

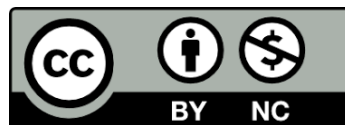
# **DRAFT POLICY PAPER AND ACTION PLAN ON CIRCULAR ECONOMY IN ELECTRONICS AND ELECTRICAL SECTOR IN INDIA'**

Panel Discussion Inputs and Suggestions

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IN ELECTRONICS AND ELECTRICAL SECTOR IN INDIA'  
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June 2021

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## Based on Panel discussion organised by Digital Empowerment Foundation, on the 'Draft Policy Paper and Action Plan', held on June 14, 2021 with the following experts on panel:

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- Osama Manzar, Founder Director, Digital Empowerment Foundation, India
- Deepak Maheswari, CEO at Public Affairs Forum of India
- Rajat Batra, Chief Executive Officer, STENUM Asia, Sustainable, Development Society, India
- Dr Syed Sultan Kazi, Advisor, Digital Empowerment Foundation & CEO, Council for Social and Digital Development (CSDD), Guwahati, India

# Executive Summary

As the world turns digital more after every passing day, with it increases the problem of e-waste. The increasing use of electronic devices and rapid development in these devices means there is more electronic waste lying outside the cities especially in developing world. India is going through this problem at a level where the plan being formalized today has to be applicable for future as well. With rising digital penetration, India is witnessing exponential rise in both use and waste of electronic devices.

Ministry of Electronics and Information Technology (Meity) published a policy paper and action plan on the issue of e-waste and invited comments. Digital Empowerment Foundation in this context organized a panel discussion on this policy paper. This discussion brought both importance and the flaws of the policy paper and action plan to the fore and are an attempt to provide the comments to the government. There is no question that going forward without circular economy, the dream of digital India cannot be imagined fulfilled and thus it becomes pertinent to push forward an action plan that centers on circular economy which is being argued for in this policy paper and panel discussion. This is a step in right direction which can initiate not just environmental but social and economic benefits as well.



# I. INTRODUCTION

**Circular economy as an alternate economy:** The world is only connected by half of its population and the amount of e-wastes being generated is mountainous. In India, keeping in mind the amount of e-waste being generated, world's largest e-Waste generating country, from only less than half of its population getting connected and using digital resources, it is then pertinent that the country adopts an alternate circular economy as rest of the population is getting into the digital map and the amount of wastes that will be generated. Instead of waiting the mountains of wastes piling up and adding challenges, the country must look at more sustainable, more recyclable, more reusable, more shareable models of digital economy, focusing more on public-oriented digital consumption instead of personal oriented consumption models. Individualization of consumption of digital goods is not a great idea if we really want to have a circular model of sustained life.

A 'circular economy' framework should be looked into as India being one of the largest populated country and also one of the largest user country of digital goods or digital equipment and therefore the circular economy principles is very much directly applied to a country like India despite 'not-being-connected' fully and aspire to be connected. If India is aspiring to get 100 % connected, and millions are going to join the digital bandwagon; this digital moving forward have to be much more environment friendly, information friendly, human friendly.

The draft of the policy paper and action plan on Circular Economy in Electronics and Electrical Sector (EEE) by the Ministry of Electronics and IT brings all the important concepts of Circular Economy in EEE under one umbrella. This can become the driver for the government to act on many of implementable aspects of circular economy in EEE. This is the biggest advantage of having this framework on circular economy. the focus on Circular Economy in electrical and electronic waste is critical as these contain those materials and metals which are very precious and thereby becomes important for any country's strategic growth.

**The country is already experiencing secondary material recovery.** Be it in the metal industry or the plastic industry, paper industry, glass industry, in all these industries there is already happening secondary material recovery to a great extent and there have been industries which are thriving on it. There's a lot of livelihood opportunities being created but the kind of environment in which they operate needs to be looked into.

The document can be a great instrument as it minutely looks at the challenges with respect to circularity and also looking at the very simple and most fundamental step which is collecting e-wastes back. In absence of this no circularity will work and that's where the biggest gap is today. If e-waste could have been collected well and accounted for, a lot of it can be built on it. The draft report has looked in great detail and it has identified the current gaps not only with respect to formal set up and leakages in the informal set ups but also leakage from the recyclers, the gaps from PROs and double accounting of e-wastes. All those

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challenges which still exist in spite of having an e-waste policy in place and EPR being stressed upon, have been documented.

The Ministry of Electronics and IT (MEITY) had invited inputs, comments and suggestions on the draft policy paper and action plan in adopting Circular Economy in the Electronics and Electrical Section (EEE) in India. Towards this, the Digital Empowerment Foundation (DEF) has organised a panel discussion with invited experts to collate views and inputs on the same. The discussion have helped to chart out key aspects of the draft paper with additional inputs and suggestions which will help the Ministry concerned to finalise and adopt the final policy paper and action plan on circular economy in EEE in India towards sustainable implementation.



## II. SUGGESTIONS, INPUTS AND RECOMMENDATIONS

*“Do not repair what is not broken, do not remanufacture something that can be repaired, do not recycle a product that can be remanufactured.” - Prof. Walter Stahel, Product Life Institute, Geneva*

### 1.2.1. ECONOMIC OPPORTUNITY

#### 1.2.1.2. Jobs

- **Green Jobs:** Creating green jobs is a very good inclusion in the document. However, most of these green jobs, are actually high value jobs. This can be emphasized in the document.
- **Alternative employment in CE:** The CE in EEE provides and encourages alternative skills and employment opportunities for many. This can be augmented well by keeping the safety standards and work conditions in proper perspective and implementation.



## 2. POLICY TOOLS & BEST PRACTICES FOR ENABLING CIRCULAR ECONOMY IN EEE SECTOR

- **Learning from advanced societies on circularity so far:** Measures have been adopted by the developed nations for a decade but it hasn't resulted in products being designed for circularity or the recycle rates going up even in these developed nations. How Apple and Samsung's latest product is less recyclable than it was five years or ten years ago? Before adopting these very resource intensive suggestions in India and elsewhere, one need to look at the final output and outcomes, as developed nations haven't seen great success with these measures for a decade. There is a need to create monitoring mechanisms around these as whether they are really leading to the circularity and then draw some important practical lessons to follow.
- **Blanket strategy on circular economy in EEE difficult:** There are no blanket strategies which will work for a single product or component, be it a phone, a laptop, a charger in e-waste process. These are very different items starting with price range to their size and to their life cycles and kinds of materials they use, amount of toxicity which exists in it, the difference between what the informal sector will pay for these materials, a laptop versus for a wire. The rates could be very different because of how these are handled, so there is a huge differentiation in the entire supply and value chain. This must be acknowledged and recognised as part of the CE process.
- **Focusing on the core processes in CE:** To understand circular economy, the need is to understand source, trading, processing and destination. Everything from scrap dealer, kabadiwala (Waste picker) is under informal sector and only small fraction is done by the formal sector. In order to address this the need is align products composition with its market value with whatever the electronic product is coming. Here, the role of industry becomes very important.

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- **Exploring circular business models:** In Indian context, there could be circular business models that can be explored / to be promoted, in addition to *Resource Recovery* that has received adequate attention already: ***Circular supplies; sharing platform; Product as a service; Product life extension.***
- **Involving Civil Society in strategic manner:** Across the country people are gainfully and dangerously engaged in e-waste recycling and that is one area where designated civil society and other groups can be empaneled and engaged in this entire circular economy framework with timely milestones.
- **Involving communities critical:** Involving the urban neighborhoods, resident welfare associations, and such designated citizen bodies in urban settings including campus residential complexes will be critical in terms of awareness, mobilisation, outreach, networking, collection and other aspects of CE in EEE.
- **Campaign and advocacy:** monthly or timely e-waste camps in neighborhoods at municipal ward levels could be handy in terms of bringing depositors, buyers and collectors in one platform.
- **Tapping them young:** Engaging College and university students in CE in EEE in theory and practice as part of vocational, work experience, social work, will add value in the movement at institutional level as young generation is most rapid users of digital devices.



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### 2.1.1 INFORMATION-BASED STRATEGIES

- **Digitisation:** The emphasis must be on digitisation of data and get rid of paper based manual system of data capturing and analysis without delay. When recyclers are submitting the data in paper one is unable to do material balances, cost analysis. Until and unless there is a centralized system, it is not useful and hence digitizing is important to bring data in a format where it can talk.

### 2.1.2 MARKET BASED INSTRUMENTS

- **Defining and implementing the Standards:** There a lot of places

where standards and specifications throughout the document have been mentioned, but then who is going to define so many standards or specifications? Standard development should come within the bureau of Indian standards otherwise it becomes difficult for the government to create so many technical standards. Bureau of Indian standard should be one of the key players in this discussion and they are under Ministry of Consumer Affairs. Plus, if one looks through a consumer's perspective then consumers need to be an integral part of this circular economy debate.

- ISO TC323, a technical committee within ISO is making standards on circular economy and these standards if developed under ISO will get into WTO and then it will come to India to get implemented. It is important for India to participate as these standards are getting developed now. Moreover, India has become a member of this technical committee which means it is free to give its comments and see that India's case is taken care of. TC323 should be considered which is currently under one of the sectional committees called chemicals and under that there is an environmental management international committee where it is currently mapped. There are few standards such as ISO 99004, 99010 which are getting developed and India can contribute in developing this. This is how can create this community of industry and social entrepreneurs who are trying to work on this subject.

### 2.1.3 REGULATORY INSTRUMENTS

“ One set of rules will not solve all the problems. There is strong need to breakdown the rules and have actions plans for categories of items under e-wastes. There cannot be identical EPR for all items, they are very different and demand different approaches for collection and EPR regulation of items.”

- **Simplifying the EPR rules:** One set of rules will not solve all the problems. There is strong need to breakdown the rules and have actions plans for categories of items under e-wastes. There cannot be identical EPR for all items, they are very different and demand different approaches for collection and EPR regulation of items. With this approach, there can be focused plan on how items need to be differentiated and different strategies to be used with respect to collection, EPR and recycling infrastructures, their rating and their labeling and product categorization.
- **Product Servitisation is necessary:** Goals of circularity cannot

be achieved if the focus is on assessing the standards from e-wastes to circularity. It is very difficult to standardize an industry that is constantly changing along with its products and customers. In this case the focus has to be on producers since the ownerships in the industry remains with the producers. This is where product servitisation must be encouraged and promoted. And that's how the producers will be incentivized to design the products which are easy to repair and long lasting and they themselves will bring an accountability for materials and products if the servitization is encouraged. This could be applied for high value products as it is possible. There is not much emphasis on this in the draft.

- **Tax benefit:** Government should come up with very strong tax benefit for driving products servitisation because it will require lot of infrastructure upfront from the industry. The industry should get a strong signal of the direction government is taking and this business model will automatically create lot of green jobs. The moment one looks at service based jobs, there will be lot of jobs across the country because by nature collection and service based products are decentralized.
- **Penal Actions:** One should also start thinking about penal actions against consumer misbehavior with respect to e-waste disposal. Secondly, the suggestion of gap funding to stop illegal disposal of e-waste from recyclers is a costly affair, very expensive. If this approach is still considered, then it must look at the kind of items it will work on. But it cannot be blanket approach and it will require lot of funding. There are lot of gaps with PROs and authorized recyclers including much of diversion and leakage from recyclers to informal sector. Monitoring is difficult on day to day basis. Panel actions can improve in filling these gaps in recycling and disposal.
- **e-Waste collection regulation:** Proper collection booths or mobile booths required with ensured data wiping on devices to ensure customer does not hesitate in depositing the mobile phones or personal devices. Consideration of data breaching should be kept in mind. Technology interface should be used to provide a better interface between formal and informal waste pickers (Kabadiwalas). Regulation should ensure that

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recycling systems Irregular raw material supply should not be a challenge as it is not a continuous waste source. Also apart from dedicated EPR budget, company should have a dedicated team to look after EPR activity.

- **Implementation is key:** Presently only 21 types of products are covered under the electrical category. For example, radio equipment are not covered, also microwave etc. So, a large chunk of e-waste that is generated is exempted. While considering the different life cycle stages, a strong mandate to adopt recycled content back in products will help to create value chain. If government ideally could mandate that every product must contain some percentage of recycled products then it is addressing some of the issues in implementation phase of e-waste rules.
- **Challenges in EPR:** There are lot of challenges in front of EPR in India. First is how to create a level playing field. Lot of companies have come forward in last four years since the adoption of the e-waste rules but recycling is not happening to that expectations. Though there is a positive change, the gap needs to be addressed.
- **Enforcing PROs mandate:** For now, there is no enforcement on PROs so how does one bring that. One of the biggest challenges is that document submission is considered a compliance. Here, involving the technology institutes for monitoring involving faculty and students can help. This can reduce the resource load which is a challenge in itself. If there is level playing field, producers will do more, PROs will do more if they see people doing it are being rewarded or being punished.
- **Cost of compliance:** There is no reference to the cost of compliance because there is procurement cost, recycle cost. Because there is no reference, there is a race to the bottom, every organization is trying to get it at the lowest cost to comply with existing provisions, and it leads to collection on paper. This is hampering the objectives.
- **Inclusive role of the informal sector:** Another challenge is how one creates inclusive role for informal sector. At present largely

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they are not recognized. It is important to give them a role since informal sector is huge and will always remain in India.

## 2.3 TASKFORCE TO ENHANCE THE COMPETENCE OF THE VALUE CHAIN

- **Broad Inter-ministerial involvement required:** Circular economy is beyond recycling and it should also cover the extractive industry. While taking about inter-ministerial relation between the ministry of environment and ministry of IT; the ministry of chemicals and ministry of mining and others should also be integrated as they are interlinked closely. When we are pulling out primary commodities, which is a primary requirement what kind of checks and balances, what kind of improvements or resource efficiency are attained and also the social cost again comes up in the extractive industry which is highly exploiting and highly polluting to environment. This is something we need to be mindful when we talk about circularity and we talk about primary metals and secondary metals.
- **Role of Ministry of Electronics and IT (MEITY) and MoEF&CC:** The policy draft assigns a lot of responsibility to Ministry of Electronics and IT (MEITY) and Ministry of Environment, Forests and Climate Change (MoEF&CC). This looks too much of expectations from these two critical ministries already having other priorities, unless specific manpower are developed, trained and engaged on this work.
- **Need for broad collaboration on e-wastes:** In case of e-waste there is need for strong e-waste collaboration as they can lend right technical guidance to do correct labeling and assessing of the products like their circularity and toxicity assessment. Without such efforts, the pollution control boards cannot have this cutting edge or the technical capacity for the products that are changing every six months. This is not highlighted in the report.
- **Role of Ministry of Finance and CE Bonds:** The role of Ministry of Finance especially in creating this new business model is not very clearly defined. The regulatory dynamics is where the impact is. The GST way of taxation can be a right taxation mechanism in generating revenue out of waste or the GST way



The role of Ministry of Finance especially in creating this new business model is not very clearly defined. The regulatory dynamics is where the impact is. The GST way of taxation can be a right taxation mechanism in generating revenue out of waste or the GST way of value added tax in a different way.

of value added tax in a different way. Ministry of finance has a larger role in defining what kind of tax regime will promote circular economy in EEE. Regarding financing CE in EEE, can there be some kind of circular economy bonds like sovereign bonds or gold bonds which government has created, to invest in this concept of circular economy. The bond mechanism will have a long-term impact and this what government should focus on.

- **Inter-ministerial linkages necessary:** The whole circular economy initiative by MEITY is important but this alone is not sufficient. This also needs to have interlinkages with other ministries so for example consumer affairs or many others because MEITY has already got a huge mandate. One Ministry's work repercussions influences other ministries and vice versa.



# 3. RECOMMENDATIONS ACROSS LIFE-CYCLE STAGES

## 3.1 RAW MATERIAL ACQUISITION

- **Raw materials in e-Wastes (Urban Mines) regeneration through Targeted Micro-Factories:** People are residing in distributed areas and there are emerging mounting e-Wastes, especially in urban areas. The key challenge is having streamlined collection of e-wastes. India is at an advantage with having a large networks of information sector players in collection. There is value in the wastes comprising of rare earths, metal, high quality materials available. Developing scientific and technological solutions is key. Targeted micro-factories to manage the wastes as it is done in Australia.
- Targeted micro-factories as a solution can help to harness each of these important materials from the urban mines. This shall help to create the entire supply chain, and informal sector can actually play a part. In this entire supply chain these micro-factories are being installed to manage wastes professionally and effectively.
- Micro-factories are very modular systems creating the right output depending upon the corresponding inputs. For example, there can be a separate micro-factory to harness the circuit boards to create important copper based alloys. Similar is the case for magnets that are rich in rare earths, then a separate module can be set up for this. This way everything can be done in a targeted fashion that allows to create and bring out the best quality material.
- Regarding secondary raw material, ultimately everything being harnessed has to be fit for purpose. Micro-factories helps in this process by doing it in a decentralised manner across the country. Towards this, the need is to empower the informal sector that's already doing a lot of hard work in collecting all of these devices and obsolete products. This can enable more and more quality materials to be generated and regenerated from these waste resources through micro-factories.

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- And these technological solutions are to be safe, ensuring safety of workforce in this domain. Micro-factories are designed such that one can harness different materials and create these high quality materials without burning and that is really the important outcome. These micro solutions that are micro level are very much about the right scale and right purpose and are looking at economies. This also ensures that enough value exists in materials be it circuit boards, magnets, ram cards or device parts and components. For example, in the case of plastics, after harnessing one can now pull out those plastics that can now be converted to plastic filaments and can used for 3d printing.
- This harnessing process is also creating value jobs for people for different modules. For every specialist module, people can be trained up to operate those specialty modules. Going after mega large smelting operations makes little purpose otherwise a lot of valuable material gets mixed up and one cannot have then the right material for the right purpose. These are the kind of programmes being worked out with businesses in Australia. And these initial of steps are already happening in India through the informal sector and is a very important first step. The right pathway to reform the informal sector is to create those jobs and to deliver social benefits.
- **Factoring social cost in circular economy must:** The social cost factors is not adequately factored in this circular draft paper. How do we factor in social cost in circular economy? There is a very little inclusion of social cost. There is overwhelming leaning in circular economy in e-Wastes on the informal sector but what is the social cost of informal sector being addressed. The solution cannot be adhoc measures like clean up some operation into addressing the social cost of informal sector or change the character of informal sector and make it formal. The moment the character of the informal sector is being converted into formal sector it loses its cutting edge.
- The advantage that informal sector has is the informality that makes it cutting-edge and that is the challenge and issue of social cost is not being addressed, while one is looking at extracting material, improving the resource efficiency,

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and trying to gain more from e-wastes management. The government need to address the issue of social cost of informal work force in e-waste sector, their wages, health, child labour and gender issues. All these things are highly exploited in nature.

- **Investing in micro enterprises in e-waste management:** The country need investment in micro enterprises, in those kinds of technologies to process wastes better. This draft document should be giving more impetus and better regulations, incentives in those kind of drives to help the ministries to focus on kind of technologies on board.
- **Secondary resource extraction and utilisation:** There are specific cases to be addressed. For example, copper import increased in 2018-19 in India. As electronic wastes are rich in copper it could be secondary source for copper extraction. Resource utilisation term is more apt as compared to “securing availability”. Manufacturing companies should actively participate and should come up with more eco-friendly materials and methods to manufacture a product. Environment indicators should setup to show how environment is affected by manufacturing units or recycling units. Reducing burden on mining industry should be top priority.

### 3.2 PRODUCT DESIGN, COMPONENT MANUFACTURING, PRODUCT ASSEMBLY

- **Product design matters:** There is mention of eco-design in the report. A lot of what discussed is about the products end design but what is important is how to extend the life of it. 9 out of 10 times one has to change a phone not because of hardware failure but because it is not able to update to the new change. Efforts should gear towards working against the obsolescence of design as a crucial differentiation. Small defects should be improved within the device and this is important.
- **Extending product life important & Right to Repair:** Circular Economy is much more than just better or more complete recycling. It is about caring for the stocks of goods and products, keeping them in service for long time. Therefore in

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addition to recycling at end of life, emphasis has to be placed on extending the product life. Clear directives are needed to avoid design for obsolescence that is practiced today by EEE manufacturers, **right to repair** has to be enforced.

### 3.3. CONSUMPTION STAGE

- **Resource efficiency:** The Draft policy paper and action plan rightly identifies the linkage between circular economy and resource efficiency and government's priority on resource efficiency. When e-waste recycling gets more standardized in operation one can better look at achieving resource efficiency and material use efficiency.
- **Research & Knowledge Advancement:** The country has exciting possibilities of rare earth recovery and micro-factories; parallel the need is to have cutting edge research happening on rare earth material because the country is dependent heavily on import and import markets are dominated by certain countries and such materials are not easily available in open market as well. For instance, regarding battery configuration, it is largely dominated by lithium chemistry at present but there's research happening in non-lithium based battery operations as well. And this can be available in days to come and they'll have less chemical footprint compared to lithium and also less import-dependence compared to lithium. So that's one of the research focus for the future. Also the e-waste recyclers are less inclined to touch battery recycling operations. Largely because even if they recover lithium, there is no lithium battery manufacturing in the country. So recovering these resources have no such market within the country. Looking at indigenous manufacturing facility for such materials can ensure that these products can be recycled and reused. These areas can be investigated.
- **Simplifying CE on ground:** Circular economy is a general concept that requires operational tools for to be implemented on the ground. For this a lot of partnership and communities need to be built to sustain it, this is missing in the document. How to enable partnership in this entire value chain needs to be seen.
- **Promoting 'Refuse' principle:** Apart from reuse, recycle etc. the country should also promote 'refuse' which is managing

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without something new, that will accelerate the circular process.

### 3.4 COLLECTION SYSTEMS FOR EOL EEE PRODUCTS/COMPONENTS

- **Expanding items under e-waste regulation:** The circular economy draft looks to expand the items which are currently covered under e-waste regulation. As compared to the regulation under the WEEE which is the European Union document, the list in India is much smaller. There exists problems in certain items to be included in the list which most of the e-waste recyclers don't want to touch. For instance, few of the tube light due to the mercury content, recycler don't find it very lucrative and it's a cost negative for recycling. Therefore, there is need to look at and address circular economy principles in such items listing as well in terms of proper collection. Moreover, due to the fragile nature there are collection challenges for such materials and also recycling challenges. These are kinds of challenges in e-waste recycling and achieving circularity for certain materials.
- **Dealing with hazardous chemicals in e-wastes:** There exist hazardous chemicals embedded in the wastes and sometimes it's not easy to recover them or remove them. For instance in plastics, the recycling plastics may not be good quality plastics. At times it cannot be used as original material. Therefore, this kind of research also needs to be part of circular economy approach.
- **Need to Focus on Toxicity:** There is very little focus on toxicity in discussions on circularity. There is very little regard to toxicity of components or materials which are available in it like how is it to be handled; what kind of technology do we have? And if we have it, are we able to address many of these things or not. There is a requirement for great amount of investment, great amount of research to deal with toxicity issue.
- **Focus on technology:** Need to develop technology in a way which can concentrate all these metals. Many companies in Europe are doing this. There is need for good interaction between academic institutes and industry and area NGOs. The draft can have details of what kinds of products are coming,

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which industry they are coming from, how much time it took to recycle, and thus proper inventory is required. Auditing is required.

- **Focusing on skilling and training:** There is lack of proper training in the skilled labor as they are following the same process with plastic and metals. Need to train semi-skilled labors who can take up this challenge. There is lack of proper guidelines on how e-waste is collected. It has to be a continuous process. The generalization is not good, it reflects lack of infrastructure. Need for auditing and collection at district level and block level and further up.
- **Engagement and Awareness:** This is at a critical low level; e-waste is kept in household in the same place as the kitchen waste. Bulk customers and e-waste generators need to be identified and dealt with separately. Artificial Intelligence (AI) and robotic tools may have important role in segregation and collection and can minimize the damage. Need to make the process green with what can be recovered. Once it is told what and how much can be recovered and how much revenue can be generated, it will have right kind of impact. Many industries are already showing interest in it. Have to come up with technology that can minimize the damage. Once talked about product revenues, people will not throw it away like now. Interlinkage between formal and informal sector must be established.
- **Data Management:** The issue is of non-reliable data on e-waste, inefficient audit procedures; Efforts to collect accurate data of valuable metal distribution should be done. Role of informal sector for dismantling and recycling is not well defined. It needs to be channelised. As stated, lack of proper training for skilled labour development on handling hazardous material should be addressed. Like Municipal solid wastes are dumped e-waste should also be collected but, in a separate box. Several electrical and electronics equipment metallic content are not known and is dumped into waste without utilisation. More awareness program for safe disposal processes are required. Bulk customers generating wastes should be identified and dealt separately.

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### 3.5 DISMANTLING & RECYCLING INFRASTRUCTURE / RECOVERY STAGE

- **Infrastructure and facilities:** Regarding technological action, proper infrastructure and facilities are required. Establishment of common performance measurement system of recycling units be considered. Interactive sessions between the stake holders for strategic planning is required. Establishment of recycling processes and exploration of more valuable metals must be focused upon. To gain from environmental benefits, Mercury and toxic chemicals identification lab should be setup and should be planned to be eliminated initially.
- **Better recycling and higher recoverability.** Currently there is lack of system to recover rare earth. There is need for better system which can enable higher recovery and better recycling. This can also keep a track of toxic fraction. Currently, while there is higher level of collection of wastes, but there is less focus on toxic fractions. It will help in better control of toxins. At this point there is no control of where the toxins ends up in. Monitoring is not easy and hence decentralizing becomes extremely important.

### 3.6 POST EOL PRODUCTION/SECONDARY MATERIAL USAGE

- **Increasing percentage of secondary materials:** It is very important to address the percentage increase of secondary metals into the supply chain process and reduction in the primary metals. The challenge is how this can be done on a continuous manner, year on year. How do we increase those percentages? This needs to be emphasised and stated clearly as possible.
- **Integration, inter-operability aspect:** Another aspect is how material and energy flows will be integrated, how they will be implemented with the technical cycles of design and development. This needs to be worked upon and is an area of research in itself. Inter-operability and infrastructure is also important and needs to be considered, along with having a market for the product that will be produced after being recycled and who is going to promote the market? Will it be Meity, ministry of finance?

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