Recycling of E-plastics in India

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E-plastic scenario

- India reportedly generates around 1.85 million tonnes of e-waste annually
- On an average 21% of this would be plastics
- Literature suggests presence of ABS, PE, PP, PC, PVC and HIPS
- Mechanised sorting of E-Plastics cost prohibitive
Recycling E-plastics

- 90% of e-waste is still recycled in informal sector
- Even in formal sector plastic recycling is challenge as
  - Mixed nature of plastics
  - Presence of FRs
## Potential value in recycling e-waste

<table>
<thead>
<tr>
<th>Material</th>
<th>kilotons (kt)</th>
<th>Million €</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fe</td>
<td>16,283</td>
<td>3,582</td>
</tr>
<tr>
<td>Cu</td>
<td>2,164</td>
<td>9,524</td>
</tr>
<tr>
<td>Al</td>
<td>2,472</td>
<td>3,585</td>
</tr>
<tr>
<td>Ag</td>
<td>1.6</td>
<td>884</td>
</tr>
<tr>
<td>Au</td>
<td>0.5</td>
<td>18,840</td>
</tr>
<tr>
<td>Pd</td>
<td>0.2</td>
<td>3,369</td>
</tr>
<tr>
<td>Plastics</td>
<td>12,230</td>
<td>15,043</td>
</tr>
</tbody>
</table>

Data for 2016, **source**: The Global e-waste Monitor, 2017, Baldé, et.al
Laboratory research
E-plastics in course aggregate

- Similar was trend for tensile strength
E-plastic compression moulding

- Research in ABS indicate that improper mixing, entrapped gases can result in lower flexural strength than virgin counterpart
- Lower strength is also attributed to degradation of butadiene rubber at higher temperature
- Similar results were seen in ABS/PC mix moulding
Recycling pilots in India
Technology by CIPET

Source: DST
Various applications
• Recycling of PCBs @ 100 kg/day
• Manual removal of metallic parts
• Depopulation of solder and components connected to PCB
• Shredding to 40 to 50 mm pieces
• Controlled calcination/pyrolysis to remove organic components
• Smelting to remove inorganic fillers and obtain black copper
• Electro-refining to get 99.99 copper while other precious metals go to anode slime
• Hydrometallurgy of anode slime to recover Au, Ag and Pd by selective leaching and precipitation
Thank you