E-waste generated in the country for environmentally sound recycling.

The rules are applicable to every producer, consumer or bulk consumer involved in the manufacture, sale and purchase, and processing of electrical and electronic equipment or components, collection center, dismantler and recycler of E-waste. **Schedule-I of the E-waste Rules lists two categories of electrical and electronic equipment covered under the rules:**

Information technology and telecommunication equipment	Mainframes; minicomputers; personal, laptop notebook and notepad computers; printers and cartridges; copying equipment; electronic typewriters; facsimile; telex; telephones – pay, cordless and cellular; and answering systems
Consumer electrical and electronic	Television sets including liquid crystal display (LCD) and light emitting diode (LED); refrigerator; washing machines; air-conditioners (excluding centralized air-conditioning plants)

It is interesting to note here that the Government itself realizes that there is difference in the above set of products due to which they have been categorized differently. It is important for all stakeholders including the Government to realize the difference in these products from the perspective of practicality, usage, life span, ownerships and physical attributes such as size, weight and logistical issues which make them different, and therefore, need to be viewed differently.

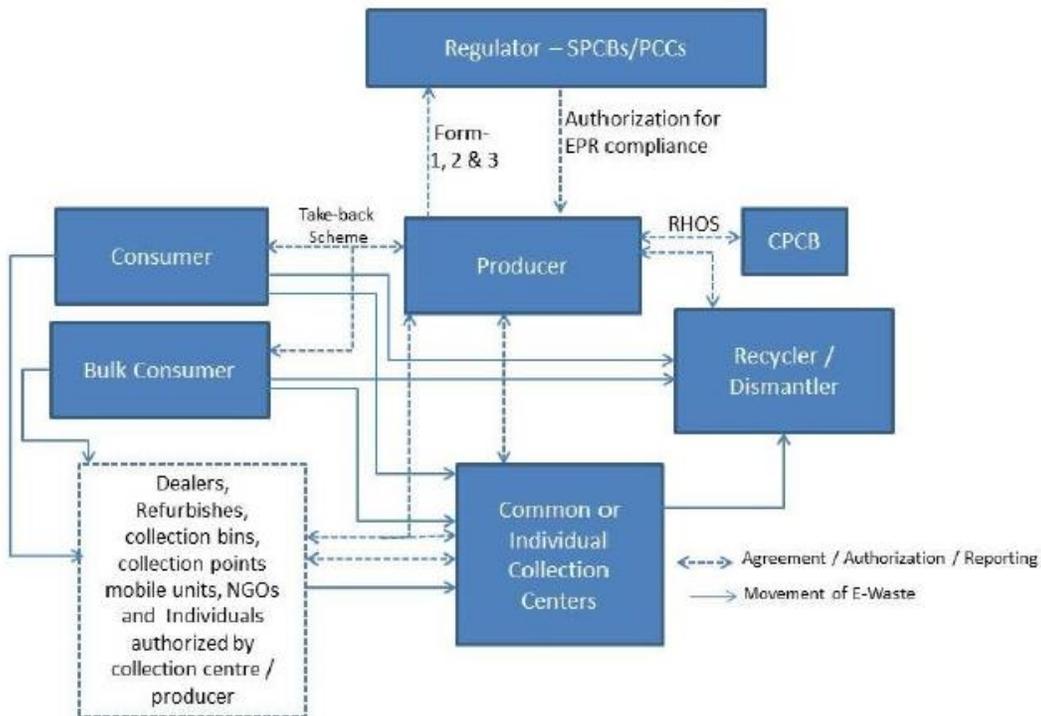
The guidelines of E-waste Rules place the main responsibility of E-waste management on the producers of Electrical and Electronic Equipment by introducing the concept of **‘Extended Producer Responsibility’ (EPR)**. The producer has a responsibility of managing such equipment after its end of life, once it is discarded by consumers. Under EPR, the producer is also responsible to finance and organize a system to meet the costs involved in complying with EPR.

$$\text{EPR cost of producer} = \text{Awareness Cost} + \text{Collection Cost} + \text{Logistics Cost} + \text{Recycling Cost}$$

Scope of EPR for the Producer

- Design a collection or product take back system to channelize e-waste for environmentally sound management
- Arrange for collection from both individual and bulk consumer and channelize the waste to collection centers or recyclers/dismantlers
- Implementation of EPR individually by setting up his own authorized collection centers; or collectively through common collection centers independently or by joining a consortium as a member
- Printing of e-waste logo on products or printed in the accompanying product documentation
- Creating awareness for the consumer about the product, information on compliance on safe handling and disposal of the end-of-life product
- Publicize contact details of the authorized collection centers and collection points or their collection mechanism to the consumers
- Manage a system directly or with help of any professional agency on their behalf for collection and channelization system of e-waste by involving relevant stakeholders such as consumer, bulk consumer, NGOs, informal sector, resident associations, retailers, dealers etc

Implementation of EPR by Producers



Source: Implementation of E-waste Rules 2011, CPCB

Responsibilities on Collection Centers, Consumers or Bulk Consumers, Dismantlers and Recyclers

Collection Centers	Consumers or bulk consumers	Dismantlers	Recyclers
<ul style="list-style-type: none"> • Obtain authorization with SPCB/PCC • E-waste collection and sorting in a secure manner and sent to the dismantlers/recyclers • Filing annual returns in Form-3 with SPCB/PCC • Maintain records of e-waste handled in Form-2 and make it available for scrutiny by SPCB/PCC 	<ul style="list-style-type: none"> • Channelize e-waste generated to authorized collection centers or registered dismantlers/recyclers or is returned to the pick-up or take back services provided by the producer • Bulk consumers to maintain records of e-waste generated 	<ul style="list-style-type: none"> • Obtain authorization and registration from SPCB/PCC • Ensure no damage is caused to the environment during storage, transportation and dismantling processes • E-waste segregation and sent to recycling facilities for recovery of materials • Filing return in Form-3 with SPCB/PCC 	<ul style="list-style-type: none"> • Obtain authorization and registration from SPCB/PCC • Make available all records to CPCB/SPCB/PCC for inspection • Ensure residue generated is disposed off in a hazardous waste treatment storage disposal facility • File annual returns in Form-3 with SPCB/PCC

Applicability

Sr. No.	Applicant	Maintain Records	Maintain Records Form -2	Filing Annual Returns Form-3	Authorisation Form – 1	Registration Form-IV	RoHS Compliance
1	All Producers – Offer to sell – Importer – Manufacturer of EEE	✓	✓	✓	✓	✗	✓
2	Dismantler	✓	✓	✓	✓	✓	✗
3	Recycler	✓	✓	✓	✓	✓	✗
4	Collection Center	✓	✓	✓	✓	✗	✗
5	Consumer (Bulk)	✓	✓	✗	✗	✗	✗
6	Consumer (individual)	✗	✗	✗	✗	✗	✗

It is important for MoEF and CPCB to revisit the rules and guidelines, as the current form poses many practical and implementation challenges to all the stakeholders concerned. Mentioned below are some of the ground challenges with recommended changes:

- It is important to note that there is no binding responsibility placed on individual consumers, due to which the heavy leakage into the informal sector becomes a reality
- It is also important to note that while Bulk Consumers may just need to maintain records, there is nothing beyond that which legally binds them
- The current rules also do not place any liability on dealers, distributors and retailers (including modern outlets) which are a critical part of the reverse supply chain and play a major role in the movement of E-waste in the country. The dealers and retailers were part of the 2010 draft rules but were omitted in the final E-waste Rules 2011
- While the government makes rules based on End of Life of electrical and electronic appliances, it has not given the definition of end of life
- The government seems to be moving towards setting targets for take backs. However, there are many considerations to be made in this regards which are practical and achievable
- Need for a single point authorization for recycling and movement of E-waste between states

APCO Survey

As part of this whitepaper APCO Worldwide reached out to a variety of stakeholders who are part of the ecosystem:

- 1) Individual consumers across Tier 1 and 2 cities and towns in India across all four regions cutting across all strata of society
- 2) Bulk institutional consumers
- 3) Producers, manufacturers and importers of EEE
- 4) Dismantlers, Recyclers
- 5) Scrap dealers from the informal sector
- 6) NGOs, bilateral entities and consulting organizations working in this area

It is very evident from the survey that there is very little awareness amongst the general public concerning how they should dispose of their appliances at the end of its life (EOL). Most households as part of the survey across India revealed that consumer electronics including white goods had a potential to be sold to interested parties such second hand buyers (including through online portals like OLX and Quikr), scrap dealers, E-waste contractors, assemblers, individuals etc. This is also one of the factors why most households tend to store their E-waste as they preferred to wait for someone to buy them.

A vast majority of the respondents were completely unaware of the existence of E-waste regulations or licensed recyclers. Most of the households preferred to sell their E-waste to scrap collectors as they offered better prices for the equipment versus the formal E-waste collection by producers.

As per the survey majority of the household respondents were of the opinion that they expected a decent residual value for their used household appliances like air conditioners, refrigerators, washing machines and televisions.

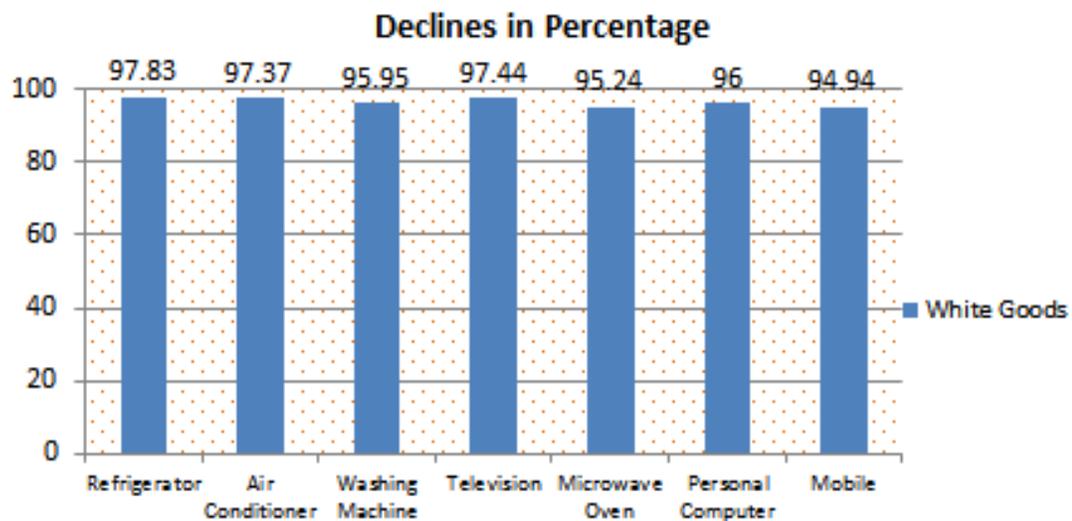
- ❖ **Household Consumers seem to expect a decent return on the purchase value of around**
 - ✓ 40 to 50% if a product is less than 2 years old
 - ✓ 25 to 30% if the product is less than 3 years old
 - ✓ At least 15 to 20% irrespective of the age, including some beyond 10 years
 - ✓ A minimum expectation of 15% is an expectation across products even for the broken, condemned pieces
 - ✓ Some even still maintain certain electrical and electronic products either out of sentimental value or waiting for a good price with few even attributing it to antique value
- ❖ **It is also interesting to note that not many bulk consumers like companies and large firms including those in the Government seem to be aware of E-waste regulations and the need to maintain any records of e-waste generated by them. It was found that while some bulk consumers were disposing their E-waste through formal channels, there were many others disposing it through informal channels (as scrap for value), and they also preferred to donate it to employees, schools and NGO's.**
- ❖ **Another group of e-waste generators, the micro, small and medium enterprises (MSMEs) seemed to**

display similar behavior as displayed by the household consumers with regards to return expectations.

- ❖ On the question of whether they would expect a fixed price set by the Government for take back across products upon end of life, an overwhelming 90 percent preferred a bargain mechanism where they could negotiate.
- ❖ Several of the respondents asked questions such as ‘Why should I pay or allow a producer to pick it up if I have the potential to sell it locally and still get a better price or put it to further reuse by donating/selling to someone known, like a domestic help, driver etc.?’
- ❖ The producers however were unanimous in their responses citing issues such as longer End of Life, increased warranties, multiple usage of product after 1st customer, product logistics, informal sector practices etc. and lack of any regulation binding the behaviors of bulk and individual consumers as the reason for lower collections of E-waste at their end.

Following are results of the survey, which establish a pattern and trend which differ from product to product.

Are customers willing to give their appliances at no cost to brand product companies at EOL?



More than 95 percent of customers in each category have declined to give their appliances at EOL to brand product companies at no cost

Fig 1: From the above we can see a common trend that there is no differentiation across products and an overwhelming majority of consumers are unwilling to give their products back to the product brand for free at End of Life.

What customers do with the product at the end of its life

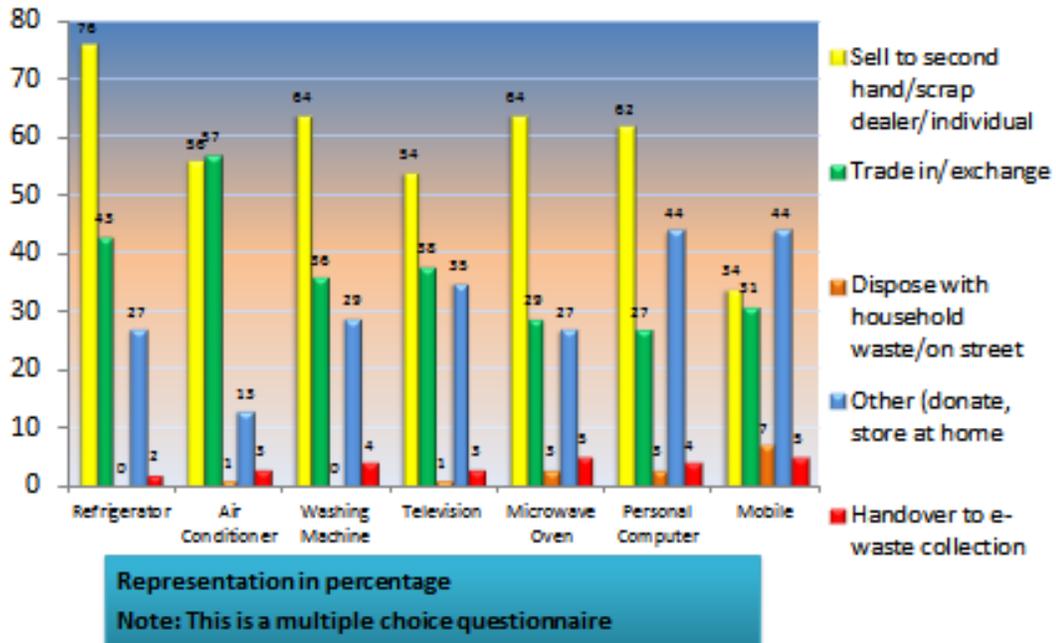


Fig 2: Consumers seem to prefer second hand, scrap dealer, resale or trade/exchange in case of refrigerators, air conditioners and washing machines. The next best option surprisingly is donate to either to an NGO or to domestic help or staff. Handing over to E-waste collection is a distant option with just 2-5 percent opting for it.

Are customers willing to give their appliances at a lesser cost at EOL to brand product companies if the e-waste will be taken care of in a scientific and environment friendly manner?

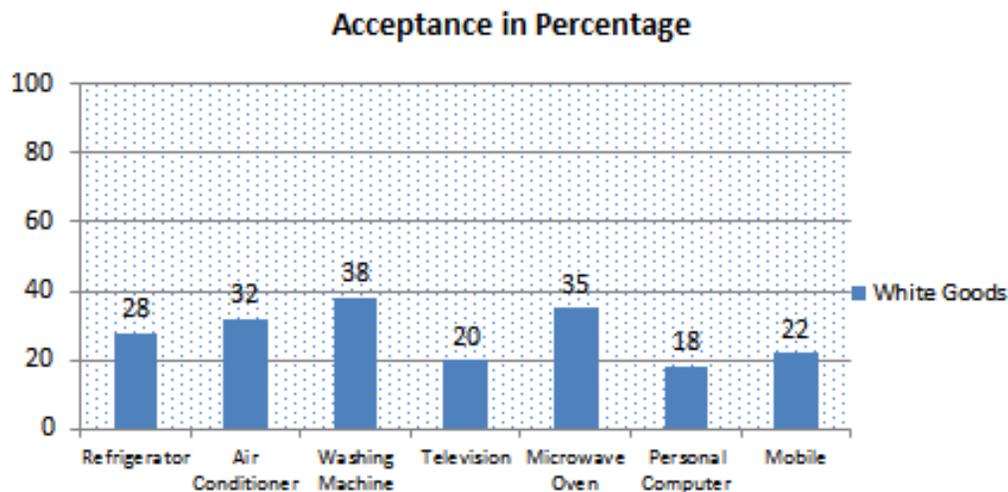


Fig 3: Consumer’s preference seem to become slightly better if they are paid a certain sum of money by producers but a majority still seem to prefer a second hand, scrap dealer, resale or trade.

Are customers willing to give their appliances to second hand / scrap dealers if they get more value even if e-waste is not managed in an environment friendly manner?

Declines in Percentage

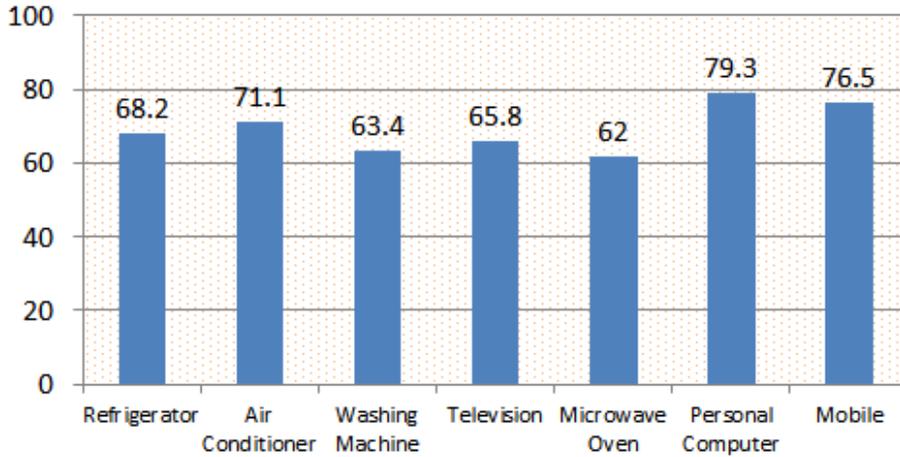


Fig 4: Since majority of the consumers seem unaware of E-waste implications they prefer to give it to someone for a few rupees more even if the management is environmentally unsafe.

Percentage of customers who intend to use the product beyond 12 years

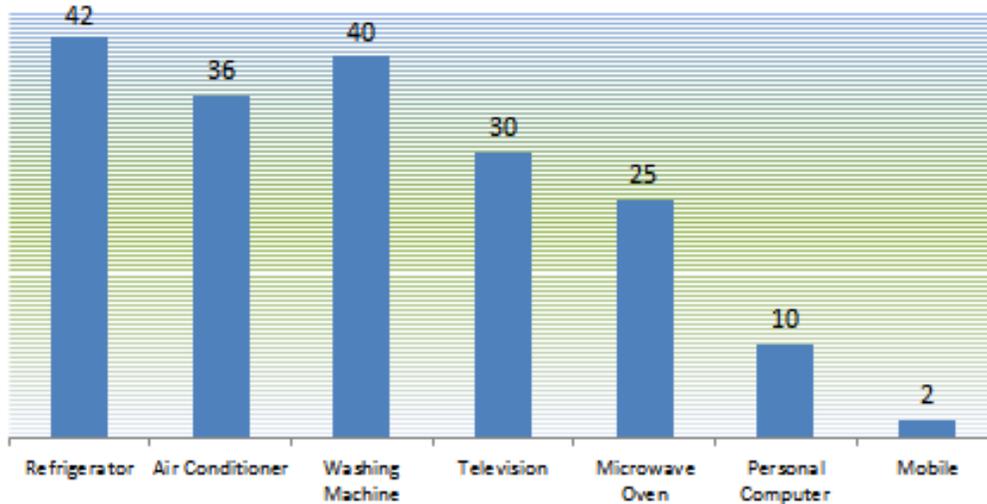
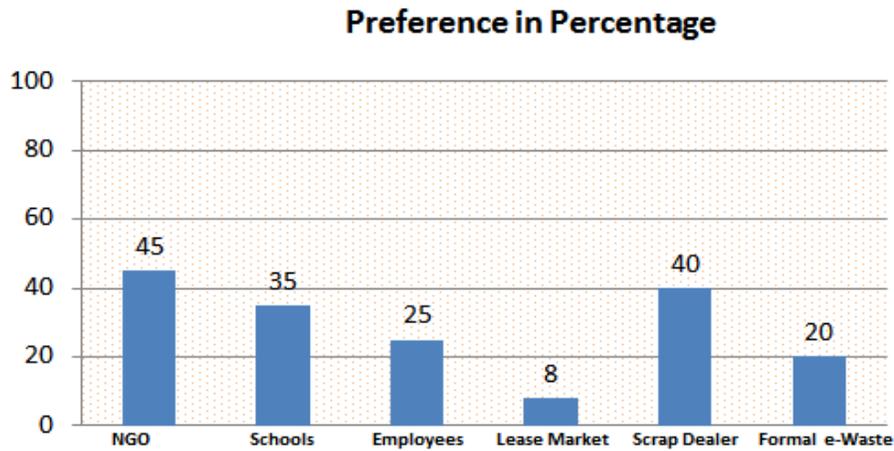


Fig 5: Consumer’s preferences in India seem to be very high to use a product till it breathes its last especially in case of refrigerators, air conditioners, washing machine and televisions. This however seems to be less in case of PC’s, laptops and mobiles primarily due to the fact that they have lesser service life also backed by consumer tastes and preference to upgrade to newer latest technology and gadgets.

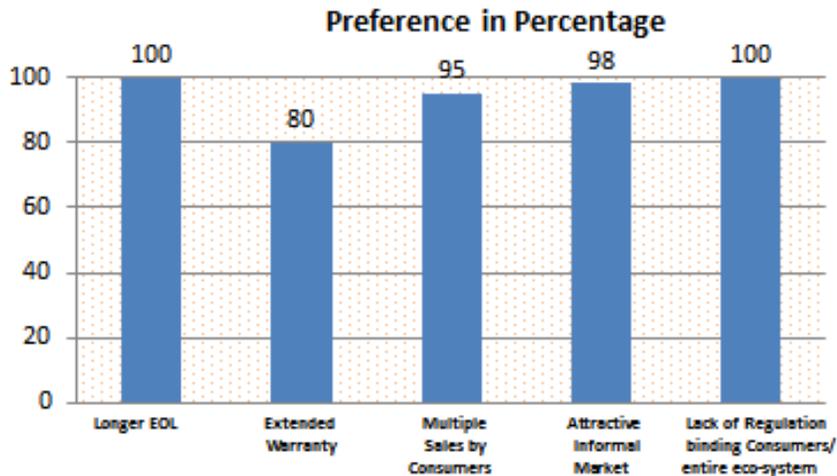
Whom do the bulk customers prefer to give their retired consumer electronics and appliances to?



Note: This is a multiple choice questionnaire

Fig 6: Bulk Consumer’s preferences in India seem to be very high to either donate or sell as scrap with very less inclination to route it through the formal E-waste system as they are not bound beyond record maintenance many of whom are unaware of the same as well

Why are Producers of Consumer Electronics & appliances unable to get products into their e-waste collection centers ?



Note: This is a multiple choice questionnaire

Fig 7: Producers have highlighted certain valid reasons due to which they appear to be failing in their resolve to collect E-waste, with certain basic concerns such as lack of definition of End of life which is quite high in terms of the consumer appliances besides facts such as genuine longer warranties, goods changing hands, attractive informal E-waste market and most importantly absence of a regulation to bind the eco-system beyond them.

Where do Formal dismantlers/recyclers largely get their inputs from?

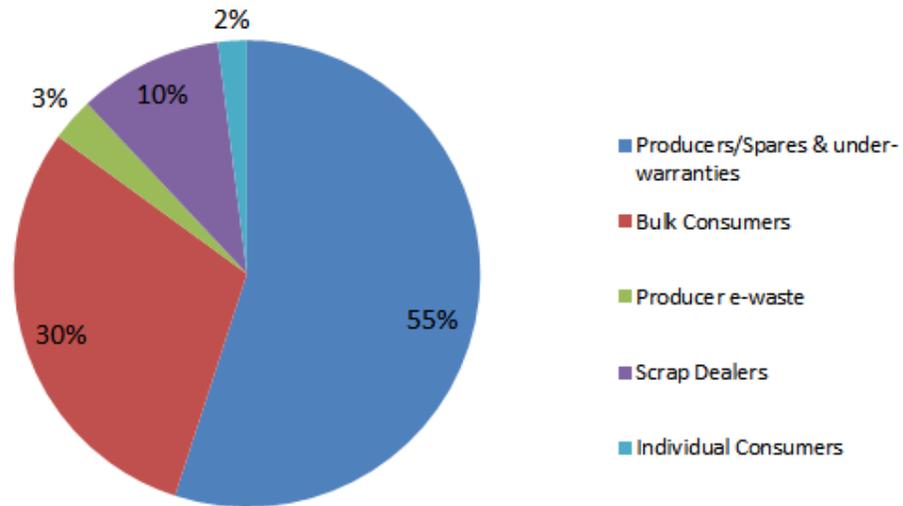


Fig 8: Formal sector Dismantlers/Recyclers seem to highlight the fact that bulk of what they receive from producers is largely parts and machines replaced under warranty or service obligation and not necessarily E-waste from an actual end of life product perspective. It also seems to be consistent with what was shared by individual and bulk consumers on their preferences with the informal sector largely dominating collections

What are the sources of input for Informal sector handling e-waste

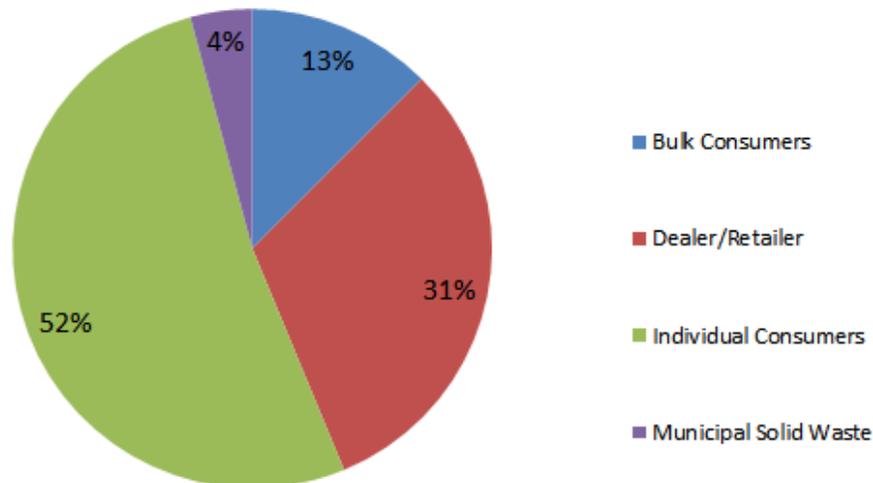


Fig 9: The Informal sector consisting of scrap dealers/kabadiwallahs, unregistered dismantlers and recyclers receive majority of their inputs from Individual consumers and dealers running product exchange programs. It is important to note that they also receive 13 percent of e-waste from even bulk consumers which includes government and private sector

The APCO E-waste survey revealed that most of the E-waste disposed of to scrap dealers was in turn sold to the recyclers in the informal sector. The informal sector cherry picks precious components for metal recovery and have up to 70 percent efficiency compared to a much higher efficiency of up to 95-98 percent by smelting and mining companies in countries like Switzerland, Japan and Korea. This is a serious cause for concern.

The survey also revealed that in Tier 1 and Tier 2 cities, most of the exchange offers given to customers were actually run by the dealers/supermarkets/multi-brand outlets and not by the product brand companies. The dealers seem to have their own local buyers in the informal sectors, who, based on the condition of the product, either sell it to second-hand traders or to scrap dealers. While the official “recall” or take back due to product defects is run by the brands and operated through dealers, the exchange is largely a local geographic arrangement.

It is interesting to note that consumer electronic and household appliances such as refrigerators, washing machines and televisions actually go through a completely different cycle from the time of their manufacturing to their EOL, as they have a heavy reuse potential and extension of life beyond expected timelines due to the ruggedness and cultural attributes of a variety of consumers in India. This pattern incidentally does not seem to be India specific alone as consumers in developing countries like China, Malaysia, Indonesia to even developed countries like Australia, Europe and US seem to display similar attributes of putting consumer appliance for further reuse.

It is interesting to note that as per a study undertaken by the *National Association of Home Builders/Bank of America Home Equity Study* of Life Expectancy of Home Components - The life expectancy of a typical appliance depends to a great extent on the use it receives.

As per the study of the major household appliances, refrigerators, washing machines and Air conditioners are expected to last at least 13 to 15 years if maintained well with microwaves following at 9 to 10 years approximately.

From the survey it was evident that modern gadgets such as mobile phones, tablets and, to some extent, laptops are often replaced long before they are worn out because of changes in styling, technology and consumer preferences to own newer products. This, however, is not the case for home appliances.

Global Scenario

Though there is no standard definition of WEEE/E-waste and many countries have their own definitions, the most widely accepted definition is as per a European Union directive which is followed by member EU countries and other countries of Europe and a few countries outside Europe as well.

WEEE Directive (EU, 2002a)

“Electrical or electronic equipment which is waste including all components, subassemblies and consumables, which are part of the product at the time of discarding.” Directive 75/442/EEC, Article 1(a) defines “waste” as “any substance or object which the holder disposes of or is required to dispose of pursuant to the provisions of national law in force.”

(a) ‘electrical and electronic equipment’ or ‘EEE’ means equipment which is dependent on electrical currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such current and fields falling under the categories set out in Annex IA to Directive 2002/96/EC (WEEE) and designed for use with a voltage rating not exceeding 1000 volts for alternating current and 1500 volts for direct current.

In 2012, 54 million of used electrical and electronic products were produced globally. A forecast based on data gathered by United Nations organizations, governments, and non-governmental and scientific organizations in a partnership known as the "Solving the E-waste Problem (StEP) Initiative' forecasts that by 2017, the world will produce 33 percent more E-waste, or 72 million tonnes.

China, as the leading producer of E-waste in the world produces about 12.2 million tons, followed by the U.S. with about 11 million tons. However, the U.S. surpasses China in E-waste generation as more products put on market in the U.S. are likely to be retired. In 2012, the U.S. produced about 10.4 million tons of E-waste against China's 8 million tons.

Scenario in India

India has exponentially grown since the beginning of this century and has emerged as one of the world's fastest growing economies. A large part of this growth is fuelled by performance in sectors like the information technology, software, telecommunications and BPOs.

As per a recent report by ASSOCHAM, India's E-waste is growing at a compounded annual growth rate of about 25 percent and is likely to generate E-waste to an extent of 15 Lakh metric tonnes (MT) per annum by 2015 from the current levels of 12.5 Lakh MT per annum. Mumbai tops the list in generating E-waste at 96,000, followed by Delhi-NCR (67,000), Bangalore (57,000), Chennai (47,000), Kolkata (35,000), Ahmedabad (26,000), Hyderabad (25,000) and Pune (19,000). E-waste typically includes discarded computer monitors, motherboards, cathode ray tubes (CRT), printed circuit board (PCB), mobile phones and chargers, compact discs, headphones, white goods such as liquid crystal displays (LCD)/plasma televisions, air conditioners and refrigerators. More than 90 percent of India's E-waste generated is managed by the unorganized sector and the scrap dealers dismantle the disposed of products instead of recycling it (scientifically). A meager 4 percent of India's total E-waste gets recycled due to poor infrastructure, legislation and framework which leads to diminishing of natural resources, irreparable damage to the environment, along with the health of people working in the industry.

Delhi emerged as the world's dumping capital for E-waste and that the city alone gets around 85 percent of the electronic waste generated in the developed world. As many as 8,500 mobile handset, 5,500 TV sets and 3,000 personal computers are dismantled in the city every day for reuse of their component parts and materials. The Delhi-NCR region alone has as many as 85,000 recyclers and employs over 1.5 lakh workers in the formal and informal sectors (like the kabadiwallahs). Over 35,000-45,000 child labour of age group between 10-14 are engaged in various E-waste activities, without adequate protection and safeguards in Delhi's various yards and recycling workshops.

Workers are poorly-protected in an environment where E-waste from PC monitors, PCBs, CDs, motherboards, cables, toner cartridges, light bulbs and tube-lights are burned in the open, releasing lead, mercury toxins into the air. Metals and non-degradable materials such as gold and platinum, aluminum, cadmium, mercury, lead and brominated flame-retardants are retrieved. The financial flow in the sector is highly organized and the huge network of collectors, traders and recyclers make financial gain through re-use, refurbishment and recycling. The low infrastructural set-up and operational costs enable them to make profit and dominate the market. It is reported that each player in the trade value chain makes at least a 10 per cent profit. The size of the informal sector continues to grow and is not only spreading in major cities such as Delhi, Mumbai, Bangalore, Chennai and Kolkata, but also to smaller peripheral towns. In India, the informal recycling sector employs mostly unskilled migrant labour.

Currently India has 97 Registered E-waste Dismantlers/Recyclers registered with the Central Pollution Control Board across 12 States.

Sr. No.	State	No. of Units	Sr. No.	State	No. of Units
1	Andhra Pradesh/ Telangana	2	7	Madhya Pradesh	1
2	Chhattisgarh	1	8	Rajasthan	6
3	Gujarat	5	9	Tamil Nadu	11
4	Haryana	7	10	Uttar Pradesh	15
5	Karnataka	27	11	Uttarakhand	3
6	Maharashtra	18	12	West Bengal	1
				TOTAL	97

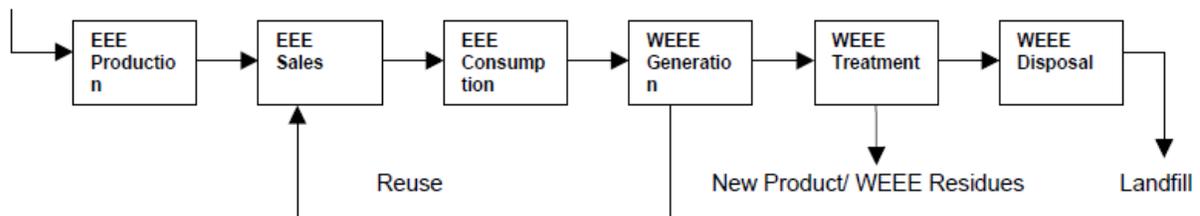
Therefore, there is also a need to get the formal sector strengthened by enabling it to engage with the informal sector. Strictly laid out rules supported by the Government will make it unviable and illegal for the informal sector (which uses unscrupulous methods to dismantle E-waste) to operate. This can be possible only if the consumer is legally bound and the supply chain of consumer, dealer, scrap dealer etc. are in some way registered and made responsible by means of authorization from the Government and integrated into the supply chain of collection process.

Given the practical challenges, geographic and social diversity, there may be a need to adopt different types of models which are customizable and suitable to different regions across India. This paper aims to achieve this objective and provides recommendations on such models.

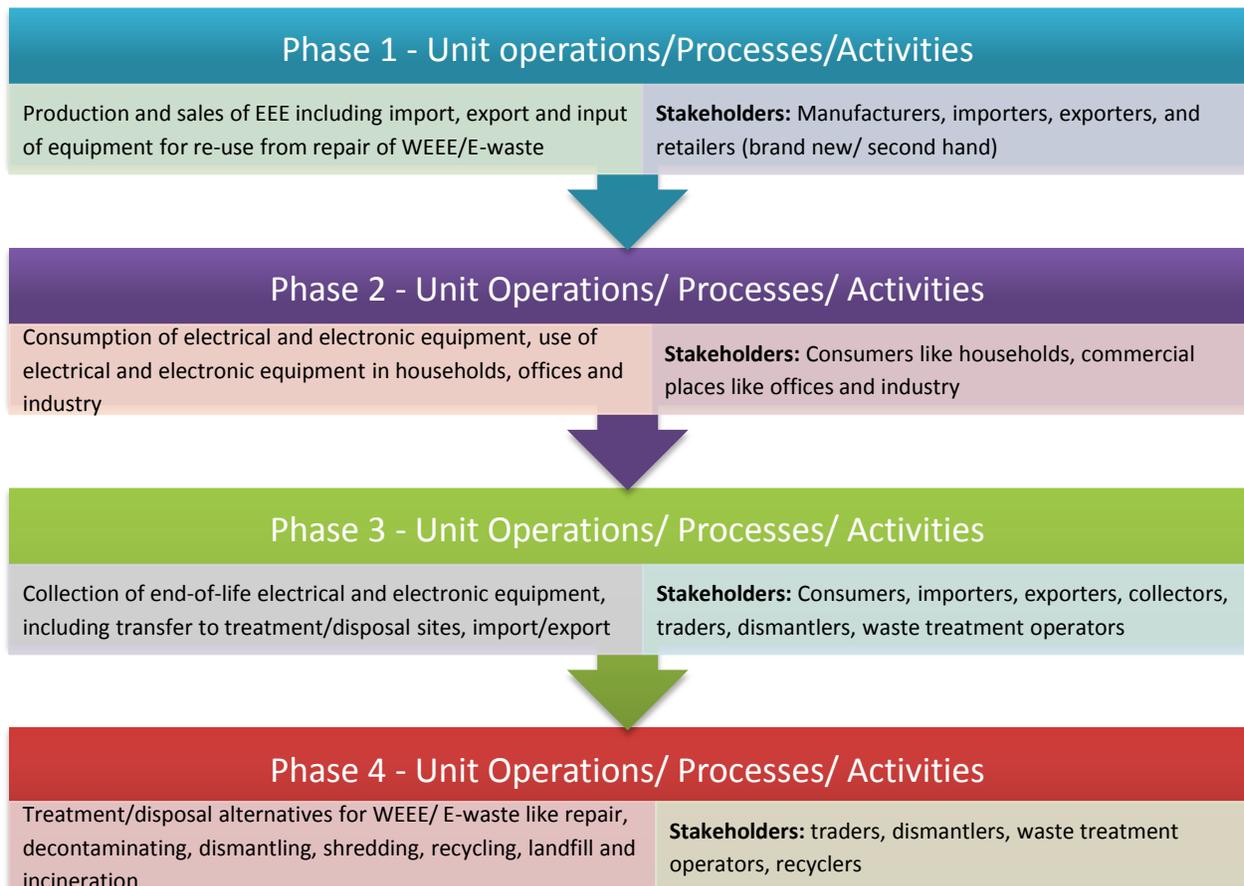
Management of E-waste in India

An efficient way to manage E-waste is to map out its supply chain beginning from production to consumption and to disposal. The following diagram shows the conceptual life cycle of electrical and electronic equipment. The material flow in the diagram assists in identifying networks or chains connecting different phase of life cycle of EEE and associated stakeholders. This WEEE/ E-waste material flow model developed by “European Topic Centre on Waste”.

Raw Material Input



The ‘Four Phase Model’ diagram below further shows the life cycle of electrical and electronic equipment identifying networks and chains connecting different phases of EEE life cycle and various stakeholders associated with it.

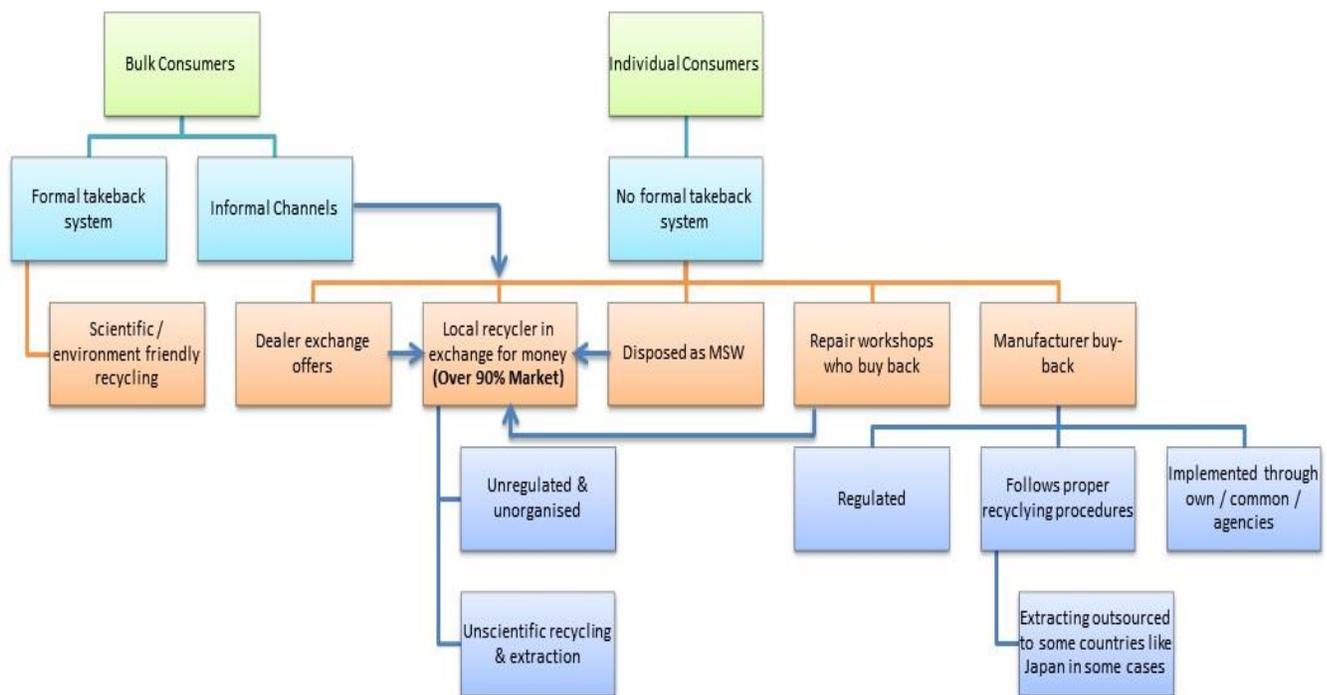


E-waste Supply Chain in India

As a consequence of the two illustrations above, the following diagram shows the E-waste supply chain in India and the two primary sources of E-waste – (1) bulk consumers, and (2) individual consumers. As per the current E-waste rules, both types of consumers are required to ensure channelization of E-waste generated by them to authorized collection centers, dismantlers or recyclers, or return to the take back services by brand companies.

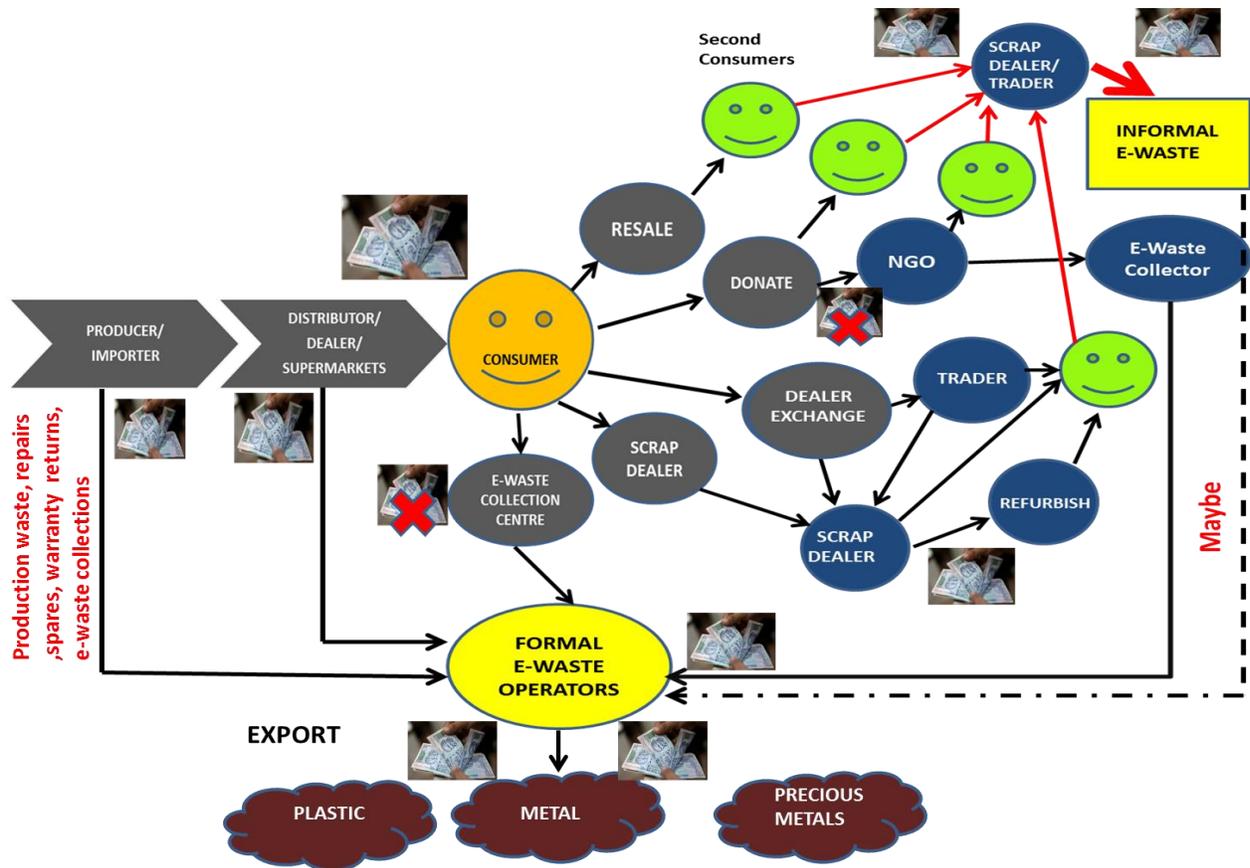
While the bulk consumers are required to main records of E-waste generated by them, some of it also finds its way into the unorganized sector, because of the financial incentives that it provides. It is also important to note that there is no legal binding on individual consumers.

The diagram also illustrates that majority (over 90 percent) of the E-waste finds its way to the local recyclers / kabadiwallahs and is not recycled in a scientific and an environment friendly manner.



Money Trail

After mapping the supply chain in the previous section, the following figure shows the money trail in the E-waste supply chain in India. The survey has thrown up some interesting findings, that if one follows the money trail, it is possible to trace the flow of goods from one hand to another for different usage purposes.



From the above, one can infer that money is changing hands at almost at every level of the supply chain. However, the exception occurs when there is formal E-waste collection by the producer or when a consumer makes a donation. This means that there is enough incentive already built into the system which unfortunately in a way kills the formal collection process, as the informal sector operates in the grey zone. Even the formal collection process has money and revenue models built in, although it is far less when compared to the flexibility or incentive offered by the informal model. This is because scientific and environment friendly recycling requires deployment of technology and process, which incurs huge capital expenditure.

Hence, for brands to even compete and contribute to managing and recycling E-waste in a scientific and environmental friendly manner, strengthening the formal process is the only solution forward. This will require some measures:

- a. Getting the informal sector to participate and progressively including them into the formal process with strict levels of compliances built in
- b. Bringing in necessary rules to bind the consumers, second-hand users and refurbishers into the formal process through accreditations and authorisations. This will also greatly contribute to eradicating the informal sector

Management of E-waste in other Countries

Countries across the world have brought in regulations for managing E-waste depending on the local market and consumer behavior. The regulations and the recycling market in many other countries across the world is yet to evolve. The table below shows the different types of regulations in both developed and developing nations of the world. Some important highlights are represented through a world diagram below:



Sr. No.	Country	Regulation
1	Europe	<p>Europe has a comprehensive and formal regional strategy on electronics recycling. However each of the 27 countries of EU have their own version. The WEEE Directive is the set of laws that governs the proper collection and disposal of Waste Electrical and Electronic Equipment (WEEE) in the 27 countries of the European Union. The overall aim for the EU is to recycle at least 85 percent of electrical and electronics waste equipment by 2019.</p>
2	Asia	<p>Except for those listed below, other countries in Asia do not have an E-waste policy.</p> <ul style="list-style-type: none"> • Taiwan, the recycling rate for IT equipment and appliances combined is 82 percent, with 500 collection points. • South Korea also has a developed electronics recycling system that now recovers and properly processes over 75 percent of discarded electronics. • Japan has a structured system based on their Law for the Recycling of Specified Kinds of Home Appliances and their Law for Promotion of Effective Utilization of Resources. Their system recovers around 75 percent of E-waste. Japan too has 500 collection points and also has an ARF (Advanced Recycling Fee) system in place. They are leaders in technologies to reclaim difficult to recover materials like rare earths. • China is the second largest producer of electronic waste in the world. China does have a national law called The Management Regulations for Recycling and Disposing of Consumer Electronics and Electronic Waste that bans E-waste and imports. The country is developing formal recycling capacity. • India, 95 percent of obsolete electronics are recycled in the informal sector. India is arguably the furthest away from having an electronics recycling system among large Asian countries.
3	North America	<p>Canada has electronics recycling systems and a national law called the Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations that regulates the export of E-waste to developing countries. It does have an industry standard for proper electronics recycling and processing, and a developed industry.</p> <p>The U.S. has a range of laws in half of the U.S. states. It does have some Environmental Protection Agency (EPA) regulations around disposing of CRT monitors, but doesn't have a national law or system for recycling electronics. It does have a very developed electronics recycling industry that largely adheres to two competing industrial standards, Responsible Recycling (R2) and E-Stewards.</p>

4	Africa	<p>The E-waste Association of South Africa (eWASA) is building a network of E-waste recyclers and refurbishers in the country. There are no legal structures for electronics recycling in Africa yet. Their studies find that about 85 percent of surplus electronics imports are reused, not discarded. Africa’s technology lifecycle for displays is two to three times the productive use cycle in richer nations.</p>
5	Latin America	<p>Five countries in Latin America now have E-waste laws or rules: Costa Rica, Colombia, Peru, Brazil, and Mexico. Brazil is particularly active with its Brazilian Association of Electric and Electronic Recycling Companies and its emerging comprehensive e-scrap policy with a target of 17 percent by 2018</p>
6	Australia	<p>Australia’s National Waste Policy sets the direction till 2020 for waste disposal by ensuring less waste production and better waste management through increasing resource recovery.</p> <p>Australia’s National Product Stewardship legislation provides guidelines that cover the disposal of electronic products during and at the end of life.</p> <p>The National Television and Computer Recycling Scheme (NCRS), a product stewardship scheme was set up in Australia in 2012. NCRS involves a combination of government regulation and industry action to take responsibility for the collection and recycling of waste televisions, computers, printers and computer products. Under the Scheme, householders and small business can drop-off these items for free at designated access points, which may include permanent collection sites, take-back events or through a mail-back option.</p>

Recommendations to the Government

Consumer electronics which are also referred to as home appliances or white goods like refrigerators, air conditioners and washing machines are significantly heavier and bulkier than information technology and telecommunication products like mobile phones, laptops and desktop computers. Due to their large size and weight, managing their E-waste supply chain logistics like collection and transportation is challenging and very different from that of IT and telecom products.

The government has itself made this differentiation by listing consumer electrical and electronics, and Information technology and telecommunication equipment separately as part of Schedule I of the E-waste Rules 2011.

It is also important to note that consumer electronic products/white goods have a longer End of Life (EOL) and change hands multiple times and last much longer in India – sometimes twice to thrice their actual end-of-life. As per fig 4 of the survey, while around 40 percent of consumers use home appliances for over 12 years, only 2 percent of them would use a mobile phone for over 12 years. Brand companies also have longer warranties on consumer electronic products with some appliances like televisions and refrigerators having warranties ranging from 5-10 years. Such long warranties are not given in case of IT and telecom products like mobile phones and personal computers.

E-waste in India is increasingly becoming a health and environment hazard as over 90 percent of it being unscientifically recycled by the informal sector, which is not part of the legal framework. The survey conducted as part of this white paper also indicates that consumers will need to be brought in to the legal framework and made aware of disposing E-waste in an environmental friendly manner. It will be essential for the government to place certain responsibility of E-waste management on all stakeholders which are part of the ecosystem.

Given the current scenario, it is extremely difficult to control to the management of the supply chain, as there is no trace of electrical and electronic equipment after the sale is made. Hence it is essential to have control over the supply chain.

Given herewith are short-term and long-term recommendations which will help contribute and facilitate efficient management of E-waste supply chain in India, in addition to treating white goods differently. Through the application of these recommendations, the government will be able to bring the informal sector (kabadiwallahs), the dealers/retailers and consumers as part of the ecosystem by placing control mechanisms at each point and regularizing the E-waste supply chain.

SHORT TERM RECOMMENDATIONS

1) Build consumer awareness and define their roles and responsibilities around E-waste disposal through a regulatory framework

Reasons	Implementation
<p>There is very little awareness on part of individual consumers and households as to how E-waste should be disposed of in an environment friendly manner. And, the subsequent result of this is the growth of the informal sector which does not handle and recycle e-waste in a scientific and environment friendly way.</p> <p>As per our survey in fig 1, more than 95 percent of consumers are unwilling to give their appliances at no cost at the end of its life. Most households as part of the survey across India revealed that consumer electronics including white goods had the potential to be sold to interested parties such second hand buyers (including through online portals like OLX and Quikr), scrap dealers, E-waste contractors, assemblers, individuals etc.</p> <p>E-waste management in India is still at an early stage and creating consumer and public awareness at this stage will be critical for the long term success of the government’s and industry’s goal of efficient e-waste management in the country.</p>	<p>It is the responsibility of both the government and the industry to create public and consumer awareness on e-waste and its safe disposal.</p> <p>The government has in the past created many successful ad-campaigns and awareness drives, such as the ‘Star Ratings for Power Efficiency in Home Appliances’. This has been very well received and most consumers are well aware on what low and high stars denote. Another awareness campaign, one of the most successful by the government is the ‘Jago Grahak Jago’ for creating awareness regarding protection of consumer rights.</p> <p><i>Similarly, we would recommend the government to conduct a campaign concerning ‘Duties of Consumer’ for safe disposal and management of e-waste, contributing to a cleaner and greener environment.</i></p> <p>Though there is little that the government can do to hold individual consumers accountable, it will still be important to bring them under the legal framework by prescribing some deterrence for non-compliance. In addition, adherence to some simple do’s and don’ts such as:</p> <p>Returning E-waste only through:</p> <ul style="list-style-type: none"> • Producer take-back system • Accredited / authorized dealer/retailer • Accredited formal recycler/recycling firm • Accredited scrap dealer/kabaadiwallahs etc <p>Stakeholders: Individual Consumers, Government, Brand Companies</p>

2) Bring bulk consumers under the legal framework through filing of records for E-waste

Reasons	Implementation
<p>As per the E-waste Rules, bulk consumers are required to maintain records of e-waste generated by them, but are not required to file returns. There is nothing that binds them currently. As a result, many of them consider disposing of to informal collectors in exchange for money, donating to employees or even to NGO's (who then distribute to schools). This has been indicated in the survey results.</p> <p>It is also interesting to note that not many bulk consumers like companies and large firms including those in the Government seem to be aware of E-waste regulations and the need to maintain any records of E-waste generated by them.</p> <p>The findings of the survey show that the informal sector receives 13 percent of e-waste from even the bulk consumers which includes government and private sector.</p>	<p>It is necessary for the government to make bulk consumers liable by bringing them under the legal framework, like making it mandatory for them to file annual returns with the authorities concerned such as SPCBs/PCCs.</p> <p>Stakeholders: Bulk Consumers, Government</p>

3) Recognise End-of-Life (EOL) range for all Electrical and Electronic Equipment after due industry consultation

Reasons	Implementation
<p>Setting an End-of-life range is necessary as each Electrical and Electronic Equipment has a different EOL. As per Fig 5. in the survey, as-many-as 40 percent of the consumers in India intend to use most home appliances for over 12 years. Some of the respondents have been using appliances beyond 20 years as well. This is in stark contrast to IT and electronic gadgets which usually get changed in about five years' time primarily due to wear and tear, obsolescence and changing consumer preferences.</p> <p>White goods have longer EOL and change many hands in India before reaching their actual EOL. In many cases, this is about two to three times their actual life.</p>	<p>The Government needs to recognize that home appliances/white goods have a longer end of life.</p> <p>We would recommend the Government to have consultations with the industry and all stakeholders to reach consensus on a range of EOL for all EEE – home appliances/white goods and IT / telecom products.</p> <p>The Government needs to be cautious while deliberating on any target driven approach as it is important to arrive scientifically on EOL of all EEE. If this is not done, there will be a situation where India will be forced to discard products before they actually reach its actual EOL.</p>

<p>Producers give warranty of up to 10 years for many consumer electronic goods such as refrigerators etc. whereas such long warranties are unheard of for technology and telecom products like mobiles and personal computers.</p> <p>Hence every category of consumer electronic and home appliance product has a different EOL.</p>	<p>This classification is essential as consumers in India tend to use products till it breathes its last, and their behavior is very different from that of consumers in other parts of the world. Also, so that consumers do not need to dispose of products before their actual EOL just because of the rules.</p> <p>Stakeholders: Government, Consumers and Brand Companies</p>
--	--

4) Treat home appliances/white goods differently from that of Information Technology and Telecommunication Equipment

Reasons	Implementation
<p>Home appliances/white goods are of a completely different nature as compared to IT or telecommunication products. Goods such as refrigerators, washing machines, air conditioners and televisions weigh from 20 to 120 kgs as compared to technology products like mobile phones which weigh a maximum of 200 grams and personal computers (laptops and desktops) which weigh from about 2 kgs to a maximum of 20 kgs.</p>	<ul style="list-style-type: none"> • We recommend the Government to include all dealers/retailers, unorganized recycling sector (kabadiwallahs/scrap dealers) under a registered accreditation model regulated by the SPCBs/PCCs • Dealers will need to be brought into the legal framework and will need to maintain records and file returns for E-waste • Producers and dealers may have contractual agreements to ensure that EOL products are given to accredited collectors/ kabadiwallahs/ recyclers only. This will further enable the informal sector to become part of the legal framework • Local recyclers/kabadiwallahs to be accredited by SPCBs/PCCs, only when they follow certain safety processes • Kabadiwallahs/local recyclers may be brought into the ecosystem through franchisee agreements with the dealers/retailers • Dealer/retailer to notify brands once they receive the products back from consumers • For this, the brands need to have a mechanism in place to receive such information and reporting on the same <p>Stakeholders: Dealers / Retailers, unorganised recycling sector, Government, Brand Companies</p>

5) Adopt 'Informal Sector Franchisee Model' aimed to move the unorganised sector to an organised one

Reasons	Recommendations
<p>The informal sector manages more than 90 percent of India’s E-waste.</p> <p>Most formal recyclers we spoke to found it impossible to compete with the informal sector. This is because the informal sector has low infrastructural set-up and operational costs, which enables them to make higher profits and dominate the market. They are not liable to many expenses like rents and legitimate wages, do not invest in modern technology, follow unscientific processes for recycling and extraction, and are not bound by any laws and regulations.</p> <p><i>While most of the above are practices NOT to be encouraged, one cannot take away the fact that the informal sector has maximum access to the end consumer and the generated E-waste and, therefore the need to leverage and engage through a formal process.</i></p> <p>It is also important to note that E-waste is differently handled at various levels – from collection and segregation to dismantling and recycling. Hence, the roles and responsibilities of stakeholders managing each of these functions are different.</p>	<p>We would recommend identifying major informal sector clusters and prepare a list of franchisees through recyclers & dealers/retailers. Instruct dealers to operate only through common franchisee/s.</p> <p><i>It is critical for defining the roles and responsibilities of various stakeholders:</i></p> <ul style="list-style-type: none"> • <i>Informal sector, primarily for collection and segregation through legally compliant practices, which may include no employment of children, safe handling methods and working conditions etc</i> • <i>Formal sector, primarily for dismantling and recycling</i> <p>Such a process would entail efforts to create awareness and build capacities among these groups of informal sector workers on environmentally sound processes; highlighting the advantages and educating them on environmental and health implications of their current practices.</p> <p>Trainings on skills up gradation, process efficiency and do’s and don’ts can be an important step towards formalization process.</p> <p>Further, the cost structure of the informal sector would change radically with the introduction of certain processes which were not a part of their value chain. This would require support of the government in terms of provision of financial aid, easing access to credit and provision of financial incentives such as subsidies and introduction of insurance schemes.</p> <p>The formal recyclers may also support this integration process by building capacities of informal sector associations and jointly develop the norms for trade of material between the two sectors.</p> <p><i>The informal sector needs to have mandatory registration with authorities concerned like the SPCBs/PCCs etc, based on their roles.</i></p> <p>Stakeholders: Unorganised/ Informal Sector, Government</p>

Refer ‘Annex’ for detailed explanation of the ‘Informal Sector Franchisee Model’

LONG TERM RECOMMENDATIONS

1) Option to Shift from Extended Producer Responsibility to Producer Responsibility Organisation - (EPR to PRO)

Reasons	Recommendations
<p>The EEE industry consists of not only manufacturers but also importers and assemblers. Apart from fulfilling their responsibilities of managing EOL products individually, there is need for an option where producers can come together to form a consortium and strive to establish an organization like a PRO.</p> <p>The PRO will ensure one organization or body responsible for collection, storage, transportation and recycling of E-waste in an environmental friendly manner, in addition to being responsible for compliance and regulatory filing with CPCB/SPCBs/PCCs on behalf of member companies.</p>	<p>PRO may be established with support from all producers, with the government also being an important stakeholder for efficient functioning. The PRO may operate as not for profit organization. However, this will require producers to come together and arrive at a consensus on participation and division of roles and responsibilities.</p> <p>A corpus could initially be created with contribution from member companies.</p> <p>PRO may take direct ownership and responsibility of collection and recycling of all WEEE generated across the country through its network of accredited collectors, dismantlers and recyclers.</p> <p>The government may include PRO and its responsibilities as part of the E-waste Rules.</p> <p>Stakeholders: Industry (Brand Companies, Importers, Assemblers), Government, Dealers, Recyclers, Collectors, Unorganised sector</p>

Refer Annex section for a detailed explanation of the 'Producer Responsibility Organisation Model'

2) Introduce Advanced Recycling Fee – ARF

Reasons	Recommendations
<p>Introduction of ARF will build a sound infrastructure, provide quality service for the public, and manage the backlog of old products, while placing the least financial burden on local communities.</p> <p>It assures a fair distribution of financial responsibility amongst product brands. It is a</p>	<p>The government may call for industry consultation and fix the ARF for each product.</p> <p>The ARF would be based on calculations based on various aspects such as recovery rate of each type of EEE, collection and transportation costs involved and recycling costs.</p>

<p>“whole solution” that avoids creating expensive, manufacturer-by-manufacturer systems, resulting in reduced administrative and enforcement problems.</p> <p>ARF can fund the entire system including local collection, utilizing existing business and organisations and offering diverse and convenient service.</p> <p>It will ensure that everyone selling in the market today shares the cost of recycling the end-of-life products generated today.</p>	<p>The government may look at creating an ARF corpus, which will be utilized for undertaking collection, storage, transportation and recycling of E-waste. The fund will be collected by the producers/manufacturers; and fund management and recycling services will be performed and coordinated by the PRO with a central role played by manufacturers with participation from the government and other stakeholders</p> <p>ARF component to be built in to the overall PRO model covering all home appliances/white goods and IT and telecom equipment.</p> <p>Stakeholders: Consumers, Brand Companies, PRO, Government</p>
---	---

ROAD MAP

As there is need for the current rules to consider the on ground issues issues and practical challenges dealing with implementation, it will be necessary for the government to further evolve the rules and guidelines on an immediate basis, considering the current and future scenarios for efficiently managing E-waste in India

Long term models have the potential for success only if the short term models are implemented and all immediate gaps are plugged

For implementing the long term models, it is highly recommended that there are pilots undertaken across models and their results are shared with Government and regulatory agencies. This will contribute to the thought process on which of the models or its combinations would be ideally suited for India. Hence, rather than adopting a particular model, it will be best to test out pilots and create a regulatory framework around the same. These could first be tested in a particular city, and depending on the success can be replicated in phases in other parts of the country

The various models have been explained in detail in the Annex

Annex

Informal Sector Franchisee Model

In accordance of the mandate of the National Environmental Policy (NEP) 2006, there is a need to identify the activities and contributions of the informal sector and provide them with a legal status. In this process, the roles and responsibilities of the informal and formal sector in the recycling chain should be clearly specified ensuring socially acceptable, economically feasible and environmentally responsible workable models. The E-waste recycling sector is fast evolving with the entry of various recyclers in the formal sector. However, most such units are unable to gain access to E-waste due to the competition from informal collectors, scrap dealers and recyclers. This is largely due to the fact that the informal sector has a highly sophisticated collection network which, in addition to reaching bulk generators, can also collect from households through a door-to-door collection network. Also, the cost structure of the formal recycling units does not allow them to pay comparable prices for the collection of material from the bulk generators.

The process of integrating the informal sector with the formal sector is challenging. There have been a number of reports on the identification of the clusters and evaluation of the processes used which reveal the need to formalize the activities. Most recyclers in the informal sector dismantle and sell the components to local recycling units. Some others venture in processing them for extraction of precious metals. Similarly, most of the formal sector E-waste recycling units in India are engaged in the dismantling of the used equipments and segregating the various waste streams. The plastics, steel, aluminum, glass etc. are recycled in India while the printed circuit boards are powered and exported to other countries like Japan, Europe, Singapore, Australia, and even China for precious metal recovery.

The path to formalization of the informal sector units would require a number of stages. The first would be to identify the major clusters of activity within the informal sector. Once the clusters are identified, the next stage would be to federate the disparate members within the cluster and also identify the various processes within these groups. Such a process would also entail efforts to create awareness and build capacities among the groups of informal sector workers on environmentally sound processes highlighting their advantages, and at the same time informing the groups of the environmental and health implications of their current practices. The awareness programmes should also provide an insight into the economics of recycling using efficient technologies for processing E-waste. The hands-on training on skills upgradation, process efficiency and the do's and don'ts can be an important step towards the formalization process. The informal sector, till now, has been extremely aware of the financial benefits which accrue due to the recycling of E-waste.

However, in order to mainstream them, efforts are required to enhance their understanding of environmental and health issues associated with their activities. The integration of the activities of the informal and formal sectors would also require specific allocation of funds for environmental

surveillance by the formalized informal sector units. The integration would also require building trust, relationship and identifying and strengthening the linkages between the two sectors for its holistic management.

Further, the cost structure of the informal sector would change radically with the introduction of certain processes which were not a part of their value chain. This would require the support of the government in terms of provision of financial aid, easing access to credit and provision of financial incentives such as subsidies and introduction of insurance schemes. The formal recyclers could also support this integration process by building the capacity of informal sector associations as well as jointly developing the norms for trade of material between the two sectors.

Franchise Model

Models like the Clean E-India launched by Guide Foundation for Development (GFFD) funded by International Finance Corporation (IFC) with an Indian partner, aim to raise awareness about E-waste hazards, and offer consumers a safe and eco-friendly way of recycling E-waste. This initiative aims to collect and "responsibly" recycle electronic waste through an approach that integrates informal waste collectors (kabaadiwallahs) into an organized network.

Launched here along with three other cities namely Ahmedabad, Mumbai, and New Delhi, the initiative is supported by a growing number of leading electronics producers. As part of this association, GFFD aims to take the lead to create "a robust ecosystem" for responsible electronic waste collection and disposal by "generating awareness" amongst educational institutions and residential complexes. GFFD through this model aims to simultaneously partner with informal sector institutions, besides local scrap dealers and waste collectors for proper collection of E-waste from institutions as well as homes to ensure that it appropriate recycling facility.

As part of the project, GFFD has appointed six franchisees and is now setting up collection centers at pre-identified schools, resident welfare associations. There is also a pilot to monitor this program using an online tracking system to measure E-waste flows in the formal sector. Training of appointed franchisees and waste collectors responsible for door-to-door collection of E-waste in an environment-friendly manner would also form part of the agenda.

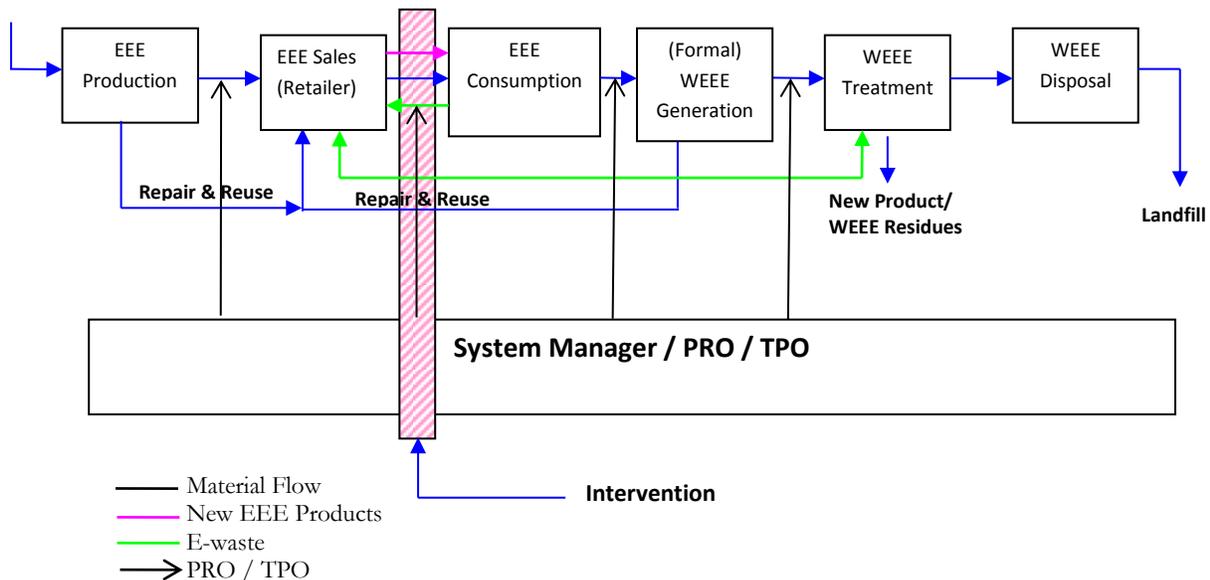
However, for models of this type to succeed, there needs to be backing of a regulatory mechanism to authorize and differentiate who in the informal sector should be legally allowed to pick up E-waste and who should not. This may require their registration with local pollution control boards to start with.

This may require the entire eco-system from the dealers, traders, scrap dealers etc. to be part of a formal graded authorization program with a regulatory backing to ensure that it results in gradual

creation of a formal sector based on guidelines from an informal one that adheres to certain fundamentals. This approach in a way also seamlessly integrates into whatever model mentioned in 1, 2 or 3 above and becomes a fundamental requirement to be put in place in the short-term.

Salient features of the Informal Sector Franchisee Model

The figure below provides a simplified version of the Informal Sector Franchisee model through a flow diagram



Source: IRGSSA

The salient features of the Informal Sector Franchisee are given below.

- Point of major intervention is at the point of sales
- Assess the cost of take back, recycling & disposal
- Prepare list of franchisee through recyclers & dealers / retailers
- Create common franchisee / vendor list through dealers / retailers / recyclers using common standards OP/ criteria etc. in major cities / geographical region
- Instruct dealers to operate only through common franchisee
- Operate by balancing negative cost with positive cost of treatment of durables

Recommended Long-Term Market Models

As per the survey, the regulations and ground realities, it is clear that certain aspects of Indian conditions are currently different, with respect to how E-waste is procured from consumers, more so in the case of home appliances like air conditioners, refrigerators, washing machines and televisions. There is, therefore, a need to develop and evolve a system, which finds acceptability among all stakeholders and is viable and sustainable in long-term. E-waste collected has to be diverted to a robust formal system, else the current majority of informal operators will continue to dominate the existing system of unsafe and hazardous handling and defeat any intent towards an environmentally clean and safe India.

The informal sector, though not recognized, forms a very important part of the ecosystem as they provide for an efficient collection system, and at no costs to the government, producers or the formal recycling sector. However, in the effort to bring the informal sector into the mainstream, the basic principles of E-waste management that include safe handling, ensuring safe working conditions and the need to drive cleaner production and clean materials for the future must not be forgotten or compromised.

There is an urgent need for regulatory framework for E-waste management which is more practical and enabling. There are multiple models that are being experimented in the market and it is highly recommended that the results of various pilots which are undertaken across models be shared with the Government and regulatory agencies. **This will contribute to the thought process on which one or more models or combinations could work for India. Hence rather than a model that gets “written”, it is best to test out pilots and create a regulatory framework around the same.**

The Government could consider adopting either or a combination of the following recommended models (Producer Responsibility Organisation – PRO and Advanced Recycling Fee – ARF) to create favourable and sustainable management of E-waste in India.

Long Term Model 1- The Producer Responsibility Organisation (PRO) Model

The electrical and electronics industry consists of not only manufacturers but also the importers and assemblers. These are important groups and hence, it is necessary for them to come together as a consortium and establish an organization which takes the responsibility of the end-of-life disposal of products being manufactured, assembled or produced by them. This organisation may be established with support from all producers, and can be designated as '**Producer Responsibility Organisation (PRO)**', which will largely be responsible for environmentally sound management of E-waste.

Recommended Structure of PRO: It is suggested that the PRO may operate as a not-for-profit organization with the management of the PRO having representations from various stakeholders. A corpus could initially be created with contribution from member companies.

The PRO will create a network of accredited collectors, dismantlers and recyclers across the country, who will be empanelled to collect, transport and recycle the E-waste on behalf of the PRO. They will periodically notify the PRO on the amount of E-waste collected and recycled of each brand. The PRO will then notify the brand companies on the amount of E-waste generated of their brands across India. This information will be critical for filing purposes with the appropriate Government authorities.

The PRO may have suitable arrangements with the accredited collectors and recyclers, such as through a membership fee, registration fee or revenue sharing mode. Additionally, the PRO will have Dealers (retailers, including large format stores) as its members. There is a revenue model as evidenced already in the earlier **money trail tracer**. It is a globally accepted fact that E-waste has a material value and all recyclers, big or small, procure electronic waste at a price and then generate revenue by selling the recovered materials. The fee or revenue can be arrived upon through ascertaining the value as per product.

Such an arrangement will make it mandatory for the collectors and recyclers to be registered with the SPCBs/PCCs and will also enable the informal sector to become part of the formal supply chain.

This model may also be formed such that part of this revenue is passed on to the generators of the waste, i.e. consumers; and part value could be utilized for logistical support of collection and storage of waste. This mechanism also provides incentives to the consumers to be active participants and thus, contribute to the E-waste flowing in to the organized sector.

Functions of Collectors and Recyclers: The Collectors may have agreements with the Recyclers to transfer E-waste at a fixed cost or revenue sharing, basis the type of product. The Recyclers will

periodically notify the PRO on the amount of E-waste collected and recycled – type and number of products and from which brand company.

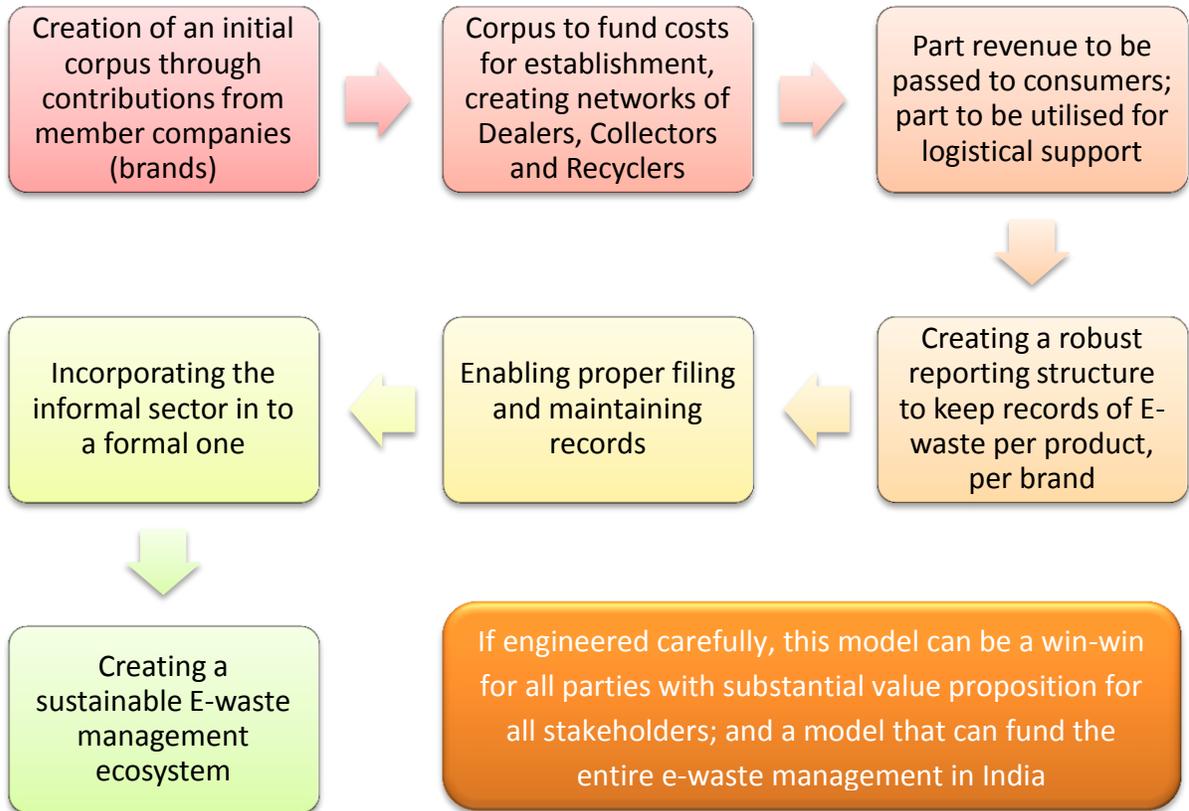
Functions of Dealer: All Dealers will need to be members of a PRO. To increase sales, Dealers generally offer cash backs or discounts to consumers on new products in exchange for their old products. The Dealers may then transfer E-waste at a fixed cost or revenue sharing, basis the type of product to accredited Recyclers. The Dealer will then need to report back to the PRO on the type or product, quantity, brand and recycler to whom it has been transferred.

The dismantling and recycling infrastructure may be set up by individual entrepreneurs, existing organized players; or the informal recyclers who get registered by SPCBs/PCC (by following environment friendly procedures as set by the relevant authorities) who will be responsible for establishing environmentally sound technologies to manage E-waste. The revenue generated through sales of the materials recovered will support the administrative, plant and machinery and other overheads. The experiences across many countries suggest that the scale of operation for recycling E-waste is growing and such ventures are considered viable and profitable.

The collection mechanism of the proposed model:

1. **PRO take-back:** The PRO will establish a network of Collectors and Recyclers across India, who will collect and recycle E-waste on behalf of the PRO. Customers or generators of E-waste will be paid for the material according the product type (fixed by PRO or the Collector). It will be essential for a proper reporting system to be established to ensure transparency
2. **Dealer take-back:** This is in case of dealer take-back / exchange offers wherein customers get some cash back or discount on new products in exchange for their old products The Dealer will then transfer the E-waste to an accredited recycler for a fee or revenue and will report back to the PRO on the type or product, quantity, brand and recycler to whom it has been transferred.
3. **By existing informal network:** One of the biggest challenges to this model is from the existing informal sector. The issue of livelihoods of existing informal sector players need to be a key component in the new model. The best option may be to channelize this sector in the collection and storage of waste from various sources, which is then passed onto authorized distribution channels.

If engineered carefully, this model can be a win-win for all parties with substantial value proposition for all stakeholders and can fund the entire e-waste management in India.



Roles and responsibilities of various stakeholders in the ecosystem

Sr. No.	Role	Responsibility
1	Generator of E-waste	<ul style="list-style-type: none"> To dispose of E-waste to the authorised dealer/ PRO Corporate users to maintain records E-waste and of donations made Individual companies and public bodies need to file returns to show their disposal practice
2	Producer Responsibility Organisation (PRO)	<ul style="list-style-type: none"> Responsible for the collection, storage and recycling of the E-waste through its network of empanelled Dealers, Collectors and Recyclers Incentivise customers from the revenue generated, as per the type of product Maintain annual records of E-waste generated, per product, quantity and brand Monitor its network of Dealers, Collectors and Recyclers for proper, accurate and timely reporting
3	Existing informal sector	<ul style="list-style-type: none"> Potential to be part of the storage and collection process Skill up-gradation to enable their participation in dismantling and recycling processes Be part of the formal ecosystem through registrations with the concerned pollution control boards, by following environmental friendly and scientific methods of managing E-waste
4	Recyclers	<ul style="list-style-type: none"> Become members of a PRO To employ authorized technologies for dismantling and recycling To maintain proper environmental and health standards To maintain and produce records to PROs
5	Regulators	<ul style="list-style-type: none"> To frame appropriate guidelines/legislation to support the model To monitor the processes regularly To provide incentives to entrepreneurs to set up facilities To regulate/control the number of facilities in a geographical area To approve technologies To form multi-stakeholder monitoring committee To create awareness among generators of waste

Long Term Model 2- Advanced Recycling Fee (ARF) Model

The following is an outline for a comprehensive financing system for the management of end-of-life electronics using an Advanced Recycling Fee (ARF).

Key Features of the Model

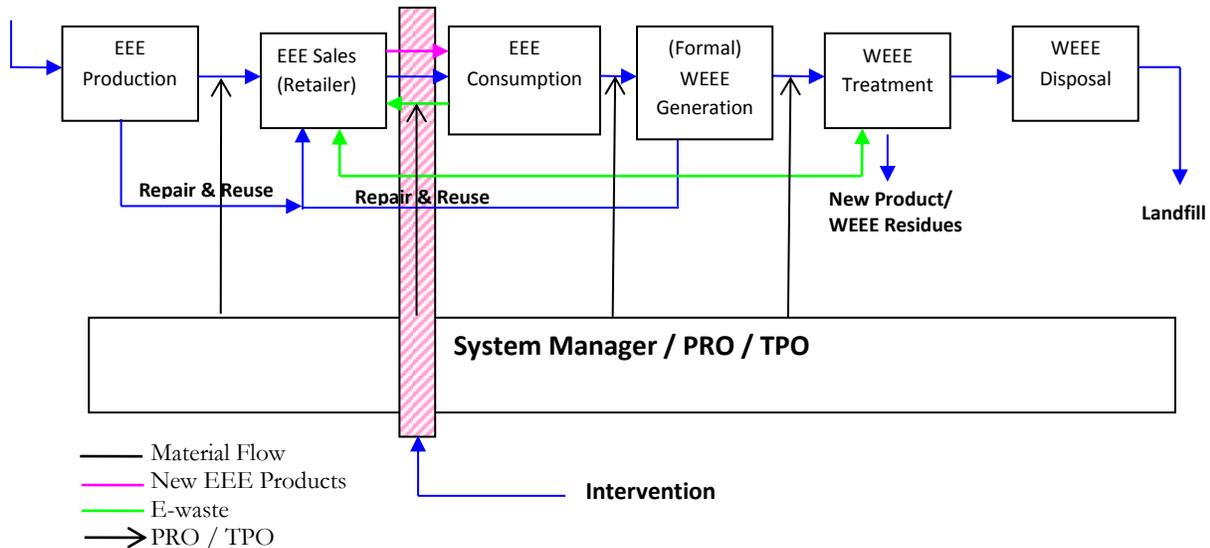
- Provides funds for the entire system including local collection, utilizing existing businesses and organizations, and offering diverse and convenient service
- Covers consumer electronics and appliances from both consumers and businesses
- Fund management and recycling services will be performed and coordinated by a not-for-profit organization (like the PRO), with a central role played by manufacturers with participation from the government and other stakeholders
- Recycling logistics and processing will be procured through competitive contracting, based on audited environmental standards, to assure the lowest cost while providing a high level of service
- Ensures that everyone selling in the market today shares the cost of recycling the end-of-life products generated today

Manufacturers' Responsibilities under the ARF

- Participate directly in managing the system
- Collect the fee on direct sales and notify retailers of the fee for in-store sales
- Provide information to customers on proper end-of-life management, through product literature or web sites
- With the inclusion of citizen suit provision, manufacturers (and retailers) can act to ensure that a level playing field is maintained
- Assist recyclers with information on product features that affect end-of-life management

Common Features of the PRO and ARF Model

The figure below provides a simplified version of the PRO and ARF model through a flow diagram



Source: IRGSSA

The diagram indicates:

- Point of major intervention is at the point of sales in both the models.
- All producers may group together to form either PRO / TPO / System manager.
- Assess the cost of take back, recycling & disposal.
- Levy uniform fee either visible or invisible.
- Instruct retailers to keep % of buy back price in case uniform fee is not acceptable.
- Create corpus for compliance mechanism.
- PRO / TPO / System manager to intervene / monitor / record across all the chain with specific nodes between production & sales, sales & consumption (bulk / individual) consumption & generation and finally between generation & treatment.

Abbreviations

EPR: Extended Producer Responsibility

IPR: Individual Producer Responsibility

PRO: Producer Responsibility Organisation

ARF: Advanced Recycling Fee

EOL: End of Life

MoEF: Ministry of Environment and Forests

CPCB: Central Pollution Control Board

SPCB: State Pollution Control Board

PCC: Pollution Control Committees

EEE: Electrical and Electronic Equipment

WEEE: Waste Electrical and Electronic Equipment

LCD: Liquid Crystal Display

CRT: Cathode Ray Tube

References

- E-waste Rules 2011, Ministry of Environment and Forests
- Implementation of E-waste Rules 2011, Central Pollution Control Board
- Time to Reboot, a report by Toxics Link
- Whither E-waste in India? – The Indo-German-Swiss Initiative
- Through the Policy Cycle Lens: India's E-waste Management Regulations – a research paper by Ashish Chaturvedi, Lakshmi Raghupathy, Rachna Arora and Sharon S. Ahmed.
- E-waste recycling in India – bridging the formal-informal divide – a research paper by Ashish Chaturvedi, Rachna Arora and Ulrike Killguss
- UNEP Report: E-waste Volume I: Inventory Assessment Manual
- UNEP Report: E-waste Volume II: E-waste Management Manual
- UNEP Report: E-waste Volume III: WEEE / E-waste "Take Back System"
- IMPACT SHEET - SWITCH-ASIA PROJECT- establishing E-waste channels (WEEE recycling) shifting to formal, healthier, safer, cleaner E-waste recycling practices in India
- <http://www.assochem.org/prels/shownews-archive.php?id=4476>
- <http://www.assochem.org/prels/shownews.php?id=4153>
- <http://www.livescience.com/41967-world-E-waste-to-grow-33-percent-2017.html>
- National Association of Home Builders/Bank of America Home Equity Study 2007
- Electronic waste management approaches: An overview by Peeranart Kiddee, Ravi Naidu, Ming H. Wong
- Into The Future Managing E-Waste For Protecting Lives And Livelihoods -Mr Satish Sinha & Ms Priti Mahesh, Toxics link
- Snapshot of Worldwide Electronics Recycling by Jim Lynch <http://ifixit.org/blog/4662/snapshot-of-worldwide-electronics-recycling-2013/>
- <http://www.environment.gov.au/>

Word of Thanks

I am very thankful to APCO Worldwide, IRG Systems South Asia and the CEAMA E-waste Committee for preparing this report. I am confident that this paper will pave the way ahead for addressing the challenges and recommending the means through which the E-Waste rules can be implemented in India, specifically in the domain of Consumer Electronics and Home Appliances.

I would also like to thank our member companies especially, Panasonic, Videocon, Whirlpool, Samsung, Godrej, Voltas, LG and Haier amongst others for their support all through the development of this paper, everyone who participated in the survey and the guidance received from various individuals, agencies and organizations with particular mention to Gesellschaft für Internationale Zusammenarbeit (GIZ).



Amit Chadha
Secretary General-CEAMA

About the Contributors:



Rameesh Kailasam, Senior Director, APCO Worldwide

Rameesh Kailasam, senior director for APCO Worldwide in New Delhi has more than 19 years' experience in regulatory, public policy, governance reforms, business and market creation strategies backed by deep economic and political insights. Previously, he served in senior positions, managing regulatory and policy issues, at technology firms like IBM, Applied Materials and Oracle. He has been involved in the promotion of semiconductor manufacturing policies, has contributed to the creation of India's National Solar Mission policy, was responsible for running e-Governance practices and contributed to drafting of State IT policies and e-Governance plans. Prior to joining the corporate sector, Mr Kailasam worked in the Government of Andhra Pradesh. He has been part of various government and industry committees and has also authored and contributed to creation of various books, policies and whitepapers in India and internationally.

Tushar Gandhi, Consultant, APCO Worldwide

Tushar Gandhi is currently a consultant in the public affairs and strategic communication practice at APCO Worldwide's New Delhi office. He assists clients in the areas of policy research, stakeholder mapping and engagement, issues tracking, corporate social responsibility and media relations. He currently heads the Environment Committee of a premier technology industry association for the world's leading technology companies. Mr Gandhi has worked across a wide range of sectors such as IT, defence, automobile, chemicals, utilities and telecom and financial services. He is an MBA (marketing), a post-graduate diploma in mass media and journalism, has earned a certification in public policy, and certification in Strategy Management from IIM Calcutta.



Amit Jain, Managing Director, IRG Systems South Asia Pvt. Ltd

Amit Jain is the Managing Director of IRG Systems South Asia Pvt. Ltd. With more than 18 years' experience in the areas of energy, environment and natural resources, he has worked on environment planning, climate change, capacity building, institutional strengthening and policy. He has worked in the areas of E-waste Management for more than 10 years both at national and international levels.

Radhika Kalia, Head-Corporate Affairs, Panasonic India

As the Head of Corporate Affairs & CSR Division at Panasonic, Radhika is responsible for driving Panasonic's brand equity in the Indian industry. With an industry experience of around twenty years, she has been at the helm of building Panasonic's image as a Thought Leader and Responsible Citizen in the Indian Consumer Durables industry. In addition to her current role at Panasonic, Radhika is also heading the E-waste Committee at CEAMA where she is mainly responsible for implementing conscious steps in the field of e-waste management. As a part of this, she is responsible for carrying out research, study, and implementation of e-waste management in India.



Legal Disclaimer: The information contained in this document represents the current view of APCO with respect to the subject matter herein contained as of the date of the publication. Quantitative market information is based primarily on interviews and therefore is subject to fluctuation. As APCO must respond to the changing market conditions, APCO cannot guarantee the accuracy of any information presented after the date of publication. The document is presented for informational purposes only. APCO provides this publication “as is” without warranty of any kind, either express or implied, including, but not limited to, the implied warranties of non-infringement, merchantability or fitness for a particular purpose.

About CEAMA

***Consumer Electronics and Appliances Manufacturers Association (CEAMA)** established in 1978, is the apex Industry Chamber for the Consumer Electronics and Home Appliances Industry. CEAMA acts as a catalyst in the promotion of Industry, trade, technology and entrepreneurship. CEAMA has about 100 member companies, from every segment of Consumer Electronics and Home Appliances Industry, providing information, representation and chance to grow in the most vibrant and exciting industry.*

CEAMA

**F-4 / 23, 4th Floor, Wave 1st Silver Tower
Plot No. D - 6, Sector – 18, Noida - 201 301 (UP)
Phone No. +91 120 4265697, E-mail - info@ceama.in**

About APCO Worldwide

***APCO Worldwide** is an independently owned communication, stakeholder engagement and business strategy firm founded in 1984 in Washington DC. We have industry and communication experience in numerous sectors particularly in the area of environment, energy, finance, telecommunications, technology, corporate social responsibility, transport, fast moving consumer goods and healthcare. APCO leverages international expertise to provide customized solutions to meet the needs of multinational clients and addresses clients’ issues from an integrated communication and public affairs perspective. Presently, APCO is located in 32 major business, political and media capitals throughout the Americas, Europe, the Middle East, Africa and Asia. APCO team includes former government officials, business executives, policy makers, journalists and NGO representatives.*

APCO WORLDWIDE

**1005-6, 10th Floor, Kailash Building
26, Kasturba Gandhi Marg
New Delhi – 400 001**

**C-815, C-Wing, 215 Atrium,
Andheri-Kurla Road, Andheri (East)
Mumbai 400 059**