Activities

During the three days training programme, a combination of technical presentation, class exercise and field visits were conducted.

1. Technical presentations focusing on
    a. E-waste and need for its management;
    b. Regulatory framework of 2011 rule and draft 2015 rule on e-waste;
    c. E-waste collection mechanism;
    d. Dismantling and recycling of e-waste;
    e. Scope of EPR and
    f. Role of IEC in spreading awareness on e-waste;
2. Field visit to an e-waste dismantling unit, where manual dismantling of e-waste predominates with few parts (specially CRTs) are dismantled with the help of machines;
3. Class exercise had been conducted in order to ensure hundred percent participations by all the participants on the issues like draft rules of 2015 and role of IEC materials in spreading awareness on e-waste;
4. Feedback sessions were a part of the training programme to get suggestions for future scope of improvement in the training programme;

Reporting of these three days programme have been prepared in line of the following heads:

1. Introductory session
2. Highlights of the presentations
3. Brief on the class exercise conducted
4. Field visit
5. Way forward
6. Feedback on the Programme
7. Appendix (pre-assessment questionnaire & filled in sheets; feedback questionnaires & answer sheets)

1. Introductory session

The introductory session was initially conducted by Mr. Nivit Kumar Yadav, where in he highlighted on the overall objective of this three day programme and explained the reason behind making this programme open for the different stakeholders beyond regulators. He also encouraged participants to pro actively introduce themselves. As part of this discussion, expectations from the programme came from the participants, representing different stakeholder groups.

The introductory session further took over by Ms. Swati Singh Sambyal, who talked about CSE and presented the various arenas, the organization is currently engaged with.

2. Highlights of the presentations delivered

The technical session focused on the existing regulatory framework and various other issues and challenges associated with the management, handling & disposal of e-waste.

Session 1: What is e-waste?

To start with, the presentation defined what is 'e-waste' and a number of definitions have been discussed, which was given by EU 2002 under its WEEE directive. This actually paints a picture of what all the definition of e-waste can cover. Likewise, Basel Action Network expanded the composition of e-waste to large household devices, which has been discarded by their users.

According to the E-waste (Management & Handling) Rules 2011 of India, e – waste is defined as waste electrical and electronic equipment, whole or in part listed in schedule – 1 and scraps or rejects from their manufacturing and repair process, which are intended to be discarded.

In order to encourage the participants, an interactive discussion was held by the moderator of the session so as to come up with listing of many more items, which participants felt as e-waste, though some of these were not covered under the current regulatory framework of India.

It has been observed that, the developed world generates more e-waste as compared to the countries like India and China and when talking about India, the data shows that the developed states like Andhra Pradesh, Maharashtra, Delhi, Gujarat, Karnataka generate more e-waste as compared to the others. This session also talked about the composition of different e-waste generated from refrigerators, washing machines, personal computers, TV sets and cellular telephones.

Session 2: Need for e-waste management system

It is one of the important aspects of handling and managing e-waste. The reason behind its management largely lies on the precious resource recovery and ensuring betterment of the environment and human health. The session talked about the serious health hazard, the e-waste poses because of its toxic constituents like lead, mercury, arsenic, chromium, cadmium, barium, beryllium, PCBs, BFR, PVC etc. Therefore if not handled properly, this can cause serious damage to the human health by causing lung cancer, damage to the central nervous system and kidney, skin diseases, accumulation of POPs and heavy metals in the body etc.

The proper management of e-waste is also necessary from the resource optimization point of view, as the electrical and electronic equipments contain precious metals like gold, silver, copper, palladium and platinum etc. So, unless managed in an efficient manner, these metals go into waste and therefore it is important to manage these products for material recovery.

The case studies from China and India showed handling of the huge quantum of acid solution for extraction of copper, gold and silver, which are finally discharged into the storm water drains. This causes serious harm to the environment, as few rivers, named Lianjiang River,

Nanyang river of China showed high level of arsenic, chromium, lead, zinc, selenium etc. Soil analysis result of Delhi also showed concentration of dioxin, zinc, lead, copper which is even higher than the allowed alert value.

Session 3: Regulatory Framework

This session talked about the current rule on e-waste, named E-waste (Management & Handling) Rules, 2011. It was found that, all the stakeholders were identified and defined and are allocated with individual responsibilities. Starting from the producer, bulk consumer, collection center, dismantles and recyclers, all are responsible for environmentally sound management of e-waste in this country. Overall monitoring responsibility of each of this stakeholder lies with regulatory agencies, like CPCB at the central level, SPCBs/SPCCs at the state levels and ULBs at the local level.

In spite of this regulation in place, the four years of existence of the rule had hardly marked any difference in the e-waste management system across the country, which has laid down the path for new draft rule in 2015. Therefore the MoEFCC had come up with a new draft rule on E-waste in 2015. Highlights of the new draft rule were also a part of this session.

According to the draft rule of 2015, the roles and responsibilities of each of the stakeholders made more clear with a special clarity given on Extended Producer's Responsibilities (EPR), the responsibility of which lies with the producer of EEEs. However, it still neglects a few major areas in the e-waste management, including the complete ignorance to the need to incorporate the informal sector. A new professional organization has been identified which is known as PROs and whose responsibility will be to collect and channelize the e-waste generated from the 'end of life' of the products from a group of producers. The clause of the Reduction of Hazardous Substances (RoHS) made stricter, though no provision has been given to ensure how the producers will implement this and who will monitor the equipment post reduction of hazardous substances.

Session 4: Dismantling & recycling of e-waste

A session on the dismantling and recycling of waste electronic and electrical equipment (WEEE) was taken by Dr. Sandip Chatterjee of the Department of Electronics Information Technology (DeitY). He highlighted the components and parts of the various WEEE and also the precious metals that these products are comprised of.

According to the global fact sheet on e-waste, the WEEE will grow by 16-28% in next five years (as per the EU). The presentation highlighted on certain data, which showed the need for dismantling and recycling of e-waste following the right method. At present, out of the 80-90% of the waste collected from the market, only 15% is recovered globally. In time of recycling, 50% gets lost in developing countries, where as only 25% gets lost in the developed countries. The rate of revenue generation from recycling/reuse of metals/plastics/silica & others from e-waste would grow from ~US$14,000 Mn in 2013 to US$ 25,193 Mn by 2017. According to Dr.

Chatterjee, the rate of gold extraction is much more effective while doing from e-waste as compared to that of gold mining.

According to Dr. Chatterjee, the informal sector is managing 80-90% of the e-waste generated in India. The data from CPCB shows, the number of authorised formal or semi-formal units approved by CPCB is 100 approximately, where as the total e-waste generation in India is approximately 99 lakh tons in 2015 (source: *E-Parisara*).

Talking about the current dismantling and recycling practices in India, Dr Chatterjee mentioned that 90% of the country's e-waste is managed by the informal sector that treats PCBs in primitive methods to remove components and value metals. The cables are also burnt in the open air to recover copper, thereby creating severe air and soil pollution and causing health hazard to the operators as well. The unwanted and remnants are disposed of in the open field or near to the river bank thereby leading to the leaching of heavy metals/chemicals into the landfills. To add to it, the recovery rate from this informal recycling is very poor, only 10-20%. On the contrary to this, the formal recycling sector, which is dealing with only 5-10% of the e-waste, segregate and disassembled the e-waste to recover small & large structural metal parts, ferrous metal, ferrite and ceramic components, non ferrous metal scrap mainly Cu and Al, cables and wires, small & large structural plastic parts and glass components. The PCBs from the formal sectors are sent to the developed country to recover precious metals.

The various globally accepted recycling methodology for recovery of materials include smelting and stripping, hydro metallurgy, electro chemical process, mechanical shredding, screening, electrostatic separation for metal extraction; Chemical recovery, materials recovery and energy recovery for small & large structural plastic parts; smelting for glass components. For the purpose of PCB recycling, mechanical shredding, physical separation and hydro metallurgical process is globally followed.

Some of the initiatives taken in India by DeitY include:

- Development of processing technology for precious metal recovery at National Metallurgical Laboratory, Jamshedpur;
- Development of printed circuit board processing technology at Centre for Materials for Electronics Technology, Hyderabad and demonstration of this technological innovation at E-Parisara, Bangalore;
- Processing technology to recovery and conversion of plastics from WEEE to value added products without any liberation of toxic gases at CIPET, Bhubaneswar;
- Development of RoHS testing and subsequent certification facility for the products which are RoHS compliant at CMET, Hyderabad;
- One demonstration plant on PCB recycling at Bangalore to control PCB export and to conserve the natural resources within the country itself;

Session 5: E-waste collection mechanism

A lecture on the efficient e-waste collection mechanism was delivered by Ms. Rachna Arora. The collection of e-waste is needed in order to prevent material leakages to backyard recycling and to ensure more material availability to the formal and efficient recycling sector. Ideally the e-waste generated from the various sectors including household, commercial set up, manufacturing defects from Original Equipment Manufacturers (OEM), from assembled products and from imports is collected through formal and informal recyclers.

Number of examples from across the globe show different models established for effective collection of e-waste. According to a Germany model, collection of e-waste is a divided responsibility between the public sector recycling company and electrical & electronic device manufacturers. Sweden model explains the collection as collaboration between producers and local authorities, where in the local authorities or municipalities manage and fund manned collection points, such as recycling centres, where the households may leave the WEEE without charge. The producer on the other hand manages and funds transports of the WEEE to pre-treatment and recycling centre in accordance with the prevailing laws. SWICO of Switzerland came with an idea of imposing Advance Recycling Fee (ARF) on the new products and equipments, which can be used to finance the recycling of end of life equipment. China demonstrated another model of circular economy where the WEEE is used as raw materials during the manufacturing processes, though the presence of huge informal sector remains a constraint behind its success. Brazil developed a kind of system, where responsibilities shared among the various partners, like OEMs, local governments and retailers and developed innovative models of involving the informal sectors.

These successful models across the globe can help develop a collection system for India, where in the ninety percent of e-waste is still under the territory of the informal recyclers. The major challenges in the collection system of India include lack of awareness among public, absence of any incentive to the consumer and absence of efficient and target based take back systems for collection of e-waste, thereby demanding some innovative models for ensuring collection of e-waste. Possible workable models suggested for India includes individual producer's responsibility, collective producer's responsibility and integration of the informal sector. Two-three models from Pune, Bangalore and Kolkata shows successful collection of e-waste by incorporating the informal sectors. Informal sectors are issued with identity cards here and a waste collector's co-operative has been made, which became responsible for the collection of e-waste.

Session 6: Extended Producer's Responsibility (EPR)

A session on the EPR has been conducted by Dr. Ashish Chaturvedi, who talked about various models of EPR, being operated globally. To make the EPR model successful, administrative, economic and informative instruments are required to be implemented. These include, but not limited to effective system for collection and take back mechanism; imposing material and product tax, advance disposal fee, deposit refund scheme etc; labeling of products, information

dissemination to consumers about producer's responsibility and the structure and substances used in products etc.

Two models of Individual Producer's Responsibility (IPR) and Collective Producer's Responsibility (CPR) through PRO can be established in order to ensure effective take back mechanism; however the CPR model is much better as compared to the IPR model, as in this case PRO takes the responsibility of each and every minute details including coordinating with collection agencies, end-to-end reporting and monitoring of member brands, auditing and reporting on a timely manner, auditing of recyclers etc.

These model has very limited scope in the context of current E-waste (Management & Handling) Rules, 2011; however it can be successfully implemented if the draft 2015 rule come in place as it explains the EPR in details. The challenges of implementing EPR in India includes

- Competition from informal sector
- Lack of target based take back & collection system
- Regulation and monitoring
- Lack of formal infrastructure
- Illegally imported EEE
- Identification of producers

The success of EPR model lies in the shared responsibilities distributed among the various stakeholders involved in the entire lifecycle of any EEE; Establishment of collaborative approach to ensure management of e-waste by setting up of collection models integrating informal sector; Development of instruments to provide the right incentives for the relevant stakeholders and Establishment of a multi-stakeholder (producer's associations, manufacturers, civil society including RWAs, NGOs, government bodies including ULBs) group for effective discussions and policy advocacy on challenges related to collection, recycling and disposal.

Session 7: Information, Education & Communication (IEC) on e-waste

Information, education and communication (IEC) on e-waste is an integral part of the e-waste campaign drive. An awareness campaign on e-waste will result in the significant collection of the e-waste and its recycling in environment sound manner in state/city. Therefore, aawareness on e-waste drop-off locations and recycling facilities are important to initiate. A successful campaign demands identification of different target groups first in order to adopt audience based strategies. Right messages on right time must be communicated to the target audience, highlighting the environmental, economic and social consequences. Elements of communication strategy include

- Stakeholder engagement
- Target group
- Development of Toolkit/ IEC material

- Implementation mechanism
- Timelines
- Financing and resource allocation

This session became effective, once the participants prepared and acted a street play on e-waste awareness campaign.