

Conference On
PLASTIC WASTE MANAGEMENT AND RECYCLING CONFERENCE: Value Creation from Waste,
23rd August, 2019, Taj Hotel, New Delhi



Lamp Lighting



Arvind Mehta, Chairman, AIPMA Governing Council

INAUGURAL SESSION

KUNAL SANGHVI, CFO, Metro-Politian Stock Exchange

I see this platform as a great initiative and thank PRO India & AIPMA, who have organized this conference as it enables the industry to sit across with policy-makers and government functionaries to discuss issues at large. PRESENTATION: PM Modi said (on the Independence Day): “If you see Single-Use Plastic on the road, help the municipality to clean it. Let’s make India SUP free.” (Importance of Plastic Recycling has gone up several-fold).

Also, FM Nirmala Sitharaman said that, “It’s time to take our entrepreneurs closer to the capital markets and masses (inclusion growth + financial inclusion). I propose to initiate a fund-raising technological platform --- a social stock exchange-- under the regulatory ambit of Securities & Exchange Board of India (SEBI) for listing social enterprises and voluntary organizations working for the realization of the social welfare objective so that they can raise capital equity, debt or as units like mutual fund.”

We at PAN India level- MSEs are committed to including Plastic Recyclers in our domain, and we see it as social inclusion. As it can raise the idea of socially responsible organizations and drive inclusive financial growth through the initiating the ‘Circular Economy of Plastics’. It would help in implementing the Sustainability -goals that the government has and help in fulfilling the role

of taking back plastics. (We can together address the problems of tyre pollution, air pollution and public waste etc.).

SUGGESTIONS:

1. Impact Investing: It is different from CSR, it sounds like philanthropy but it is driven out of the passion of the entrepreneur. Unlike in CSR, in Impact Investing the ROI might be lesser or more, the returns might be known or not known, but there is a social satisfaction to the person who is investing. (We are thinking about how CSR -can be rerouted through Impact Investing) and in the long-run whether we like it or not, every organization is expected to create a good impact on the environment. It is a globally growing phenomena.
2. With PRO-India we have worked for 6 months and learnt that we can create a product-on exchange platform. - Plastic Credit Units (PCU). It will help in creating demand for recycled products and give a seamless plus anonymous platform for transaction. (It can help in bringing back the plastic to the plastic producers'). Endeavors related to manufacturer's accountability and matching the Environmental compliances can be made easy.
3. Awareness creation to the lowest-level of the customer chain, so that a good-segregated back-end facility is also created. This can help with the EPR claims for every organization, a policy that is now implemented across India.
4. Mobilize funds for the organizations that want to do 'Plastic-Recycling Organizations', getting them introduced to social-exchange platforms and pulling funds globally for this particular cause. (Global attention will definitely be fostered).



Kunal Sanghvi

He had a **PROPOSAL with defined PHASES**
Responsibility document between bodies

- I) **CPCB**- Receives the RPD and sends it to the DOF for validation; Register Process Activities, Undertakes monitoring and reporting
- II) **SPCB**- Receives the RPD and sends it to the DOF for validation
- III) **Designated Operational Entity**- Receives letter of RPD
- IV) **Recycling Company**- Prepares Recycling Process Document

So, that there is a seamless getting back of the plastic from the overall ecosystem (regulating, certification)

Broad Impact of Impact Investments

- Size: The domestic impact investment AUM average at around \$36 million.
- They generate many sustainability initiatives.
- India definitely has turned into a target for impact investment, but India entrepreneurs have the opportunity to grab the eyeballs and improve the visibility of Indian business in the Global Impact Investment.
- The bottom line is that if your cause is very right, you are going to get funded over a period of time.
- Most of the investment trends show that the initial focus was on 'Clean Energy' and only 32% was on 'Financial Inclusion'. Now it has gone up for 52%.
- 75% of the impact investments are coming from banks and endowment funds - in the form of EPD (that means very less debt) and other mixed instruments ensured too. For example:- Social Venture Connexion launched in Canada in 2013, Social Stock Exchange launched in London 2013; while other Stock Exchanges exist in South Africa, Jamaica, Brazil and Kenya; Impact Exchange -- a joint venture between Stock Exchange of Mauritius and Impact Investment Exchange Singapore.
- 'How to Mobilize funds through Social Exchange'- Since most of the times the CSR fund do not reach the good causes, let's take the example of CSR funds for Plastic Recycling/ tyre recycling, when such things come at an Exchange Platform, there noble causes are visible to the world. (Attracting more investments).

ASHOK CHATURVEDI, CMD UFLEX

Way back in 1995, our company has done recycling of Mixed Plastic -MLP, whether it is made out of polyester, adhesive or all of them put together. And we are doing it for the past 25 years and we are willing to share it with all of you (without any technology fee for that). Therefore, MLP is 100% recyclable and also we have to remove 'Waste' word from our mind. So, it can be used for any other type of activity, even if it is given by some consumers to you. Even the plastic is being produced by the resources given to us by the

mother Earth and channelized as 'Flexible-Packaging' and Multi-layered Packaging'. Things we should note here is that even the farmers would be suffering or would be in a bad shape (not only India's but in the world) if the producers had not brought their crops and make snacks out of it for global-food chains. Example: - Potato Chips (which can be packaged and consumed anytime later). Waste plastic can be used as an input for some other industry. I recommend to the Government of India: If the municipality only carries out the segregation and collection business from the whole city and set up a factory where - glass, bottles, MLP and major packaging components are separated, this will ease a lot of work-load of the companies who want to step into recycling activity. The municipality can also create separate bins and sell them off. I have seen this model in Poland. We also want to take one more initiative in our hands, since we are manufacturers' we have to stop the burning of Plastics also. As whatever filters you may put in place, but many vapors, hazardous chemicals and carbons will pass through it. We wanted to make 'Bio-plastic (Biodegradable plastic) but we also met at that point some companies in the US which were making 'Oxy-Biodegradable Plastic' but we did some research in the US and China but we came to a conclusion, that these are all fake stories. Later, we came up with our own solutions -- to be biodegradable plastic our first aim should be to make 'Recyclable Plastic Products' or products made out of recycling. A plastic that is MLP which is biodegradable, recyclable and reusable should be allowed. In two to three years, it will become a fertilizer and a biomass.



PRAKASH JAVADEKAR, Hon'ble Minister of Environment, Forest and Climate Change
(Video Message)

He addressed the conference by saying that, "There is a kind of need for a literacy campaign which can put across this message that 'Plastic as a component itself is not harmful or toxic'. It is not a bad material to be used. We are open to discussion a whole lot of suggestions and recommendations from the industry stakeholders. I would invite you all for meeting.



Speakers of Inaugural Session

TECHNICAL SESSION

Mr. Hiten Bheda, Chairman- Environment Committee, the All India Plastic Manufacturers' Association (AIPMA)

India generates substantial amount of waste and urban areas are leaders in that generation. Major issue we are facing during recycling is that waste doesn't reach to the facilities but can be seen littering on the roads and lanes. The reason behind this is that the vans cannot reach in the narrow range of the slums where nearly 40% of the urban population lives. They ultimately dispose their daily plastic waste into sewage. Municipal corporations can deploy bike based special purpose vehicles for the collection of garbage in these areas. Most areas are located near the slums and the disposal of waste into sewage results in the blockage of sewage. This also carries the plastic waste to the sea.

The problem is the visible plastic pollution in India. If we compare the USA and India, 90% of the USA's waste goes into landfills, whereas in India it is much less.

Recycled waste management rules were first introduced in 1999, amended in 2003 and after that had a long pause. After this the new government came in and followed the



Hiten Bheda, AIPMA - Chairman Environment Committee

Gandhian idea of swachhta. Not only visible cleanliness but also economical. As the waste at the ground level is going to cost the economy as a whole. Later waste management rules 2016 were introduced which talked about plastics, e-waste, bio medical waste etc. the laws were very beneficial and firm but no implementation happened at the growth level. The state government failed to understand that all the laws apply on them also and they have to follow them until ngt came into the picture and directed them that if they fail to submit a report, a penalty of about 1 crore rupees would be imposed on them.

The objective of the plastic waste management rules was to give thrust on plastic waste minimization, source segregation, recycling, involving waste pickers, recyclers and waste processors in collection of plastic waste fraction either from household or any other source of its generation or intermediate material recovery facility and adopt polluters pay principle for the sustainability of plastic waste management system. Mr. Hiten Bheda sir believed that the center and state are not working on the same wavelength even though this is a concurrent subject for both. Around 18 states have imposed a complete ban on plastic bags, whereas in another 5 states a partial ban was imposed on religious and historical sites. About 15-18 states have banned on different types of single use plastic.

Mr. Jeevaraj Pillai, Jt. President (Packaging) - UFLEX Ltd

Began with talking about the who and what the stakeholders wants. Government being the primary stakeholder, wants waste to not be littered around into the drains and gutters getting into the food chain, water streams and aquatic life & it wants to prevent this by the implementation of various rules and regulations. Other stakeholders are the industry, they wish to have solutions that are easy to implement. The solution should be feasible economically and infrastructure should be available to the industries to impose those solutions. Current scenario tells that about 60% of collected waste remains unsorted and mixed with other garbage at landfills as the municipalities, household waste etc do not have proper practices to segregation. Only about 15% of the waste gets collected, segregated and then goes further to recycling or incineration. The problem arises where about 25% of plastic waste remains uncollected and remains dumped or littered. There is available a very easy solution for the waste management called the blue-bin & black bin mechanism. The waste is collected by the municipalities, then segregated. The recyclable materials are put into the blue-bin and the non-recyclable into the black bin. The materials in the black bin either end up in landfills or incineration. Whereas the recyclable materials from the blue- bin such as glass bottles, cans, PET bottles, paper etc. go to the recyclers.



Mr. Jeevraj Pillai, Jt. President (Packaging), UFLEX



Dr. Atul Sud & Mr. Jeevraj Pillai

ANAND S. KULKARNI, Technical Director (Climate Change & Sustainability) KMPG India spoke about key regulations which have emerged in India (Sustainability & Plastic Recycling

Convenience vs Contamination

Especially for Pharmas, there is nothing that can beat the utility of plastic pieces. However, with our growing consumption we also need to be careful. The key sectors using plastic/ generating waste-

1. The Packaging Industry
2. The Building & Housing Industry

Creating the absolute number is 26 thousand tonnes of Plastic generation each day and about 60% of this plastic waste generated gets recycled/ collected. DOES IT RECYCLED? Growing concerns of Single-Use Plastics. What is the central definition of the Single-Use Plastics? At times we focus on developed and developing countries but there is much more attention given to SUP in the African continents. USA to delve into 52 bills last year

in different states, banning SUP, replacing plastic packaging and also introducing the use of bio-plastics. Also, we see a growing trend in terms of banning plastic imports. China, infact has done great economically by banning the import of plastic which has been adopted by the Government of India also.

It is interesting to realize that we have the PWM Rules from 1999, but they have become more stringent now. They were for 20 microns initially and for colored-poly bags especially for food packaging etc. Then in 2003 they were amended again and by 2016 - 6 comprehensible plastic waste management rules came in. By 2019, we are now seeking to resolve issues related to multi-layered plastics and defining up to 50 microns of plastic pieces which are to be banned. It has defined the no-energy generating plastic and non-recoverable/non-recyclable plastics i.e no alternate use plastics also with specificity. To supplement this under the 'Hazardous Waste Management Rules' 2019 has specified that recommended an import ban for solid plastic across areas, irrespective of the fact that you are a manufacturer, or located in the SEZ Zone or as an export oriented unit. Even the European Union has taken certain steps to promote the recycled economy and targeting specific companies with respect to plastic packaging. (Promoting the idea of all the Plastic available in the EU market would either be reusable or be recycled), including feedstock for production, Export high end technology, prevent leakage into the river, air and Waste to Wealth Creation. Even major brands have joined the initiative by eliminating their key products, even though they were major- revenue generators for their companies as a matter of showing commitment to environmental sustainability and to reduce their plastic footprint. By 2030, major brands pledge to increase sorting and recycling capacities (four folds - as of 2015). Industry leaders which are participating in these initiatives are 'Essel Propack, Uflex Ltd has started producing specialized flexible packaging films with 90% Post-Consumer Recycled Content and BASF has seized the opportunity to increase manufacturing of bio-plastic based packaging such as Bio-PET and PLA meet the growing demand of Pepsi and Coca-Cola, Nestle has increased the use of Bio-PE/ Bio-PET and Pepsi Co. has promised to use 100% compostable plant material by the end of 2019 for its snack-products, P&G Ambition 2030 Sustainability Goals include reducing the use of virgin plastics in packaging by 50% by 2030, Coca- Cola Enterprise Commitment 2020' and ITC plans to go beyond 'Extended Producers' Responsibility' requirements and ensure that 100% packaging is reusable, recyclable or compostable by deploying superior solutions. How the states have taken cognizance, with Maharashtra leading the bandwagon?



Anand S. Kulkarni, Technical Director (Environment), KPMG India

PANEL DISCUSSION I: BEST PRACTICE AT CITY LEVEL

MR. PRANJUL JHA – BIOCRUX

Started by talking about the intensive use of plastic in the households each & every day. Informed that we generate about 15,342 tons of plastic waste every day that has gone up to about 26,000 tons of plastic every day and compared the figures to the presence of about 9000 African elephants. The cities in India with maximum generation of Plastic Waste are Delhi, Kolkata & Ahmedabad in that order. According to a CPCB report, only about 80.26% of plastic waste is actually collected out of which only about 28.4% is recycled from the collected waste. About 20% plastic waste remains uncollected and most states don't even reveal the numbers. We are not unaware of how plastic is affecting our marine life, to the extent that there would be more plastic in the sea as compared to fishes till 2050.

But the nature gives back and the Kerala and Mumbai floods are live examples. All of this indicates the enormity of the plastic waste generated and our inability to deal with it. We've been believing that every resource on the surface of the earth is infinite, whereas it's always finite. The land, atmosphere etc. are all just finite. Therefore, we need to look into the circular economy and focus on reduce, recycle and reuse of the plastic waste. Don't look upon it as a waste product but as a raw material for another industry.

Nothing comes easy, one of the many challenges in the circular economy is that plastic waste comes in mixed forms and hence it becomes unviable to segregate in terms of effort. So, Circular economy is more difficult as it would become economically unviable. We should begin segregation at the point of consumption and not only where it is collected. Keeping in mind this philosophy" recycling options at the point of consumption for cleaner environment", Bio crux started working on it since 2012. Wherein they have

machines which are interactive machines having 360 solutions providing for PET bottle recycling. It helps in reduction of volume, reduces the storage area, we can store more bottles in limited area. Also, it becomes easier to collect, to recycle and to create resins out of it. It can then be used in structural products, high grade fibers, t shirts etc. The idea is to be inclusive in approach, to involve and aware people and to be a part of the plastic industry.



Mr. Pranjul Jha, COO, Biocrux India

He then talked about the specifications on the machine. The machine has a T.V for the awareness and educational purposes, it has a reward system for people to remember and change their behavior, it is very child safe and can be put across any tourist destination. The BIOCRUX PET Neutral program has been established in 50+ cities, 300+ installations, 1, 00, 00,000+ bottles have been recycled. There have been 200+ PET waste recycled,

500+ co2 emissions prevented, 151+ cubic yard landfill prevented and about 11630 liters of crude oil saved only in transportation. The challenges discussed by Mr. Jha were:

- 1.) Support from the government- **policy interventions and execution** e.g. EPR Detailing, **funding**- currently done from CSR.
- 2.) Awareness at the authority- installation but the ramp up is slow.
- 3.) Habit of waste disposal.

Suggestion:

Urged knowable people to not only change oneself but also spread awareness and word across to others.

Mr. Debartha Banerjee- Sampurn(a)Earth environment solutions

Began with introducing oneself as a registered PRO some years back, but ben working in EPR and Collection back program from many years. One of the initial programs was with tetra packs. Tetra packs was one the first organizations to collect the tetra packs and use them in school benches, chairs etc. the way the program was implemented was to work with informal market & scrap dealers who don't find a market for tetra pack cartons. So, Sampurn(a)earth worked on creating a market for them by providing incentives and building up a chain. Also, spoke about the dry waste collection centers that they are operate in Mumbai, Goa & Gujarat. They way collection centers work can be broken down into two parts. There can be collection centers established for markets but the informal market is completely absent. For e.g. They have established a project in Dwarka, Gujarat wherein they became aware of that fact that there is only a single scrap dealer all across the region and that it works only with the industrial waste and nobody to take care of the post-consumer waste. Also, in Goa, there are hardly any collection centers all across Goa & in some regions wastes doesn't even get collected which is the reason for the littering problem Goa is dealing with. Though, the Goa municipalities have been able to collect all the dry waste and send 100% of it to incineration facilities even after facing problems related to the high moisture content in the plastic waste and mixed calorific value. The sampurn(a)earth, attempted a material recovery center in Goa with very simplistic machines such as simple conveyors, simple belling machines etc. to compact the waste and hence they have been able to recover around 70-80% of what was earlier going into incineration. From this, traceability has come, it's now heading towards the recovery area, and the waste sent for energy recovery has come down.

Establishment of collection centers and inexpensive recovery centers all across the country is of prime importance as it helps in the primary sorting of material into multiple categories. The MRF solutions gives the first level collection and segregation point. So,

the single category of dry waste that they receive in their centers is segregated into 30 categories because the supply is made to 30 different industries. Wanting to establish the recovery centers in Mumbai, the major challenge is the availability of the land even though in the Mumbai development plan 2020 there's a provision to establish about 72 recovery centers.

Mr. Debartha Banerjee informed that about 1% of the total population consists of scrap dealers, rag pickers, aggregators etc. Addressed the scrap dealers as the real environmentalist but the invisible environmentalist. They provide all the facilities that a dry waste collection center has to provide such as it offers the first collection & segregation point and also gives traceability. They remain invisible because it is believed that a lot of policies are violated over there for e.g. the minimum wages would be met but the labor safety won't be taken care of. So, Sampurn earth has evolved from those collection centers to a market place where they are engaging with the informal markets and creating customized collection centers which can aid value to the market by providing sustainable use for the non-recyclable plastic like MLP'S and to formalize the work of the informal markets.



Debartha Banerjee

Shri C. Ramesh Rao- National Scheduled Castes Finance & Development Corporation (NSFDC)

NSFDC is a national cooperation and a body of government of India and is furthering the national priority given by the Hon'ble Prime minister of India such a Skill India, Stand up India, Startup India, and Digital India. So, NSFDC is working for this as well as the aspirational districts of the country. Basically, promoting economic empowerment of the scheduled caste group and the Safai karamchari group.

Issues:

Challenge in identification- Who identifies & certifies the waste pickers as they are in & out of their profession.

Awareness creation: Whenever we go about some plastic recycling waste project, before that we have to embark upon the very aggressive awareness campaigns such as sensitization, education. So, that should be consistently run over a period of time so that we involve them in a projectised way.



Skilling of the waste pickers- how would we do the skilling, what modules to be used, how much hour skilling would be required and the NSDFC can help the stakeholders.

To link them to the value chain in the plastic industry as some may want to take it up on a larger scale and we need to promote the entrepreneurial intent in them so that they are aware of the scientific waste management practices. Stakeholder involvement- before taking up any project there should be relationship building with the national partners. Also, make a list of partners such as NGO's, industries, startups who can come up and join hands and take up pilot.

Shri Rao, ended his talk by saying that the system is working towards promoting recycling and that they have been given mandate by the government of India to join hands with the private sector, industries organizations etc. to see if they can take up some livelihood and entrepreneurial activities for the target group. He also invited the interested organization to join hands and sign the generic memorandum of understanding. Mr. Rao insisted that the pilot projects should be setup in U.P area such as Noida or R.K Puram as 1/5th of the India's scheduled castes stay in those areas and 90% of safai karamchari's belong to scheduled castes. We are working with multiple partners who channelize our self-employment loans at concessional levels rates through the state channelizing agencies. These work with public sector banks, regional rural sector banks, and cooperative societies are the partners and they are interested in expanding their partners in the plastic sector as well and hence work for the target group.

Dr. Atul Sud, Director Legal, Regulatory & Corporate - Affairs- Perfetti Van Melle India Pvt. Ltd



It was a daunting task but we all came together the Perfetti, Dabur, Pepsi and all and launched the first pilot EPR project. But believe me it was a deliberate effort of many and I believe the recommendation given should be that if the CSR as part of Sustainability, as a role and functioning, and the support of statutory bodies and municipalities to ULBs, manufacturers, brand-owners they all have to come together if this has to become a reality. If the legislation puts only the manufacturers and brand-owners in a tough-place, naturally it is going to take us a lot of time to reach the ground level.

Often Rule 9 of PWM rules is read and forced, whereas people fail to read Rule 6, 7, 8 of the same rules where the role of the panchayats and urban development bodies is clearly mentioned. That is why we are still not able to reach our desired levels of recycling, even though brands have showed 100% commitment for doing EPR, there is no infrastructural support.

Even in the west, the developed nations have taken 15 years to come to 40% of their EPR levels of their total produce. We pleaded the CPCB and other ministries for any kind of support that they could extend. In the end we decide that there is no help going to come to us and we decided to recycle 10% of the MLP we generate in the market. We were humbled that our report has brought the desired results, 2018 amendment was possible because of that, whereas 2016 amendment threatened that MPL (anything that is non-recyclable will be banned). One of the things we achieved through WE CARE's pilot was that we could show that MLP could be transformed into something else. Energy-recovery is one of the things, road-construction is another and others. We also saw many corporates coming in and joining hands for the same project and we would continue to work to achieve EPR framework on a national level. Plastic is no longer a waste, it is raw

material for anybody who has the ability to set up a plant and recycle it. It is material available for free and there are companies willing to fund you.

Also, some state governments have done the lead and initiative and done the pyrolysis on their own. They have the 'Punjab Plastic Waste Management society. Now, the industry is taking the lead in this society with the support of the government officers. But we need to have an exchange of ideas and we cannot function without an EPR framework. Because there is fear that whether our sincere work would also be recognized by the government or not. The industry will comply with all the PWM but we need some sympathy and understanding.

I request all of you to see the 'National Resource Efficiency Policy' is a very sensible piece of document. We are committed and give us some action, give us some time to at least recycle 75% of the plastic till 2025 or 2030. In the CSR policy, PWM should have been the first topic. Please give us some support, we are action-oriented.



Mr. Rajesh Pahwa- Proprietor - 21st Century Polymers

He started by talking about the declaration made by Hon'ble prime ministers speech on the 15th August ,19 that we would not be using single use plastic after the 2nd October 2019. He then presented his perspective by saying that " Today when a recycler like me see the ministers, chairman of municipal corporations, high grade officers from pollution control boards, plastic resin producers, plastic packaging and product manufactures, waste management companies, educational institutions and investors are offering an opportunity to be in one team to achieve 'ZERO LANDFILL'.

We were informed by Mr. Pahwa that in India about 80 % of pet is being recycled. The only material that cannot be recycled is the one in the landfills, therefore he believes we

require help from the municipalities to get it segregated. Being the third generation and with over 30 years of recycling experience, Mr. Pahwa told us that their organization has specialized machines to segregate plastics and also use color sorting machines to separate the colors used to beautify the plastic products. He also suggested that companies like WE CARE can use blue color of hdpe for the multilayer packaging of toilet products. Emphasized on the fact that recycling is not a problem but segregation is.

He continued his talk by speaking about the various uses of plastics such that plastics are extensively used in car manufacturing. The future of cars everybody is dreaming of that cars would soon run on batteries requires cars to be light weight which is possible only by using plastic widely in it. Recycled plastic is also being used to make economic prosthetic for legs which can again be recycled later. The economic comparison was done by telling us that on prosthetic which earlier costs 5000 dollars in the US would only 10 dollars now. Plastic PET bottles are also recycled and used in-production of t shirts and bags. He also believes that collection of plastics helps to provide livelihood to many people who work as rag pickers. He also pointed out the misconception of people by informing that during the production of virgin plastic more carbon is emitted as compared to the release during the recycling process.

He focused on the segregation and recycling of plastic as the best option to tackle the plastic problem as he believed that plastic generation has been the most amazing innovation ever and there's no other product as versatile as plastic.



Rajesh Pahwa



Panel Discussion I



Ms. Annupa Mattu Ahi - TOMRA Collection Solutions Australia

Ms. Annupa began by talking about Tomra that they have been providing solutions for the collection and management of waste primarily in plastics to the industries as well as the government for the past 40 years.

Challenges:

Urbanization- compounded waste generation, prepackaged food & goods and growing wealth.

Consumerism- increased consumption & packaging

Legislation- inappropriate systems and framework

Economic drivers- not in harmony with the environment

Education- awareness and misconception

Plastic is important, it's what we are doing with it that is the key factor and also how we understand the meaning of recycling. TOMRA fundamentally, principally believes in closed loop cycling or clean loop cycling. **She believed that one thing that any**

government can do to mobilize an effective system is legislation i.e. through policy and framework and that it is a quicker, faster and sustainable way. TOMRA were the first ones to create the reverse vending machines. Clean recycling boils down to one practice that is clean collection. Clean recycling has proven to be the best practice and Germany has achieved the bottle to bottle recycling via clean technologies. She gave an e.g. of Australia where people are aware to practice to drop recyclable material into recyclable bins at roads, in schools, at shops etc. She also talked about the introduction of deposit system for the collection of bottles, beverage cans, and containers. The impact of the clean collection was said to be unimaginable as in a country where the population size is not even comparable to India about 1 billion cans were collected in a month. Very important for everyone to realize their responsibilities are ranging from the producers to the consumers. The system needs to be put into place, the responsibilities should be clearly defined be it legislation, policies, framework, infrastructure. She clearly defined her idea saying, we want to reduce littering, and we want to increase the recycling rates, the waste to not end up in oceans and rivers. She believed that the stake-holders find it hard to be compliant with the policies in India because there is not a single system that provides with accurate data, no records, no reporting, no compliance and it all starts with a practice of clean collection.

PANEL DISCUSSION II: SOLUTIONS TO MPL AT EACH STAGE OF VALUE CHAIN



Mr. Amit Banga, CEO – S. B Packaging Pvt Ltd

Talked about the mono-polymer packaging and how is it different from the multilayer packaging. Multilayer packaging has multiple plastics embedded in it which makes it very complex and the end product is also not very valuable. Whereas mono-polymers are

believed to easily recyclable. Therefore PET bottles being a mono-polymer are collected in huge number. Mono-polymers leads to circular economy by making recycling possible, easy and cost effective. The recycled material can be used as a raw material therefore its value is as high as the virgin material. It also enables the recycler to give good price for waste material procured from waste collection agencies.

Informed that many multinational companies such as PepsiCo, Walmart etc. are getting to shift towards sustainable packaging. He recommended that one should give up multilayered packaging and follow mono-polymer packaging as it is easily recyclable.



AMIT SAHA, “I welcome everyone in the room who is present here, and is passionate about plastics (this way or the other). First, I would like to talk about the “Global Context” about Plastics, as to ‘why plastics has provoked so much emotion in this country’ in the recent past. I would like to share with you some statistics. In the last 50 years nearly, we have grown on ‘Plastic Invention, Innovation & Discovery. We have gone from 0 to 400 million metric tonnes of Plastics (globally), i.e. if we calculate 5% of this, India would stand at 16 to 18 million tonnes of plastic.

This material has practically changed the way we lived, I remember in my childhood we used to have soggy Parle-G biscuits with paper packaging and it would change the tastes for us. However, now we have plastic, which is light-weight, lowest-cost, lowest-carbon-footprint and flexible element that can be turned around any which way. The point to be noted here is, that Plastic is growing faster than the GDP of many countries, and there are many reasons behind it.

You must have been noticing that many studies have come up, and talking Plastics in India we have a study by ‘Ellen MacArthur Foundation’ (18- months old), in 2050 there will be

equal amount of plastic as there are fish in the world. We in India wonder why it is such a big deal as we in India recycle 67% of our plastic. (No other country in the world matches this, even though Europe has been practicing PROs and other technologies and has only managed to reach 37% of the recycling rates (the whole of Europe) and USA it is at less than 17%. India consumes 200+ Billion plastic pouches/ pieces every year (2014- 160 Billion KPMG figure). Probably, it is because of this number of plastic pieces which are littered and so much adversity is created in our ecosystem. It is our responsibility that we manage to bring back plastic and restore the used plastic so it not littered everywhere. (Whether we are consuming it, producing it or supplying it). Multi-stakeholder discussion. We have considered 'Collection as an actionable-change for the plastic industry'

Dr R.K. Bajaj, Sc.G & DDG (Standardization) - Bureau of India Standards (BIS)

Began by introducing BIS- Bureau of Indian standards, which was established under the BIS act 1986 and amended up to 2016. BIS has published over 20,000 standards for various products. Would talk about the standards developed in the plastic recycling field. **IS 14534** - Basic guidelines for the recycling and recovery of plastics. It also prescribes guidelines for the collection, segregation and processing for various scrap. It helps to establish different options for recovery of plastics arising from pre consumer and post-consumer services. Also, prescribes guidelines to the manufacturers of plastic products with regards to the market to be used, in order to facilitate the identification of raw materials.



Dr. R.K. Bajaj

Recycling of plastic for the manufacturing of product designation- It is intended to be used for the identification and classification of recyclable plastic material on the basis of

its properties and applications. It also applies to recyclable materials ready for normal use without any modification.

IS 16591- it is for the mixture of polypropylene and polyethylene recyclable derived from PP & PE used for flexible and rigid consumer packaging? It establishes the system used as the basis of specification of the mixture of PP & PE recyclate. Also covers material derived from PP & PE used for flexible or rigid consumer packaging. Recyclate derived from this method should not be used for the packaging of hazardous materials.

Post-consumer polyethylene Terephthalate for bottle recycling- provides the designation system for PET and other bottles.

IS 15434- this standard has also been mentioned in plastic waste management rules?

Other than these standards there are about 9 other standards given in schedule 1.

It was also informed that all the standards are technically reviewed after every 5 years.

Mr. Dinesh Dayal, President, Indian Beauty & Hygiene Association (IBHA)

Aims to bring about more and more safe healthcare & beauty products by also being environmental friendly. Started a project about 5 years ago on multilayered plastic and its waste management where they developed an end to end model starting from collection, segregation, storage and recycling too useful materials and products & with zero waste.



Dinesh Dayal

They have been working on the sachets that are seen littering the roads after people approached them to do something about that. Sachets are usually not collected by the rag pickers because they are difficult to collect and then segregate. So, they then mastered a project related to the same in Maharashtra. They began by collaborating with a women rag pickers, NGOs, incentivized them and then began looking for recyclers. After

several failed attempts they attended a board meeting with AIPMA an old them about their plan and asked if AIPMA could find them a recycler and AIPMA did. They then began their project with RUDRA that helped them convert their multilayered plastic waste to fuel oil. Now the projects have been established in Chennai and Bangalore too. In Bangalore the collected sachets waste goes to ACC cement. Plastic having a high calorific value heats better & reduces the use of coal going into the cement factories, therefore providing a synergistic benefit. They are now plan to collect plastic waste from Mumbai and supply it to the recycler who is going to use them in the making of Plywood. Adding plastic to plywood makes the plywood stronger and gives it a better life. IBHA in future plans to collaborate with municipalities and other recyclers to get rid of the littering problem and pit them to better use by recycling.



A member of the audience asking questions

PANEL DISCUSSION III: PLASTIC SOLUTION FOR INDIA

Mr. Vagish Dixit, Managing Director, ALPLA

ALPLA is the largest producers of plastic bottles in the world. Working since the last 63 years. Have over 178 production sites in 46 countries with 72 in house sites that means working inside the client's plant which gives an example of sustainability as there is no transportation, no packaging hence reduced carbon footprint.

E waste, concrete, bio waste are bigger problems as compared to plastics but just because we do not see them fallen on the roads nobody considers it a problem.

Plans to spend in vans for compression so that rag pickers who earn below than their minimum wages can use it, compress the waste, collect more waste and increase their wages. Structural issues need to be addressed:

- 1.) Address issues of ethical sourcing
- 2.) Ensure smeta 6 compliance

3.) Alleviate social issues related to the rag pickers for eg providing them with gloves so they don't hurt while collection or sorting bio waste

4.) Create a safe eco system

The energy required for pet bottles is about 400 less than what it is required to recycle a glass material. Glass has 400 % more cumulative energy demand for recycling than plastic across all categories on average. Establish a recycling plant with a capacity of 10,000 tons facility by 2021 for recycling and social alleviation.



Mr. Vagish Dixit

Dr. P. B. Rastogi, Former Advisor to Govt. of India- Ministry of Environment, Forests and Climate Change, GOI



Dr. P.B. Rastogi

Began by talking about the exceptional increase in plastic waste over the years that is, 2.3 million tons in 1950 to 335 million tons in 2016 and is expected to increase 300 times

more till 2050. Talking about the plastic waste management rules, Dr. Rastogi said that these rules were introduced as early as 1999 and have had many amendments since then but the implementation is very poor.

Recently, India has banned import of plastic waste pet bottles in India from China, Italy Japan Malwa etc. for reprocessing purposes which is believed to be an unfair process as we already have so much to deal with. DR. Rastogi also commented on Hon'ble Prime Ministers speech on the 15th august saying that it is not possible to ban single use plastic giving an e.g. of the medical syringes widely use and they don't have a substitute and saying that is a serious matter of discussion. Further Dr. Rastogi explained that collection, segregation, refuse and recycling are the areas we should definitely focus on. Also, One can go through the book, "PLASTICS" that is available in the ministry that clarifies any mis-conceptions that exists about plastics.

Mr. Geir Saether, Sr.VP (Circular Economy) - TOMRA Collection Solutions Australia

The problem is littering. Plastic is a versatile and fantastic material with wide uses. So, we should continue to use plastics but not litter. The greenhouse gas emissions come from both the production and incineration of plastic products and wastes. However, practical solutions are available.

Polluter pay principal is generally recognized all over the world. And a well functional EPR is also gaining popularity all across the world. Plastic as a material is easily recyclable but it has to be separated into clean fractions. Talked about the clean loop mechanism which is used to PET bottles, cans and other containers and that this mechanism has a dedicated collection i.e. a separate collection usually through the reverse vending machines. When this method is applied, through the deposit system the bottles are so clean that when they are recycled into small pellets, red crude is obtained and it's a bottle to bottle recycling method. TOMRA works in to provide technological inputs in the form of spectroscopy which helps to separate different plastic materials from each other.



Mr. Geir Saether

Major aim is to collect the waste, clean it, separate it and use it to make new products. In Norway and Australia the mixed waste is dropped at the material recovery facility by the municipalities. There they have Tomra sorters, granulators, washing lines & extruders. After all the facilities granules are obtained which is then sold to the convertors and new products are made out of them. The residuals from this process are then sent to the incinerators. Energy recovery also happens at this stage where thermal and electrical energy is produced.

Dr. Jitendra Sharma, Consultant – United Nations Environment Programme (UNEP)

He began by talking about the report on single use plastic which was released in the year 2018 during the world environment day. It is guidance or holistic document which was released on single use plastic. It also included government's roadmap on sustainability as well various approaches the government can take. Recently in January UNEP has also released another document on the legal limits on single use plastic around the globe after the research done in different regions of the world. Talking about the definition of single use plastic, Dr.Sharma said that UNEP follows the definition that also has been given in the document that says," the materials which are intended to use only once before it is thrown out or recycled, he also believes that the definition in India could be a little different and that they have been working closely with MOEF and hope that MOEF is soon to come up with a definition and list of products which would be referred to as single use plastic. Also working very closely with MOEF in regards of the EPR framework and hope that soon they are going to provide with draft of the EPR framework guidelines. UNEP helps the government organizations to make policies and plans. It believes that there are 4 pillars of any policy, they are: regulatory framework, financial instruments, volunteering instruments & information instruments.



Dr. Jitendra Sharma

Dr. Medha Tadpatrikar, Director - Rudra Environmental Solution India Ltd

The company started working with pyrolysis when plastic waste wasn't an issue. In 2009. In the recent times they've received funding from the some foreign organizations. According to Ms. Madhavi Purohit, pyrolysis early was done only for rubber tyres which wasn't a really good process and hence it received a bad name. Though she believes that in terms of plastic, it is one of the best solutions one can have particularly for the plastic that is believed to be traditionally non-recyclable such as multi layered plastic's etc. also, Segregation is not required during the pyrolysis process, all types of plastic can be put into it and fuel can be obtained. During the pyrolysis process there are three things that are produced: fuel, char and gas. The fuel can be used in industries for running the machines or in generators, incineration etc. The gas whereas is used to run the pyrolysis reactor itself, so it's very energy efficient process. The char is used in road construction. So, we could say that all the by products are useful. Pyrolysis thermo catalytic depolymerisation has no emissions and residues are not there. The fuel processed can be directly used without processing. It is a good technology to work with the legacy plastic that has been dumped in the landfills many years ago.

They realized that there are certain issues while working in India that is that the technology should be financially viable, socially accepted and not very large machines can be set up because collecting such a lot of plastic at one place becomes very difficult. So we realized that in India decentralized machines that could convert plastic into fuel are a way forward. Instead of setting up a machine with 25 tons capacity, we could set up machines with a capacity of 3-4 tons at varied places because logistics has a very large

cost. But wouldn't say this is the only way to go because tackling the issue would require mixed efforts such as plastics into the roads, in cement kilns etc.



Dr. Medha Tadpatrikar

Shri P. Raghavendra Rao, Secretary, Dept of Chemicals and Petrochemicals, GOI

We were trying to prepare a perspective plan for the Chemicals and Petrochemicals sector and as pointed out by a technical expert that the scenario is soon going to change because of the banning of single use plastic and due to the new emphasis on recycling of the plastic, the demand for virgin plastics is going to be severely affected. Thus, we can assess from the European example as well, that the demand and supply of petroleum would reduce significantly. Now, Europe is facing only 1% growth in the Petroleum industry as dealing with Plastic waste has become the top most priority. All the recycling practices that have been discussed in the conference are very relevant and would be taken into consideration only if they are economically viable practices.



P. Raghavendra Rao, Secretary, Dept. of Chemical & Fertilizers, GOI



Panel III

SIGNIFICANT INSIGHTS RECOMMENDATIONS

1. ASHOK CHATURVEDI, CMD UFLEX

- His company is vision leader in recycling and manufacturing flexible plastic products. At the event he spoke how his company has been recycling all sorts of plastic from the past 25 years. He said that not only single-use plastic but even MLP is 100% recyclable and so we should eliminate the word 'Waste' from our minds. Also, he busted a myth that all types of MLP (multi-colored, adhesive etc.) cannot be recycled together. As they have been doing it in their own treatment plants across the world. No sorting or further segregation is required.
- We should be proud that we are supporting the outputs of the 'farmers' especially as their crops are turned into example 'potato-chips' and are packaged in such a way that they can be consumed anywhere or anytime. He recommended to the **Government of India**: If the municipality only carries out the **Segregation** and **Collection** activities from the whole city and set up a factory where - glass, bottles, MLP and major packaging components are separated, this will ease a lot of work-load of the companies who want to step into recycling activity. The municipality can also create separate bins and sell them off. This model is being followed very successfully in **Poland**.
- As plastic industry leaders and manufacturers', **we have to stop the burning of Plastics also**. As whatever filters you may put in place, but many vapors, hazardous chemicals and carbons will pass through it. Also, research has been carried out that some manufacturers are making 'Bio-plastic (Biodegradable plastic) and 'Oxy-Biodegradable Plastic' in the US and China but these are all false stories. It is impossible to make such plastic and we should not fall for such falsehood/ import such product blindly but our first aim should be to make 'Recyclable Plastic' or products made out of recycling. A plastic that is MLP which is biodegradable, recyclable and reusable should be allowed.

2. Ms. Annupa Mattu Ahi - TOMRA Collection Solutions Australia

- She said that, “TOMRA has been providing solutions for collection and waste management for the plastic industry as well as the government bodies.” So, she is familiar with the government working for the past 40 years. She said that “We would recommend that the government observes that increased consumption & packaging is due to increased urbanization and growing consumerism.” However, there were **not enough appropriate policy measures** (no accurate data, no single- window system for compliant certification, no reporting, no sale of segregated collected plastic waste, no support from the government) in place for awareness towards environmental compliances. In order to remove the misconceptions such as ‘Plastic is a toxic material’, the key change would come when we learn how to deal with Plastic which everywhere in our daily-life. She suggested, “If every citizen can learn as to how to recycling at their own individual level, they can come up with their own styles of recycling. For example- TOMRA believes in closed loop cycling/clean loop cycling. **She believed that one thing that any government can do to mobilize an effective system with a legislation i.e. through policy and framework and that it is quicker, faster and sustainable way.** TOMRA were the first ones to create the reverse vending machines. Clean recycling boils down to one practice that is clean collection. Clean recycling has proven to be the best practice and **Germany** has achieved the bottle to bottle recycling via clean technologies.
- She gave an example of **Australia** where people are aware to practice to drop recyclable material into **recyclable bins** at roads, in schools, at shops not just any dustbins. She also talked about the **introduction of deposit system** for the collection of bottles, beverage cans, containers. The impact of the clean collection in India, if this model is followed would be so great that we cannot even imagine (given the country’s population size). India, can win, only that ‘Banning something is not a solution’ as it is not killing people, ‘Littering’ is killing people.
- If everyone is consuming it, why only the producers bear more responsibility for it. Even Consumers and Government has a wide ranging responsibility after using it. She recommended that clearly defined legislations, policies, framework, infrastructure and systems should be in place.

3. Shri C. Ramesh Rao- National Scheduled Castes Finance & Development Corporation (NSFDC)

NSFDC is a national cooperation and a body of Government of India, NSFDC is working for this as well as the aspirational districts of the country. Basically, promoting economic empowerment of the scheduled caste group and the safai karamchari group.

Issues:

- **Challenge in identification-** How do we identify & certify that the waste/rag pickers are in & out of their profession (seasonally). Can we ever label them as 'Plastic-Waste Rag-Pickers'?
- **Awareness creation:** Also we always try to create awareness about 'plastic waste recycling' before that we have to embark on an awareness campaign. While doing such aggressive awareness campaigns such as sensitization, education only for a short-period of time, I suggest that the government runs a long-term project on creating awareness about 'Plastic Waste Management and Recycling'. So, that we can also involve waste-pickers in a projectized way. **Skilling of the waste pickers-** How would we do the skilling?
- No recommendation/direction has been given by the government to us. As to what modules to be used to educate them, how much hours of skilling would be required at NSDFC to skill them? How to link them to the value chain in the plastic industry as some may want to take it up on a larger scale and we need to promote the entrepreneurial intent in them so that they are aware of the scientific waste management practices?
- Stakeholder involvement- Before taking up any project there should be relationship building with the national partners. Also, make a list of partners such as NGOs, industries, startups who can come up and join hands and take up pilot.
- He urged that the people involved in promoting recycling should join hands with the private sector, industries organizations to initiate livelihood and entrepreneurial activities for the target group (SCs). Mr. Rao insisted that the pilot projects should be setup in U.P area such as Noida or R.K Puram as 1/5th of the India's scheduled castes stay in those areas and 90% of safai karamchari's belong to scheduled castes. We are also working with multiple partners to channelize our self-employment loans at concessional rates and are interested in signing MOUs with public sector banks, regional rural sector banks, and cooperative societies to expand our partners in the plastic sector and for the benefit of the target group.

4. Mr. Amit Banga, CEO – S. B Packaging Pvt Ltd

He talked about the mono-polymer packaging and how is it different from the multilayer packaging. Suggesting the idea to slowly shift from MLP to mono-polymers, would be an idea move for the industry. Mono-polymers are presumably better as they are believed to easily recyclable. Therefore PET bottles being a mono-polymer are collected in huge number. Mono-polymers leads to circular economy by making recycling possible, easy and cost effective. The recycled material can be used as a raw material therefore its value is as high as the virgin material. It also enables the recycler to give good price for waste material procured from waste collection agencies. Informed that many multinational companies such as PepsiCo, Walmart, etc. are getting to shift towards sustainable packaging. He recommended that one should give up multilayered packaging and follow mono-polymer packaging as it is easily recyclable.

5. Dr R.K. Bajaj, Sc.G & DDG (Standardization) - Bureau of India Standards (BIS)

He introduced BIS- standards available for plastic field.

IS 14534 - Basic guidelines for the recycling and recovery of plastics. It also prescribes guidelines for the collection, segregation and processing for various scrap. It helps to establish different options for recovery of plastics arising from pre consumer and post-consumer services. Also, prescribes guidelines to the manufacturers of plastic products with regards to the market to be used, in order to facilitate the identification of raw materials.

Recycling of plastic for the manufacturing of product designation- It is intended to be used for the identification and classification of recyclable plastic material on the basis of its properties and applications. It also applies to recyclable materials ready for normal use without any modification.

IS 16591- it is for the mixture of polypropylene and polyethylene recyclable derived from PP & PE used for flexible and rigid consumer packaging. It establishes the system used as the basis of specification of the mixture of PP & PE recycle. Also covers material derived from PP & PE used for flexible or rigid consumer packaging. Recyclate derived from this method should not be used for the packaging of hazardous materials.

Post-consumer polyethylene Terephthalate for bottle recycling- provides the designation system for PET and other bottles.

IS 15434- this standard has also been mentioned in plastic waste management rules.

Other than these standards there are about 9 other standards given in schedule 1. It was also informed that all the standards are technically reviewed after every 5 years.

6. Mr. Dinesh Dayal, President, Indian Beauty & Hygiene Association (IBHA)

- He addressed the gathering by emphasizing how they are aiming to bring about more and more safe healthcare & beauty products (which are environmental friendly). He informed about a project about 5 years ago on MLP and its waste management where they developed an **end to end model** starting from **collection, segregation, storage and recycling** useful materials and products and resulting in 'Zero-Waste Generation'
- **Littering Sachets on Roads-** They were approached to collect Sachets usually found on the roads as rag pickers find it very difficult to pick that up, manually and segregate. **They have mastered this project in Maharashtra.** After collaborating with a women rag pickers NGO, they incentivized them and then began looking for

recyclers. AIPMA helped us in finding a relevant recycler and we started our project with RUDRA to convert MPL to oil-fuel.

- Such projects are now established all over and such waste goes to cement factories. Even in Chennai and Bangalore, Plastics having a high calorific value heats better & reduces the use of coal going into the cement factories, therefore providing a synergistic benefit. Now we plan to collect plastic waste from Mumbai and supply it to the recycler, who would be converting it into Plywood. As we know, by adding plastic to plywood makes the plywood stronger and gives it a better life.
- **Collaboration with Municipalities-** IBHA in future plans to collaborate with municipalities and other recyclers to get rid of the littering problem and pitch the idea of using 'recycled plastic only'.

7. Shri P. Raghavendra Rao, Secretary, Dept. of Chemicals and Petrochemicals, GOI

We were trying to prepare a perspective plan for the Chemicals and Petrochemicals sector and as pointed out by a technical expert that the scenario is soon going to change because of the banning of single use plastic and due to the new emphasis on recycling of the plastic, the demand for virgin plastics is going to be severely affected. Thus, we can assess from the European example as well, that the demand and supply of petroleum would reduce significantly. Now, Europe is facing only 1% growth in the Petroleum industry as dealing with Plastic waste has become the top most priority. All the recycling practices that have been discussed in the conference are very relevant and would be taken into consideration only if they are economically viable practices.

8. Mr. Rajesh Pahwa- Proprietor - 21st Century Polymers

He expressed gratitude that, "Today when a recycler like me see the ministers, chairman of municipal corporations, high grade officers from pollution control boards, plastic resin producers, plastic packaging and product manufacturers, waste management companies, educational institutions and investors, they are all offering an opportunity to be in one team to achieve 'ZERO LANDFILL' . (*Industry is changing*)

- Mr. Pahwa said that in India about 80 % of PET is being recycled. The only material that cannot be recycled is the one in the landfills, therefore he believes we require help from the municipalities to get it segregated. Being the third generation and with over 30 years of recycling experience, he said that his organization has specialized machines only to segregate plastics and they also use color sorting machines to separate the colors (used to beautify the plastic products). He also suggested that companies like WE CARE can use blue color of HDPE for the MLP of toilet products. **He emphasized on the fact that recycling is not a problem but segregation is.**

- He said that we are all aware, that Plastics are extensively used in car manufacturing, however how can we think about eliminating Plastics when our future cars are imagined to be running on batteries requires. For that simple reason, a car has to be light-weight practically.
- We cannot imagine prosthetic limbs for patients being made of something other than plastic (recycled plastic) which used to be earlier imported from US and it used to cost us 5000 dollars in the US but now we manufacture it for only 10 dollars in India. PET bottles are also recycled and used in the production of T- shirts and bags. Also, he resolved a misconception of people that more carbon is emitted during the production of plastic, but I would like to point out virgin plastic production emits more carbon as compared to recycled plastic.

9.) Mr. Vagish Dixit, Managing Director, ALPLA

- ALPLA is the largest producers of plastic bottles in the world. Working since the last 63 years. Have over 178 production sites in 46 countries with 72 in house sites that means working inside the client's plant which gives an example of sustainability. Therefore, we promote zero-carbon footprint by not using any transportation/packaging to take it outside for recycling.
- Plans to spend in vans for compression of plastic waste so that rag pickers who earn below than their minimum wages can use it, compress the waste, collect more waste and increase their wages.
- Structural issues need to be addressed:
 - 1.) Address issues of ethical sourcing
 - 2.) Ensure SMETA 6 compliance
 - 3.) Alleviate social issues related to the rag-pickers for example- providing them with gloves so they don't hurt while collection or sorting bio- waste (pharma waste).
 - 4.) Create a safe eco system