PET OPPORTUNITIES OUTLINE

- Key Issue
- Metrics: A New look
- Defining the PET Carpet Issues
- Opportunities
- The Future
KEY ISSUE

Hundreds of millions of pounds of PET Carpets are being produced each year in growing quantities, and we don’t know how to recycle into useful products.

YET !!!
## Care Diversion Metrics

<table>
<thead>
<tr>
<th>Collections</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nylon 66</td>
<td>37%</td>
<td>36%</td>
<td>27%</td>
<td>35%</td>
<td>32%</td>
<td>34%</td>
</tr>
<tr>
<td>Nylon 6</td>
<td>47%</td>
<td>44%</td>
<td>49%</td>
<td>36%</td>
<td>35%</td>
<td>25%</td>
</tr>
<tr>
<td>Polypropylene</td>
<td>9%</td>
<td>8%</td>
<td>11%</td>
<td>12%</td>
<td>10%</td>
<td>11%</td>
</tr>
<tr>
<td>PET</td>
<td>4%</td>
<td>8%</td>
<td>7%</td>
<td>12%</td>
<td>19%</td>
<td>24%</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
<td>4%</td>
<td>6%</td>
<td>4%</td>
<td>4%</td>
<td>6%</td>
</tr>
<tr>
<td>PET</td>
<td>2007</td>
<td>2008</td>
<td>2009</td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
</tr>
<tr>
<td>---------</td>
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<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>PET Collections</td>
<td>4%</td>
<td>8%</td>
<td>7%</td>
<td>12%</td>
<td>19%</td>
<td>24%</td>
</tr>
<tr>
<td>PET Production</td>
<td>15%</td>
<td>18%</td>
<td>20%</td>
<td>26%</td>
<td>31%</td>
<td>35%</td>
</tr>
</tbody>
</table>
PET PRODUCTION vs. COLLECTIONS PROJECTION

- Series 1:
  - 4%
  - 8%
  - 7%
  - 12%
  - 19%
  - 24%
  - 30%
  - 33%
  - 37%

- Series 2:
  - 15%
  - 18%
  - 20%
  - 26%
  - 31%
  - 35%
  - 38%
  - 39%
  - 40%

- Data points:
  - 1 2 3 4 5 6 7 8 9

- Y-axis values:
  - 0% 5% 10% 15% 20% 25% 30% 35% 40% 45%
## TOTAL NYLON AVAILABLE TO RECYCLE

<table>
<thead>
<tr>
<th>Year</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nylon %</td>
<td>84%</td>
<td>80%</td>
<td>76%</td>
<td>71%</td>
<td>67%</td>
<td>59%</td>
</tr>
<tr>
<td>Nylon Lbs.</td>
<td>249MM</td>
<td>233MM</td>
<td>234MM</td>
<td>239MM</td>
<td>223MM</td>
<td>207MM</td>
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</table>
NYLON % IN COLLECTION STREAM

<table>
<thead>
<tr>
<th></th>
<th>Collection Lbs.</th>
<th>Nylon Lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>296</td>
<td>249</td>
</tr>
<tr>
<td>2</td>
<td>292</td>
<td>233</td>
</tr>
<tr>
<td>3</td>
<td>308</td>
<td>234</td>
</tr>
<tr>
<td>4</td>
<td>338</td>
<td>239</td>
</tr>
<tr>
<td>5</td>
<td>333</td>
<td>223</td>
</tr>
<tr>
<td>6</td>
<td>351</td>
<td>207</td>
</tr>
<tr>
<td>Year</td>
<td>Nylon</td>
<td>PET</td>
</tr>
<tr>
<td>------</td>
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<td>-----</td>
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<td>2007</td>
<td>84</td>
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<td>2012</td>
<td>59</td>
<td>24</td>
</tr>
<tr>
<td>2013</td>
<td>55</td>
<td>30</td>
</tr>
<tr>
<td>2014</td>
<td>52</td>
<td>35</td>
</tr>
<tr>
<td>2015</td>
<td>50</td>
<td>40</td>
</tr>
</tbody>
</table>
DEFINING THE PET CARPET ISSUES

Technical Issues

Market issues
Bottles vs. Carpet

- PET Bottles
  - Built for Recycling
  - Infrastructure Exists
  - Proven Technology: Millions $$ spent to develop

- PET Carpet
  - Not built for easy recycling
  - Very little infrastructure exists
  - Present systems not adequate
  - PET degradation with additional melts (IV degradation)
Market Issues

- Lower recycling revenues
- Higher costs to recyclers
  - Greater collections costs: $0.06/lb. for useless carpet
  - Greater Landfill Costs: As much as $0.05/lb.
- Threatens Total Recycling Infrastructure
- EPR Legislative activities
EXAMPLE OF COST ESCALATION

- Collector: 20MM lbs. per year collections
- 4% PET Collection – 800K lbs. of unusable
  - $10K collection cost
  - $40K landfill Cost
  - **Total cost: $50K**
- 30% PET Collection – 6000K lbs. of unusable.
  - $72K collection cost
  - $300K landfill cost.
  - **Total Cost: $372K**
NEXT STEPS

- Phase I: Talking/Gathering Information: Over
- Phase II: Needs POA ASAP: Time is Critical
  - Financial POA: CARE Assistance
  - Technical POA: Trials/Technical Evaluations
There is **NO** Engineered Plastic market for PET. No Specifications exist.

PET Polymer is extremely Brittle.

It would take years of market development in research and marketing to establish any market in this area.
OPPORTUNITIES/FUTURE

- PEC: Technical Evaluations
- Non-Wovens Institute: Engage with technical evaluations
- Non-wovens: Very large PET Market
  - Acoustic Panels
  - Wall Covering: Laminated PET to PVC wall covering
  - Walk off Matt – Backing component
  - Roofing – Non Woven Reinforcement
  - Backing structure for drainage on Stucco walls
  - Acoustic layer laminated to batting
  - Carpet tile backing
  - Air Filter Media
  - Geotextiles
  - Plastic Decking: Patents Issued: 2 years in future: Takes the entire carpet.