

**Extended Producer Responsibility as an Instrument for Electronic Waste Management:  
A Critical Analysis of India's e-waste Rules**

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Extended producer responsibility (EPR) has been a widely used policy approach, in developed and developing countries alike, to manage the growing problem of electronic waste (e-waste). EPR assigns the responsibility of the end-of-life waste management to the producers of electric and electronic equipment. India has adopted EPR approach in its e-waste (Management and Handling) Rules, 2011, which have come into effect in May, 2012. According to these rules, the producers have been made responsible for setting up collection centres of e-waste and financing and organizing a system for environmentally sound management of e-waste. In this paper, we use implementation of these rules in the city of Ahmedabad in western India as a case study to conduct a critical analysis of the provisions of India's new rules. Interviews of main stakeholder groups, including a sample of commercial establishments regulated under the rules, regulatory agencies enforcing the rules, informal actors involved in waste collection and handling, as well as publicly available information on the implementation constitute data for our case study. We draw broader implications of our analysis of implementation in Ahmedabad. In general, there is a need for more transparency from the producers in providing information on the mechanism for collection and recycling; more awareness must be generated on e-waste and the Rules amongst the consumers; and it is important to sort out potential issues around enforcement jurisdiction.

## 1.0 Introduction

The use of electrical and electronic equipment (EEE) such as computers, televisions, and mobile phones has increased at a rapid pace in the last two decades in the world. The end-of-life disposal of EEE generates waste electrical and electronic equipment (WEEE) or electronic waste (hereafter referred to as e-waste), which is considered as one of the challenges for environmental management in the 21<sup>st</sup> century (UNEP, 2012). According to estimates, the total amount of e-waste generated in the world was estimated to be 53 million tonnes in 2012, up from 42 million tonnes in 2008 and growing at an annual rate of 6% (Sustainable E-waste Management, n.d.). Various factors have been ascribed to this increase, including rapid technology innovations, changing consumer preferences, falling consumer prices, introduction of new products and product categories, and quicker obsolescence of these products (Khetriwal, Kraeuchi, & Widmer, 2009).

Management of the ever increasing quantities of e-waste, which is in many ways different from conventional waste types, has become a major issue for governments throughout the world (Tong, Lifset, & Lindhqvist, 2005). Besides containing various ferrous (50%) and non-ferrous metals (13%), plastics (21%), glass, wood, ply-board, ceramics, rubber and other items, e-waste also contain elements like lead, mercury, arsenic, cadmium, selenium, and hexavalent chromium; often beyond their respective threshold quantities (MoEF, 2008).

India is one of the fastest growing markets in the World for EEE. Some projections predict a 5-fold increase in e-waste from old computers and 18-fold increases from mobile phones between 2007 and 2020 (UNEP, 2009). Recognising the need to tackle this explosion of e-waste, the Government of India introduced the E-waste (Management & Handling) Rules, 2011 (“Rules” from hereon) to regulate the e-waste management practices in India. Extended producer responsibility (EPR), one of the most commonly used policy frameworks for e-

waste management (Khetriwal et. al., 2009) is the underlying framework for the Rules, which came into force from 1 May 2012. In the EPR framework, governments assign certain responsibilities to the producers for the disposal or treatment of products at the end of their life (Fleckinger & Glachant, 2010), relieving the responsibility from urban local bodies, which are traditionally involved in solid waste management.

The new rules have been in force since only the last two years and there is little research on understanding the impact of the Rules on the e-waste management practices in the country – the exception being a recent study conducted by the non-profit organization, Toxics Link (Toxics Link, 2014). This paper is an exploratory study on the implementation of e-waste Rules in one of the fastest growing cities in India, Ahmedabad, in the western state of Gujarat. Given that India has no baseline data on even e-waste generation quantities, any quantitative assessment of the Rules on outcomes such as collection or recycling rates is impossible. We thus focus on exploring if and how the Rules have any impact on e-waste management practices. We answer this question by examining how three central stakeholders in the implementation process – producers of EEE, bulk consumers, and the regulatory agency in-charge of enforcing the Rules – are responding to the obligations assigned to them under the Rules. We rely on qualitative data, including interviews with a small sample of key stakeholders, publicly available information from producers’ websites, and existing academic literature on e-waste management in India.

In the next section, we provide an overview of the e-waste management practices in India along with the regulatory background that led to promulgation of e-waste Rules. We end the section with a brief introduction to EPR as a framework for e-waste management. In the subsequent sections, we briefly describe India’s e-waste Rules, the Methodology followed for the study, and the findings. We end with policy implications of our findings.

## **2.0 E-waste Management Practices in India and the Origin of e-waste Rules**

This section briefly reviews the extant literature on e-waste management practices in India, prior to the introduction of the Rules, in order to provide a context for the new e-waste Rules in India. The rest of the section discusses the regulatory background for e-waste management and introduces the concept of EPR, which is the underlying framework for the formulation of the Rules.

### *Role of Informal Sector in e-waste Management*

India has a huge informal sector involved in collection and recycling of different streams of waste. E-waste is no different and e-waste collection and recycling in India has traditionally been almost completely carried out by the informal sector with minimal presence of formal organized sector (Subramanian et. al., 2014; Time to Reboot, 2014; Rajya Sabha, 2011). Lack of regulation has been cited as one of the reasons for the proliferation of informal sector (Subramanian et. al., 2014), which handles approximately about 90% of India's e-waste (The informal recycling, 2014). This sector is largely unorganized and includes rag pickers, scrap dealers, and electronic repairing shops. The flow of e-waste generally involves collection by rag pickers from where it finds its way to the scrap dealers either directly or through repairing shops.

The informal sector employs semi-skilled and unskilled men and women, and often children, to break and dismantle e-waste in an unscientific and primitive manner such as manual disassembling and open burning (Bandyopadhyay, 2010; Bandyopadhyay, 2008; Manomaivibool, 2009; Pradhan & Kumar, 2014). Owing to presence of several toxic elements in e-waste, such practices release a large quantity of toxic fumes, hazardous acids, and organic pollutants as effluents in the environment (Bandyopadhyay, 2008; Pradhan & Kumar, 2014). These practices also expose the people involved to various health hazards (see

for example, Pradhan and Kumar, 2014 for a risk assessment, which finds high concentrations of heavy and toxic metals such as arsenic, cadmium, lead, selenium, zinc, and copper in soil around places in the Indian capital, New Delhi where e-waste is dismantled and recycled). These various environmental, health, and occupational hazards prompted MoEF to initiate the process of formulating a separate sets of measures for management of e-waste which resulted first in the guidelines for environmentally sound management of e-waste in 2008, and subsequently the e-waste Rules in 2011.

### *Regulatory Background*

Hazardous Waste Management Rules 1989 (later amended in 2000 and 2003) was the first of a series of rules to be introduced in India under the umbrella legislation, the Environmental Protection Act, 1986. These rules pertained mainly to industrial waste and there was no mention of e-waste in the 1989 and 2000 version. The 2003 version, however did contain a reference to “electrical and electronic assemblies or scraps.” Several other rules have been introduced since then, such as i) Biomedical Waste (Management & Handling) Rules, 1998; ii) The Recycled Plastics (Manufacture and Usage) Rules, 1999; iii) The Municipal Solid Waste (Handling and Management) Rules, 2000; iv) The Batteries (Handling and Management) Rules, 2001; and v) Plastic Waste (Management and Handling) Rules, 2011.

The introduction of a series of rules that deal with different categories of solid waste streams could be an indication of the increasing recognition of the need to differentiate, from the perspective of waste management, among different streams within the broad category of hazardous waste. In particular, e-waste is heterogeneous in terms of its composition. One category of elements contains valuable material such as plastics, ferrous and non-ferrous metals, glass, wood, ceramic, rubber, and ply-board that can be recycled and reused. The other category of elements contains toxic materials such as lead, arsenic, and mercury, which

can cause adverse health and environmental effects if not managed appropriately. This heterogeneity in the composition of e-waste has led to the suggestions that conventional waste management policies cannot be applied for management of e-waste (Khatriwal et. al., 2009). The formulation of separate e-waste Rules in India are consistent with this logic.

#### *Extended Producer Responsibility Approach to E-waste Management*

The disposal of EEE products after their useful life have external effects in terms of their impact on human health and the environment. Extending the responsibility of the management of this waste is a way to force the producers to internalize these product externalities (Sachs, 2009). In the traditional model, where the responsibility lies with the local municipalities, the management of waste is financed by taxpayer money. By making the producers responsible for waste management, EPR shifts the burden to the producers, and away from the local agencies.

EPR approach also has the potential to provide incentives to the producers to incorporate waste disposal costs at the design stage (OECD, 2005). Because it costs the producers to safely dispose products after their useful life, it makes economic sense to reduce these costs by incorporating the environmental issues at the design stage. For example, creating products with less toxic materials reduces the cost of processing the toxic products after their useful life. These two aspects – ensuring the internalization of product externalities and incentives for environmentally-friendly product design changes – are often cited as the two most important reasons for adopting EPR for e-waste management (OECD, 2005).

#### **The E-waste Rules**

The Rules apply to every producer, consumer, or bulk consumer involved in the manufacture, sale, purchase, and processing of EEE or components, including collection

centres, dismantlers, and recyclers of e-waste. However, micro and small enterprises, and batteries have been kept out of the ambit of the rules.

The Rules define extended producer responsibility as “the responsibility of any producer of electrical or electronic equipment, for their products beyond manufacturing, until the environmentally sound management of their end-of-life products (MoEF, 2008: 28).” The producers have been deemed responsible for collection of e-waste generated either during the manufacturing process or from the end-of-life use of the product by consumers. The producers are also made responsible for setting up collection centres of e-waste and financing and organizing a system for environmentally sound management of e-waste. The Rules, however, give producers the choice of either preparing such a system on their own, or by joining a collective scheme involving other producers.

The Rules also contain specific responsibilities for collection centres, dismantlers, and recyclers involved in e-waste management. All these entities are required to register with the state pollution control boards (SPCBs) of the states in which they operate and ensure proper handling and disposal of e-waste. In addition to registering with the SPCB, these entities are also required to maintain records of e-waste handled, and file returns with the SPCBs. The rules also contain a suggested time line beyond which e-waste cannot be stored by producers, collection centres, dismantlers, or recyclers. With regards to the consumers – household consumers as well as institutional consumers (called “bulk consumers” under the Rules) – the Rules require them to channel their waste to registered facilities. The bulk consumer should also maintain records of the e-waste generated by them in a specific format (Form 2). Finally, the urban local bodies (ULBs) are given the responsibility of safe disposal of orphaned e-waste, defined as unbranded e-waste.

One of the important provisions of the rules is that the use of lead, mercury, cadmium, hexavalent chromium, polybrominated phenyls, and polybrominated diphenyl ethers has been prohibited for new electrical and electronic equipment, such as computers, telephones, and televisions. These provisions on the manufacturing process will apply to every producer of electrical and electronic equipment. However some categories of products and product manufacturers, including fluorescent and sodium vapour lamps have been kept out of the ambit of these provisions. Firms which do not comply with above prohibition might see their imports of materials banned. A timeline of two years from the date of commencement of rules has also been setup for complying with the provisions of reduction in the use of hazardous substances in manufactured or imported electrical and electronic equipment.

Following the promulgation of the Rules, the central pollution control board (CPCB) developed implementation guidelines (CPCB, n.d.) for various actors regulated under the Rules, including producers, collection centres, dismantlers, recyclers, SPCBs, and ULBs. Figure 1, which shows the implementation scheme for the Rules, is adapted from these guidelines. One can interpret from Figure 1 that the Rules envision SPCBs and producers as the central actors in the implementation. In our study, we focus on these two central actors: the producers of EEE, who are made responsible for end-of-life management of their products and the state pollution control agency, which is the main agency responsible for the enforcement of the Rules. In addition, we also explore how the bulk consumers, who are estimated to generate close to three-quarters of the total e-waste generated in India (Manomaivibool, 2009), are responding to the new Rules. We analyse the response of these three actors to the implementation of the Rules and draw larger implications for e-waste management under the new Rules.

## **Methodology**



### *Study Site*

Ahmedabad is the fifth largest city in India in terms of population, and the largest city in the state of Gujarat in western India. It is also the commercial capital of Gujarat and one of the most important economic hubs not only in Gujarat but western India. Ahmedabad has historically been a key trade and industrial centre in India, especially for the textile industry. The city has moved beyond textiles to become an industrial hub and today boasts of several chemical, pharmaceuticals, dyes and paints, electronic appliances and equipment, and machine component industries. Besides industrial activity, Ahmedabad is also a major centre in India for hospitality, jewellery, financial, and service industries. Besides these factors, the key factor for choosing Ahmedabad for the case study is the fact that Ahmedabad ranks among the top 10 cities of India in terms of e-waste generation.

### *Data Collection*

Our data collection effort is a part of a larger project conducted by GIZ (a German organization) in collaboration with Nokia in Ahmedabad. As outlined earlier, we identified three of the most important stakeholders – producers, bulk consumers, and the SPCB – in the implementation of the Rules. For bulk consumers, we listed various types of consumers classified as “bulk consumers” in the Rules. This involved preparing a list of schools, banks, educational institutions (both colleges and schools included), private sector firms (industries and private offices included), and government and semi-government firms (public sector units and government establishments included).

Within each category we listed 10 biggest entities in order of size. We surveyed a certain number of entries (generally 5-15) within each category. In case of banks, for example, we started with large public sector banks and followed it up by covering some large private sector banks. We approached the main branch to get information about the other branches of

that particular bank in Ahmedabad city or district as applicable. The rationale behind choosing the largest entities in each category was the assumption that the largest entities would also be among the biggest consumers of EEE and therefore largest generators of e-waste in their respective categories. In case of educational institutions, we first prepared a list of more than 100 reputed schools in the city and then went on to survey private as well as government schools. The idea behind choosing the two types was to ascertain if there was an underlying difference between the types of schools. For establishments, we adopted a similar approach and covered both government and private establishments. For private establishments, we mostly limited ourselves to firms in the Vatva industrial area, the largest of the three main industrial hubs within Ahmedabad district, and with presence of a number of SMEs largely involved in the chemicals, dyes, and machine component manufacturing.

With regards to producers, we collected publicly available information on e-waste practices from the websites of 20 major producers of EEE in India. The selection of 20 is based on our understanding of the most popular brands, which together hold a substantial market share in EEE such as computers and mobile phones<sup>1</sup>. The specific information we collected include whether the websites mention the Rules, the mechanism for collection and/or recycling of their end-of-life products, and whether the recycling centres with which the producers have tied up is on the list of authorized recyclers. In addition, we also collected data on the location of the corporate offices of these 20 producers.

In the case of the regulatory agency, the Gujarat Pollution Control Board (GPCB), we have data from two interviews: one is an informal unstructured conversation with a lower-level official involved in the implementation of the Rules and the other with the person in-

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<sup>1</sup> It must be noted that in the case of certain equipment such as computers, there is a substantial grey market (Manomaivibool, 2009), which implies that the share of the organized sector (i.e., big brand producers such as Lenovo, HP, Dell) is likely to be low.

charge of the implementation of e-waste Rules in the Head Office of GPCB in the capital city of Gandhinagar.

To supplement this data, we conducted interviews with three scrap dealers in Ahmedabad. Given that informal collection and recycling was the major mechanism through which e-waste was managed prior to the Rules, we hoped that the interviews with these informal actors (i.e., the scrap dealers) could help substantiate our findings with regards to the practices of the three stakeholders of interest in response to the implementation of the Rules.

There are a total of five scrap markets (*kabadi market*) in Ahmedabad. These are designated areas, spread mostly on the eastern parts of the city where scrap and waste of all types are traded. The markets are listed below:

Table 1: Scrap markets in Ahmedabad

<b>Serial No.</b>	<b>Scrap market (Kabadi market)</b>	<b>Major scrap dealt</b>
1	Mirzapur	Small vehicles, auto components
2	Bholabhai Park	Tyres, Auto and auto components
3	Behrampura	Tyres, Large vehicles
4	Dani Limda	Small vehicles
5	Narol	Small vehicles

In Bholabhai park, there is one shop which deals with e-waste, mostly computer and accessories. Besides these 5 markets, there is another market in Memnagar which deals with non-auto waste. E-waste is dealt and traded in a separate area of the city, in Char Tola Kabristan under Gomtipur locality in the city. There are close to half a dozen shops which deal only in e-waste. We went to the informal market in Char Tola Kabristan for the survey

and approached all the shops. However we were able to get responses from only three of them.

### *Interview Methodology*

All the interviews with various stakeholders are conducted using semi-structured questionnaires. The authors of the study are assisted by a team of three trained interviewers. None of the interviews was recorded because of the general reluctance of the interviewees. The interviewers took notes during the interviews. After the interviews, the interviewers recreated, as much as possible, the conversation and entered it into a word processor.

### **Findings**

We analysed our data to generate evidence, if any, for our central question: if and how the stakeholders in the implementation of the Rules are responding to the provisions of the e-waste Rules in Ahmedabad? We organize the discussion in this section around the three key stakeholder of interest to us: producers, bulk consumers, and the regulatory agency, GPCB.

#### *Producers*

As outlined before, the producers are given the main responsibility to manage e-waste under the EPR framework. In terms of the operationalization of this responsibility, the Rules mandates certain actions for the producers. The main responsibilities under the Rules are:

- Collecting the end of life products either individually or collectively and ensure that the collected waste is channelized to registered dismantler or recycler
- Financing and organizing a transparent system to meet the costs involved in the environmentally sound management of e-waste
- Creating awareness on the hazards of e-waste and appropriate handling techniques

- Obtaining authorization from state pollution control agency; maintaining annual records of e-waste handled as well filing of annual returns in a specified format.

We assess the producers with respect to these broad responsibilities mandated under the Rules.

#### *Awareness of Rules and Information Provision*

Most producers (more than 80%) explicitly mention the Rules and their commitment to comply with the Rules. Although the details vary, almost all the producers that we studied provide information on the hazardous nature of e-waste and the consequences of mixing e-waste with municipal solid waste. This is a requirement under the awareness generation mandates of the Rules. Providing this information on websites is a relatively low-cost affair and we cannot infer anything from our data on the other mechanisms (publications, advertisements, and posters are the other modes of communication that the Rules suggest) through which producers engage with the consumers in terms of creating awareness on e-waste.

#### *Collection and Recycling Practices*

All the firms in our sample provide some level of information on how to deposit their products after the end of useful life. The detail varies from just a phone number on which consumers can call to the specific address of the collection centre that will accept the waste EEE of that producer. Twelve out of the 20 producers in the sample provide specific location details where consumers can drop off their e-waste. In some cases (e.g., Sony), the collection centres are their own service centres and in some cases these are third party recycling firms with which the producers have tied up for collection and recycling. Only one brand (LG) claims to provide monetary incentive for depositing the equipment after its use. The consumers can schedule a pick up from a third party registered with LG. The third party

collector will assess the value of the deposited equipment and pay the consumer at the time of pick up.

Only seven out of the 20 producers in our sample reveal the name of the authorized recycling firm with which they have a tie-up. The most popular recycling firms are Sims Recycling India Private Limited and Attero Recycling Private Limited. The third recycling firm is Trishyiraya Recycling India Pvt. Ltd. None of these centres are registered with the Gujarat State Pollution Control Board; however, these centres are registered in other states – Sims in Uttar Pradesh, Attero in Uttarakhand, and Trishyiraya in Karnataka.<sup>2</sup> Most of the remaining producers indicate that they process the collected waste through a tie-up with an “authorized” recycling centre without revealing the name of the authorized recycling firm. This lack of transparency is puzzling.

Although some producers had voluntary take-back system before the introduction of the Rules (Nokia is a well-known example (Down to Earth, 2013) and even Panasonic claim that they had a voluntary take-back even prior to the Rules), there is some evidence that the Rules may have influenced the collection and recycling practices of the producers, at least in our sample of producers. It is difficult to make any causal statements in an exploratory study of this nature; however, the fact that almost all producers in our sample explicitly acknowledge the Rules and their commitment to comply with the Rules while providing information on collection and/or recycling mechanism indicates a potential influence of the Rules on these practices of producers.

#### *Compliance with Authorization Requirements*

Rule 9 of the Rules requires that producers obtain an authorization from the state pollution control board “concerned as the case maybe (MoEF, 2011: 32).” The application for

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<sup>2</sup> [http://www.cpcb.nic.in/Ewaste\\_Registration\\_List.pdf](http://www.cpcb.nic.in/Ewaste_Registration_List.pdf) accessed on 26 October 2014

authorization, which is due within three months of the effective date of Rules (i.e., 1 May 2012) should contain information on the mechanism for collection and channelization of waste for dismantling/recycling. In addition, the producers must file annual returns on e-waste handling with the SPCB by June 30 of every year. The goal of this reporting requirement is perhaps to track if the generated e-waste is going through the formal collection and/or recycling channels.

Our interviews with the person in-charge of the implementation of the Rules reveal that no producer has so far applied for authorization under the Rules in Gujarat, even after two years since the Rules have come into effect. This is surprising given our finding that most producers are aware of the Rules and explicitly mention the Rules on their websites. The answer, however, lies in the detail regarding the SPCB that has the jurisdiction over the producers. According to the guidelines on the implementation of the Rules (CPCB, n.d.), the concerned SPCB from which the producers must obtain authorization is the SPCB of the state in which the producers' manufacturing facilities and corporate head offices are located. None of the producers in our sample has their corporate offices located in Gujarat. The implication is that although most producers sell their products throughout the country, the regulatory control entirely lies within the SPCB of the state in which the producers have their manufacturing operations and/or corporate head offices.

The location of corporate head offices of the 20 producers in our sample reveals that they all are located in five states. Assuming that the 20 producers in our sample hold a significant share of the EEE sold in India, it is clear that only five states PCBs – Karnataka, Haryana, Delhi, Uttar Pradesh, and Maharashtra – have the regulatory control on the producers. Recognizing this issue, the guidelines require the SPCB that grants authorization to the producers to inform the details of the authorization to CPCB, which will make this information available through their website to all the stakeholders, including the other SPCBs

of states in which the producers sell their products. As of now, the CPCB does not have any information on its website regarding authorizations to producers. The guidelines also suggest that the producers make their authorization information available on their websites. The websites of a few of the 20 producers in our sample provide information on the registered collection and/or recycling agency which collects their waste but no details are available on the authorization from the relevant SPCBs.

### ***Bulk Consumers***

According to the Rules, bulk consumers are “bulk users of electrical and electronic equipment such as central government or state government departments, public sector undertakings, banks, educational institutions, multinational organizations, international agencies and private companies that are registered under the Factories Act, 1948 and Companies Act, 1956 (CPCB, n.d.: 4).” As already explained, we interviewed a sample of three types of bulk consumers: banks, educational institutions, and medium and small industries in Ahmedabad. In our interviews, the focus is on understanding the response of the bulk consumers to the introduction of the Rules. The general findings of our interviews are described below.

#### ***Banks***

All nine banks in our sample are aware of the e-waste rules and their responsibility under the Rules. All of them maintain a record of e-waste generated and channelled through dismantlers and recyclers. This is one of the main obligations of bulk consumers under the Rules, apart from ensuring that the e-waste generated is channelled through authorized collectors, dismantlers, and/or recyclers.

In terms of e-waste management practices, most banks (five out of nine in our sample) dispose of e-waste by auctioning the e-waste to vendors registered with the banks or through



take-back agreements with the dealers of EEE, especially that of computers. In the take-back system, the banks enter into a contract with the dealer to take back the old equipment when they replace it with new equipment and offer discounts on the new products.

In the case of other banks, two banks are still following the practice of selling their e-waste to the scrap dealers in the informal market although these banks are aware of the Rules. Another bank indicated that they just store e-waste in their branches after their useful life and the disposal process is carried out by their main office in Mumbai.

What does this tell us about the influence of the e-waste Rules on e-waste practices of banks? Clearly some banks continue to sell their waste in the informal markets, even after being aware of the Rules. On the other hand, our interviews reveal that after the introduction of the Rules, the banks that take the auction route are insisting on the vendors that bid for their e-waste to obtain necessary government authorizations under the Rules to qualify for participation in the auction. This is the most significant change prompted by the Rules.

It is also interesting to note that the banks have a system of record keeping of e-waste generation even before the implementation of the Rules. This is apparently because of the requirements under the annual financial audit that banks must undergo. Under this auditing process, computer and other electronic equipment that banks purchase are considered as physical assets that banks must account for in their annual statements. In this process, the banks must maintain a record of the disposal of e-waste. Thus it is not possible to attribute the record keeping practice of banks to the implementation of e-waste Rules.

#### *Schools and Medium and Small Industrial Units*

In the case of the other two types of bulk consumers in our sample – educational institutions and industrial units – the awareness regarding the Rules is very low. Only one educational institution out of the seven and only two industrial units out of 12 that we

interviewed report any knowledge of e-waste Rules. Not surprisingly, very few of them claim to maintain (a quarter of the 12 industrial units and two out of seven schools) a record of e-waste generation required under the Rules.

Regarding their practice of disposing of waste, our interviews suggest that these entities have no established policy. The mode of disposal of e-waste ranges from “gifting” the equipment to the employees after the useful life, selling to scrap dealers, and exchanging the old products for the new products from their dealers to receive discounts on the new products.

#### *Other Bulk Consumers*

While we did not interview other groups of bulk consumers, our interviews with the GPCB officials, reveal an initiative by the Gujarat state government. State government offices are defined as bulk consumers under the e-waste Rules. According to the GPCB official we interviewed, the Gujarat state agency, Gujarat Informatics Limited (GIL), charged with procuring computers and other EEE for state agencies, is in the process of incorporating an e-waste policy as part of its procurement policy. While the full details of the policy are not available, our interpretation is that GIL will enter into a contract to manage e-waste generated across the state government offices either with the provider of their EEE at the time of purchase or with a registered collector/recycler. This could potentially be a useful model for other state agencies as well in which one state agency is made responsible for managing the e-waste generated across all the government agencies. According to the GPCB official, this policy is developed in response to the requirements under the e-waste Rules.

The final piece of evidence regarding the potential influence of e-waste Rules on the practices of bulk consumers comes from our interviews with the scrap dealers. None of the scrap dealers is aware of the e-waste Rules. However, two out of the three dealers noted that there has been a decline in the waste they receive through the informal channels over the past

two years, which coincides with the implementation of the Rules. They attribute this to (i) the increasing practice of auctioning the e-waste by industrial units and government establishments and (ii) the longer time intervals of product replacement by industries.

Although one is tempted to infer from these observations that the Rules may have some effect in reducing the waste going into informal markets, it is also possible that the waste stream got shifted to some other informal market rather than the formal markets. Our data from just three dealers from only one market cannot eliminate this alternative explanation for the decline in the waste quantities to informal markets.

## **GPCB**

The Rules make the SPCBs the main agencies responsible for monitoring and enforcement of the Rules. The activities under monitoring and enforcement include granting and renewing authorization to producers, recyclers, dismantlers, and collectors; monitoring compliance with the conditions of authorization; and action against violation of the conditions of authorization. In addition, the SPCBs must conduct an inventory of e-waste generation given that there is no baseline information on the e-waste generation.

According to our interviews with the GPCB officials, the agency has granted authorization to seven e-waste collection/dismantling centres in various parts of the state within the past 18 months, after the Rules have come into effect. One such authorized centre is located in Ahmedabad. The website of GPCB<sup>3</sup> lists these seven centres as “recyclers” although details on the types of activities for which these centres are authorized indicate that only one firm is authorized to recycle (recycling of toner cartridges).<sup>4</sup>

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<sup>3</sup> [http://www.gpcb.gov.in/pdf/E\\_WASTE\\_INFORMATION.pdf](http://www.gpcb.gov.in/pdf/E_WASTE_INFORMATION.pdf) accessed on 21 October 2014.

<sup>4</sup> The GPCB official insisted that no recycling is carried out in India by formal recyclers. According to this official, the e-waste is dismantled in India and recyclable material is exported to other countries for recovery of valuable material. Part of the reason, according to him, is that the amount of e-waste collected in the formal recycling sector is so low that it is not economically viable to set up recycling process in India. We could not

As part of its obligations under the Rules, the GPCB has also floated a tender to identify consultants, who will assist GPCB in conducting an inventory of e-waste in Gujarat. However, according to the GPCB officials, the tender will be cancelled because another state agency, the Gujarat Environmental Management Institute, has already been assigned the responsibility of e-waste inventorization by the Gujarat state government.

The third activity that the GPCB has initiated under the Rules is notifying various bulk consumers their responsibilities under the provision of the Rules. Although the copy of the letter sent to the bulk consumers was not shared with us, the officials indicated that the letter informs the bulk consumers on their responsibilities to channel their e-waste through authorized entities and provides the list of seven collectors/dismantlers that the GPCB authorized in the state.

In terms of enforcement for violation of provisions of the Rules, our interviews with the GPCB officials suggests a general reluctance to take enforcement actions. According to our assessment, there are at least two reasons for this reluctance. First, there is a general sense that two years is a relatively short time for the regulated entities to respond effectively to the Rules. For example, the officials cited the implementation of the Municipal Solid Waste Management Rules for which it took them more than 10 years to effectively enforce the requirements of the rules. The officials also repeatedly emphasized a need to “sensitize” both the producers and the consumers regarding the requirements of the Rules before enforcement actions are initiated on the offenders. Second, the sanctions for violation of Rules involves initiating a judicial process, which is a time-consuming process. Also, there is a general sense that in the larger scheme of things within the GPCB, implementation of e-waste Rules does

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independently verify this claim. According to another lower-level GPCB official we interviewed, the authorized collection centres in Gujarat have not been able to collect enough waste because, according to him, the waste is mostly still passing through the informal channels.

not appear to be a top priority. The official in-charge of e-waste Rules implementation is also responsible for the implementation of the Hazardous Waste Management Rules, which regulate a large number of industrial hazardous waste in the state.

The GPCB believes that the awareness of the Rules is generally low among the consumers, especially the household consumers. They view this as a big challenge in the effective implementation of the Rules. In particular, the question of how to induce the household consumers to channelize their waste through authorized channels, given that selling the waste to informal scrap dealers fetches them money.

### **Policy Implications**

Our preliminary analysis of the implementation of e-waste Rules in Ahmedabad raises some issues with potential implications for implementation of the Rules in the country. First, the issue of the concentration of regulatory control in a few SPCBs. If our interpretation of the implementation guidelines is correct, the producers are accountable to only the SPCBs of the states in which their head offices are located. The accountability involves seeking authorization and filing annual returns with the SPCB. This potentially raises some important questions. Given that many producers operate throughout the country, should one SPCB be made responsible for the producers' operations throughout the country? What are the incentives for that one SPCB to take action for violation of the Rules in other states over which it has no jurisdiction with regards to the enforcement of other environmental regulations? Our interviews with GPCB indicate that the GPCB has had no interaction with the producers so far, perhaps because none of the head offices of EEE producers is located in Gujarat. How can GPCB ensure producer responsibility in Gujarat if the producers are not accountable to GPCB?

The second issue is regarding the incentives for consumers (both household and bulk) to channel their waste to the authorized collection centres/recyclers. Our interviews with a section of bulk consumers clearly indicate that their current practice of waste disposal has a monetary value associated with it. In absence of such monetary incentives from the producers, it is unlikely that the bulk consumers will be willing to channel the waste through authorized producers' channels. This is because the cost of formalization reduces the value of the e-waste (Manomaivibool, 2009) and, given the large numbers of bulk consumers, the probability of an enforcement action by the SPCB is quite low. This is consistent with recent findings on the behaviour of bulk consumers such as IT companies (Subramanian, Heeks, and Jones, 2014).

Finally, our results also indicate the need to step up efforts to improve the awareness among the waste generators (i.e., household and bulk consumers). The producers provide information on their websites, which is cheap for them. However, the awareness generation should go beyond websites because many bulk consumers, including industrial units, need increased awareness on their obligations under the Rules, the need for systematic management of e-waste, and the options available to them for recycling. While we have not studied the awareness among the household consumers, one would expect the awareness to be even lower among households, which is corroborated by one recent study (Kwatra, 2014).

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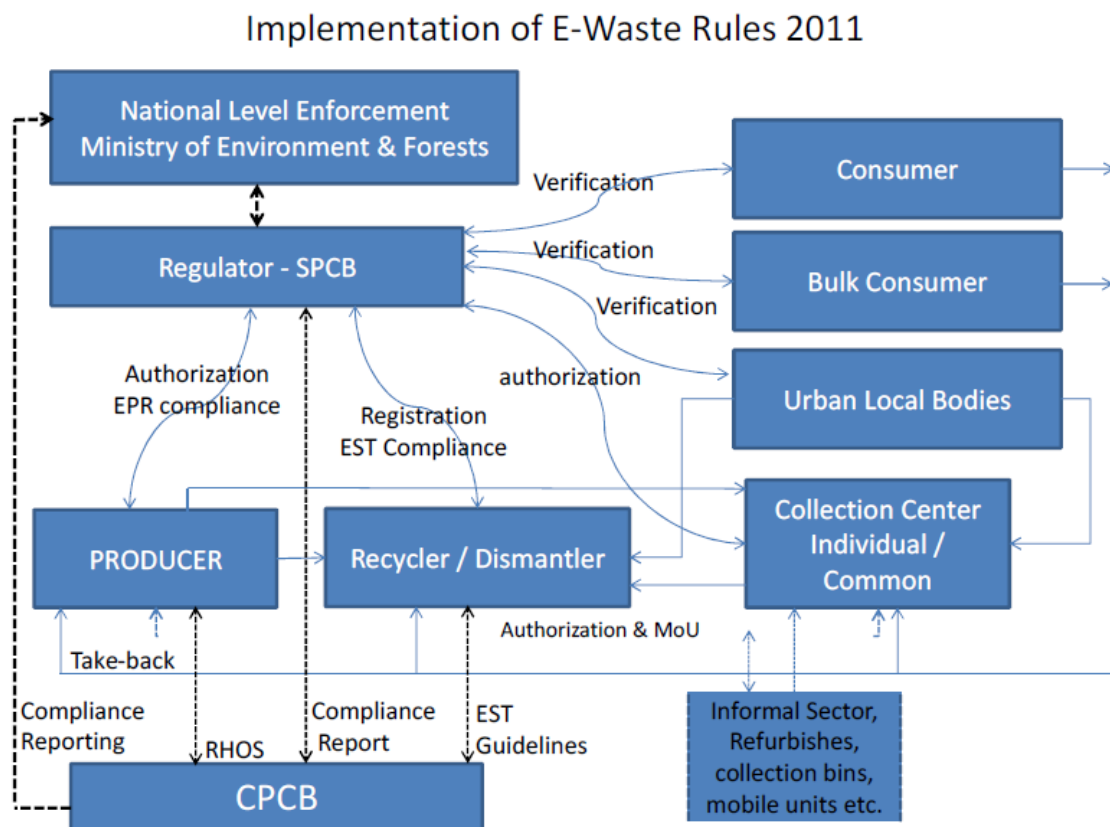


Figure 1. Implementation Mechanism for E-waste Rules (adapted from CPCB (n.d.))