“Plastics Recycling, Circular Economy and Integrated Waste Management”

Indian Polyester - 2020
**Content**

- Plastic Consumption in India
- Plastic Waste – Indian Scenario
- Plastic Waste – Global Scenario
- Reduce, Reuse & Recycle
- Value Added Applications with Recycled Plastics
- Plastics Waste Management Rules
- Circular Economy
- Case Study – Economy Indicator of different materials
- Conclusion
Plastic Consumption in India

- Plastic Waste – Indian Scenario
- Plastic Waste – Global Scenario
- Reduce, Reuse & Recycle
- Value Added Applications with Recycled Plastics
- Plastics Waste Management Rules
- Circular Economy
- Case Study – Economy Indicator of different materials
- Conclusion
Indian Plastic Industry

- Plastics industry is one of the fastest growing industries in India
- Strength of Industry - 50,000 Active Processors, 7500 Recyclers
- India’s plastics industry targets 3% share of the global polymer export market by 2025
- Currently share 1% of global polymer export market which is close to 850 bn dollars
- The Indian plastics industry expected to grow at an annual rate of 8-10%, with domestic polymer consumption expected to double by 2028

India has big potential to grow and presents many opportunities for Plastic Industry
Plastic Consumption In India

Polyolefins demand growth (CAGR) is 3.5%, 2018-19 consumption – 10,500 KTPA

- Within Plastics, Packaging accounts for largest share of application
- Within Packaging Materials (mostly single-use), Plastics (rigid + flexible) enjoy the highest share
Plastic Consumption in India

**Plastic Waste – Indian Scenario**

Plastic Waste – Global Scenario

Reduce, Reuse & Recycle

Value Added Applications with Recycled Plastics

Plastics Waste Management Rules

Circular Economy

Case Study – Economy Indicator of different materials

Conclusion
Plastic Waste – Indian Scenario

Plastic products produced in + 50,000 units across India employing ~4 million

More than 25,000 tonnes of plastic waste generated across India every day

Only 15,000 tonnes of plastics (~60% of the total quantity) recycled daily

10,000 tonnes of plastics discarded in unsafe ways

Much of discarded single use plastics end up in landfills and cement kilns

As per CPCB reports, plastic contributes to 8-9% of the total solid waste

Composition Of solid waste in India
Plastic Waste Issue

Whom to Blame?

Plastics Causing Inconvenience?

Is it the “Plastics or the People”

Use Sensibly! Stop Littering!

“Recyclable” is meaningless unless Recycling is actually done!
Plastic Consumption in India

Plastic Waste – Indian Scenario

Plastic Waste – Global Scenario

Reduce, Reuse & Recycle

Value Added Applications with Recycled Plastics

Plastics Waste Management Rules

Circular Economy

Case Study – Economy Indicator of different materials

Conclusion
Plastic Waste – Global Scenario

- Global Plastic Waste Management Market is projected to grow at CAGR 3.1% till 2024
- Asia Pacific region will continue to dominate the market
- Growth attributed to awareness on sustainable development
- The packaging segment in the recycled plastic waste market is projected to grow at the highest CAGR of 8%
Impact of 3 E's Plastic Waste – Global Scenario

20 countries with the worst management of plastic waste

Majority of countries are in Asia Pacific
Plastic Consumption in India

Plastic Waste – Indian Scenario

Plastic Waste – Global Scenario

**Reduce, Reuse & Recycle**

Value Added Applications with Recycled Plastics

Plastics Waste Management Rules

Circular Economy

Case Study – Economy Indicator of different materials

Conclusion
3 R’s – Key to Optimistic Future

Modern Waste reduction works on 3 R’s

‘Reduce, Reuse, and Recycle’ waste hierarchy

Improves overall waste management processes
**Why to Recycle?**

- Mandated by some states
- Customer Expectations
- Environmental benefits
- Energy Recovery
- Opportunity to convert waste to wealth!
Ways of Recycling

Plastics Waste Management

Recycle
- Mechanical Recycling
- Mixed waste recycling
- Chemical recycling

Repair/Reuse
- Household & Industrial containers are reused many times
- Carry bags, Water bottles etc.,
- Repaired buckets, Woven sacks
- Shelter for huts etc.,

Incineration
- Energy recovery Ex. Heat, Oil etc.,
- Plastic Consumption in India
- Plastic Waste – Indian Scenario
- Plastic Waste – Global Scenario
- Reduce, Reuse & Recycle
- **Value Added Applications with Recycled Plastics**
- Plastics Waste Management Rules
- Circular Economy
- Case Study – Economy Indicator of different materials
- Conclusion
Products Made by Recycling

.....Converting to value added end products

Huge Value addition

Plastic Waste
Huge Value addition

Box strapping

Plastic footwear
Indian Experience of Value Addition in Plastics Recycling

Products Made by Recycling

Milk pouches

Barsati film

Battery Cases

Luggage
## Products Made by Recycling

<table>
<thead>
<tr>
<th>Name of Plastic</th>
<th>Some uses of virgin plastic</th>
<th>Some uses of recycled plastic</th>
</tr>
</thead>
<tbody>
<tr>
<td>PET</td>
<td>Soft drink and mineral water bottles</td>
<td>Multi-layer soft drink bottles, carpet fibres fleecy jackets</td>
</tr>
<tr>
<td>HDPE</td>
<td>Milk crates, bottles for shampoo and cleaners milk and cream bottles</td>
<td>Waste bins, detergent bottles, crates, agricultural pipes, kerbside recycling crates. Plastic lumber, Plant pots, Traffic cones, Toys, Outdoor furniture</td>
</tr>
<tr>
<td>Rigid PVC</td>
<td>Clear cordial and juice bottles, plumbing pipes and fittings</td>
<td>Detergent bottles, tiles, plumbing pipe fittings.</td>
</tr>
</tbody>
</table>
## Products Made by Recycling

<table>
<thead>
<tr>
<th>Name of Plastic</th>
<th>Some uses of virgin plastic</th>
<th>Some uses of recycled plastic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible PVC</td>
<td>Garden hose, shoe soles, blood bags and tubing.</td>
<td>Hose inner core, industrial flooring</td>
</tr>
<tr>
<td>LDPE</td>
<td>Garbage bags, garbage bins, black plastic sheet</td>
<td>Composite bins, crates</td>
</tr>
<tr>
<td>PP</td>
<td>Drinking straws, icecream containers hinged lunch boxes</td>
<td>Composite bins, crates</td>
</tr>
<tr>
<td>PS</td>
<td>Yoghurt containers, plastic cutlery</td>
<td>Coat hangers, office accessories rulers, video/CD boxes</td>
</tr>
</tbody>
</table>
Plastic Consumption in India

Plastic Waste – Indian Scenario

Plastic Waste – Global Scenario

Reduce, Reuse & Recycle

Value Added Applications with Recycled Plastics

**Plastics Waste Management Rules**

Circular Economy

Case Study – Economy Indicator of different materials

Conclusion
Plastic Waste Management (Amendment) Rules, 2018 released by the MoEF in 2018, offer a series of directives to all stakeholders of plastic industry

<table>
<thead>
<tr>
<th>Producer</th>
<th>Generator</th>
<th>Retailer</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Responsibility towards waste collection based on EPR</td>
<td>• Waste Generator includes institutional generators, event organizer shall take steps to minimize generation of plastic waste and prohibited to litter</td>
<td>• Only registered vendors shall be eligible to provide plastic carry bags for dispensing commodities</td>
</tr>
<tr>
<td>• Establish a system for collecting back the plastic waste generated</td>
<td>• Segregate waste and handover to authorized agency</td>
<td>• Plastic bags or multi-layered packaging which are not labelled in accordance with rules shall be liable to pay fines as per local byelaws</td>
</tr>
<tr>
<td>• Obtain registration from SPCB and Sales to registered processors only</td>
<td>• Pay user fee as prescribed by bye laws of the Local Body</td>
<td></td>
</tr>
</tbody>
</table>
# Prescribed Authorities for PWM

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Prescribed Authority</th>
<th>Major Responsibilities</th>
</tr>
</thead>
</table>
| 1.  | SPCBs/PCCs                               | - Registration to producers, manufacturers & recyclers.  
- Annual Report Submission to CPCB in **Form-VI**.                                                                                                           |
| 2.  | Local Body                               | - Development and setting up of infrastructure for segregation, collection, storage, transportation, processing and disposal of plastic waste.  
- Frame bye-laws incorporating provisions of PWM Rules, 2016  
- Submission of Annual Report by local body in **Form-V**.                                                                                              |
| 3.  | Secretary-in-Charge, UDD                 | - Enforcement of PWM Rules, 2016 relating to waste management use of plastic carry bags, plastic sheets or like, cover made up plastic sheets and multi-layered packaging.                   |
| 4.  | Gram Panchayat                           | - Set-up, operationalize and co-ordinate plastic waste management in rural area.                                                                                                                                      |
| 5.  | District Magistrate or Deputy Commissioner | - Providing assistance to SPCBs/PCCs, UDD, Gram Panchayat in enforcement of PWM Rules, 2016.                                                                                                                        |

All 28 States and 9 UTs have banned use of SUP’s completely/partially
Plastic Consumption in India

Plastic Waste – Indian Scenario

Plastic Waste – Global Scenario

Reduce, Reuse & Recycle

Value Added Applications with Recycled Plastics

Plastics Waste Management Rules

Circular Economy

Case Study – Economy Indicator of different materials

Conclusion
Shift to Circular Economy

- Circular economy - alternative to traditional linear economy (make, use, dispose)
- A circular economy follows the 3R approach: reduce, reuse and recycle
- Circular economy works in closed loop
- Circular economy contributes to a sustainable world
- Circular economy is restorative or regenerative by intention and design
- Leads to value enhancement of Raw material, Components and Products
Drivers for change

- Economic and Structural Losses
- Price Volatility
- Demographic Trends
- Urbanisation
- Acceptance of New Business Models
- Technological Advances

Circular Economy – Regenerative and Restorative by Design
Plastic Consumption in India

Plastic Waste – Indian Scenario

Plastic Waste – Global Scenario

Reduce, Reuse & Recycle

Value Added Applications with Recycled Plastics

Plastics Waste Management Rules

Circular Economy

Case Study – Economy Indicator of different materials

Conclusion
Eco-indicator for Diff. Materials

**Function:** contain 1 litre of fluid

<table>
<thead>
<tr>
<th>Container Type</th>
<th>Glass</th>
<th>PE</th>
<th>PET</th>
<th>Alu</th>
<th>Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass [g]</td>
<td>325</td>
<td>38</td>
<td>25</td>
<td>20</td>
<td>45</td>
</tr>
<tr>
<td>Mass/volume [g/litre]</td>
<td>433</td>
<td>38</td>
<td>62</td>
<td>45</td>
<td>102</td>
</tr>
<tr>
<td>Energy/Mass [MJ/kg]</td>
<td>14</td>
<td>80</td>
<td>84</td>
<td>200</td>
<td>23</td>
</tr>
<tr>
<td>Energy/Volume [MJ/litre]</td>
<td>8.2</td>
<td>3.2</td>
<td>5.4</td>
<td>9.0</td>
<td>2.4</td>
</tr>
</tbody>
</table>

The winner is steel. The losers are glass and aluminium.

Recycling changes the picture a little – but not simple
Energy Breakdown of PE Bottle

Life-Cycle Analysis
Plastic Consumption in India

Plastic Waste – Indian Scenario

Plastic Waste – Global Scenario

Reduce, Reuse & Recycle

Value Added Applications with Recycled Plastics

Plastics Waste Management Rules

Circular Economy

Case Study – Economy Indicator of different materials

Conclusion
Conclusion

- Shift to Circular Economy from Linear Economy must
- India’s waste management system needs to be changed
- Awareness at each and every level required to stop plastic menace
- 3 R’s (Reduce, Reuse & Recycle) need to be demonstrated
- Plastic waste recycling facilitate
  1. Clean Environment
  2. Employment Opportunities
  3. Economical Products
  4. Shift from waste to wealth

Use Plastics Responsibly!
Invincible - Plastic

A cozier world with plastics!
Lighter cars with plastics!
Flying further on less fuel with plastics!
Switch off the engine with plastics!

A Better World With Plastics!

Tapping the sun’s energy with plastics!
A lighter world with plastics!
Capture the wind’s power with plastics!
Keeping it cool with plastics!
Thank You!

It’s the only home we’ve got!

Stop Littering, Save World!