Sustainable Recycling Industries (SRI) India Plastics Project

Newsletter 2 October 2016

Sustainable Recycling Industries

Sustainable Recycling Industries (SRI) builds capacity for sustainable recycling in developing countries. SRI improves local capacity for sustainable recycling together with private and public institutions, as well as the informal sector in India, Colombia, Egypt, Ghana, Peru and South Africa. The programme is funded by the Swiss State Secretariat of Economic Affairs (SECO) and is implemented by the Institute for Materials Science & Technology (Empa) and the World Resources Forum Association (WRFA).

CII – Sohrabji Godrej Green Business Centre (CII – Godrej GBC) is the country leader of SRI in India and the project is jointly implemented by CII – Godrej GBC and ToxicsLink. SRI India has been fortunate to have been receiving immense support from various other organizations from the government and private sectors, namely, MoEFCC, CPCB, BIS, DST, Geocycle, NEERI, several recyclers, manufacturers and producers.

SRI India

The SRI India project aims to

- List the various identification and segregation methods of BFR plastics
- Identify an alternative mechanism for handling BFR plastics
- Develop technical standards for the handling, transport and safe disposal of BFR plastics
- Create a pilot take-back mechanism to segregate & prevent BFR plastics from entering the secondary value chain and implement a monitoring system

This newsletter is intended at providing the project stakeholders, the status of various project activities. A brief on the progress of every objective and the planned activities is described in the newsletter.

Background

In India, an estimated 50-60% of the plastic waste generated (more than 5.6 million tons every year) is recycled. Most of the plastic recycling takes place in the so-called informal sector, providing livelihood to many, but being done with little regard for worker safety and environmental protection, and without control or monitoring by the government.

However, certain fractions of plastic waste such as those found in waste electrical and electronic equipment (WEEE) may contain hazardous substances and require specific treatment and in some cases, destruction. EEE is a combination of several materials, ranging from metals to plastics. By weight, plastics constitutes roughly around 25-30% of WEEE. Approximately, 80% of these plastics in WEEE are high quality, high value plastics and should be sent for controlled recycling. Whereas the remaining 20% that is contaminated with additives and is of low value, is unfit for recycling and has to be disposed or treated in an environmental friendly manner.

Of the many additives used, brominated flame retardants (BFRs) and heavy metals are considered to be the most problematic additives in WEEE plastic. Flame retardants are added to ensure fire-resistance of EEE and by weight they constitute nearly 5.5% of WEEE. The most commonly used flame retardants, almost 80%, are brominated flame retardants (BFRs).

Identification and segregation methods for BFR plastics

Unsystematic method of handling contaminated plastics facilitates them in re-entering the products in the secondary value chain unreasonably. There is a need to prevent contaminated plastics from entering the

secondary value chain for which effective identification and segregation is required.

To determine the various identification and segregation methods for BFR plastics, several studies were carried out with immense support from Empa and ToxicsLink. Desk work and field visits to the informal plastic recycling facilities in New Delhi was done to understand their system. Series of sampling and testing campaigns was undertaken to assess the efficiency of BFR plastic separation methods as applicable in the informal sector.

Several methods can be used to identify and separate bromine-rich plastic waste streams during recycling operations. Manual methods require the inspection of each individual plastic, usually before shredding, either fully manually (based on markings or on the source (product) of plastics), or semi-manually (with the help of hand-held instruments) and the Mechanical methods can be run in batch or on-line, usually after shredding.

Different methods can be used in combination to improve separation efficiencies. For instance, a combination of simple methods could include source segregation (i.e. knowledge-based screening of products likely to contain BFR), sink/float separation (allowing batch separation) and Beilstein test screening (as on-spot method to verify separation efficiency of sink/float separation).

For more details on every method, access the report 'Managing hazardous additives in WEEE plastic from the Indian informal sector' on http://sustainable-recycling.org/haarman_2016_sri-india/

Informal sector training

An informal sector training was organized in June 2016 involving small and micro informal metal and plastic recyclers and traders from in and around New Delhi. The program was aimed at initiating a dialogue with the informal plastic recyclers on BFR plastics, the various health and environmental hazards posed due to their handling methodology and to create awareness on various identification, segregation and handling/disposal of BFR plastics from WEEE. The program comprised of presentations from ToxicsLink on hazards of improper handling of BFR plastics, E-Parisaraa on best practices from the formal recycling sector and demonstration of salt water bath segregation technique by Empa. The program was well received by the participants and more of these programs are planned to be organized in other huge informal recycling markets across the country.

Alternative mechanisms for handling BFR plastics

i. Use of contaminated plastics as alternate fuel in cement kilns

Co-processing is described as a secure form of waste management that fully recovers the energy and mineral content from waste for beneficial re-use as fuel for energy generation and product additives for manufacturing.

Co-processing in cement kilns is recognized as one of the best waste disposal options, owing to nil residue after disposal, complete material and energy recovery and no major investment. The organics in the wastes is completely destroyed and the inorganic are immobilized in the clinker matrix – the intermediate product of cement. Further the acidic gases, if any generated during co-processing gets neutralized, since the raw material is alkaline in nature.

Co-processing of plastic parts of electronic waste has been considered as the best available option for destruction as per Stockholm Convention. BFR plastics serve as a potential alternative fuel and mineral feedstock for cement production as about 50% weight consist of combustible material and another 40% weight is made up of silicates, calcium, aluminium and iron. Co-processing of the BFRs containing plastics in cement kilns will be a good solution due to the efficiency in destruction of POPs hazardous waste.

However, BFR contaminated plastics while being used for co-processing, needs to be handled in an environmentally safe manner avoiding the possibilities of contaminating the nearby environment and eliminate the chances of accidents leading to environmental catastrophe. Options and limitations for the destruction of wastes containing BFRs in cement kilns need a detailed evaluation of the kiln to decide on the options and limits of recovery energy in BFR containing polymers.

To arrive at the necessary details, CII - Godrej GBC and Empa, along with Geocycle, NEERI and other stakeholders are carrying out trials. The details will be made available after completion of trials.

ii. Conversion of contaminated plastics into fuel through pyrolysis

Pyrolysis is a thermal process with less or absence of oxygen. In the pyrolysis process (heating in an oxygen-free atmosphere), the organic components of the decomposed material generate liquid and gaseous products, which can be used as fuels and/or a source of chemicals. Conversion of BFR contaminated plastics into fuel through pyrolysis might be another feasible disposal or treatment option.

CII – Godrej GBC is working with Rudra Environmental Solutions Limited, Pune, in carrying out trials to convert plastics with BFR into oil. The trials are underway and the results will assist in determining the operating conditions of the pyrolysis process and properties of the pyro oil produced.

Technical standards for the handling, transport and disposal of BFR plastics

The use of Electrical and Electronic Equipment (EEE) has become an indispensable part of lives. EEE is a combination of several materials, ranging from metals to plastics. By weight, plastics constitutes roughly around 25-30% of WEEE. Approximately, 80% of these plastics in WEEE are high quality, high value plastics and should be sent for controlled recycling. Whereas the remaining 20% that is contaminated with additives and is of low value, is unfit for recycling and has to be disposed or treated in an environmental friendly manner.

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The most commonly used flame retardants, almost 80%, are brominated flame retardants (BFRs). Owing to the hazards posed by BFRs, CII – Godrej GBC has submitted the draft technical guidelines on the identification, segregation and disposal of brominated flame retardants contaminated plastics, to the committee on standards formation at the Bureau of Indian Standards (BIS).

Pilot take back mechanism and monitoring system

Extended Producer Responsibility (EPR) is the responsibility of any producer of electrical and electronic equipment (EEE) for collection and channelization of e-waste from end of life product to an authorized dismantler/recycler.

Target based approach for implementation of EPR has been adopted in the E-Waste (Management) Rules, 2016. Phase wise collection target has been fixed for producers for the collection of e-waste, which can be either in number or weight and shall be 30% of the quantity of waste generation as indicated in EPR Plan during first two year of implementation of rules followed by 40% during third and fourth years, 50% during fifth and sixth years and 70% during seventh year onwards.

A producer can implement its EPR either through take back system and/or by setting up collection centres or both for channelization of e-waste from end of life products to authorized dismantlers/recyclers. The producers are required to have arrangements with authorized dismantlers/recyclers either individually or collectively or through a Producer Responsibility Organisation spelt out by the producer in its EPR Plan which is duly approved by Central Pollution Control Board (CPCB) in producer's EPR authorization.

SRI India aims to work with various producers to create a take back mechanism in line with their EPR requirements. SRI India is encouraging producers to include segregation and safe disposal of BFR plastics as part of their take back plans.

Development of green standards for recycled plastics

Plastic recycling is a big business in the Indian market. Despite the plastic recycling efficiency prevailing in the Indian plastic recycling industry, it cannot be rest assured that the recycled plastics are free of the environmental and health hazards they might possibly pose.

CII – Godrej GBC along with Empa is working on the development of green standards for recycled plastics. The green standards is expected to drive the change required in plastics recycling through sustainable manufacturing and creating a pull effect from the users' end. The first draft of the standards will be open for stakeholder consultation in November 2016.

What does SRI India want to achieve on its completion?

SRI India envisions a take back mechanism that will accommodate proper identification, segregation and safe disposal of BFR contaminated plastics thereby ensuring that it does not enter the secondary value chain. A well-formed take back mechanism will also lead to the formation of a monitoring system to review the implementation and functioning of the take back model.

If you are interested in this subject & would like to contribute to the project, please contact -

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