Toyota and SMM
Lessons from the Trenches

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My Perspective

• Bachelors Ecology/Cognitive Sci (Rice)
• Masters Envi Science & Mgmt (Bren/UCSB)
  – Courses in Industrial Ecology, LCA, Green Supply Chain
• Experience in LCA-based tool development
  – Published in Journal of Industrial Ecology
• Toyota NA Lead for Waste
• NRC since 2000 (CURC, STAR, CRRA)
Toyota LCA Experience

- Owning a package lifecycle
- EPIC Development (packaging)
- EPAT Development (paper)
- ECO-VAS Use (vehicles)
- Well-to-Wheel Analysis (fuel/drivetrain)
- Copper Cradle-to-Cradle (vehicle)
Lessons Learned

• EOL is one factor among many
• Pursue data over dogma
• Have good data/methodology (e.g. ISO 14040)
• One Tactic does not Fit All
• Plan to navigate trade-offs (ex. Recycled content & Durability)
• Mass Rules
<table>
<thead>
<tr>
<th>Product Category</th>
<th>Dominant Impact</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Use</td>
<td>Production Phases</td>
<td>Packaging, Disposables</td>
</tr>
<tr>
<td>Long use</td>
<td>Use Phase</td>
<td>Vehicles, Clothing</td>
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<tr>
<td>What else?</td>
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</tbody>
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- Recycling tends to focus on Short Use Products
- EOL impact is Small to Tiny
- Useful Question: What stage does the impact come from?
Key Distinctions

• Make the focus match the stage
• Needs change over time

<table>
<thead>
<tr>
<th>EOL Infrastructure</th>
<th>Examples</th>
<th>Focus</th>
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<tbody>
<tr>
<td>Reliable</td>
<td>Cardboard Packaging</td>
<td>Lightweighting, RC, Reduce</td>
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<tr>
<td>Volatile</td>
<td>Plastic Packaging</td>
<td>Waste Pooling, RL, Alts, Reduce</td>
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<tr>
<td>Established</td>
<td>Vehicle Scrap</td>
<td>DfR, SOC removal</td>
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<td>Nascent</td>
<td>HV Batteries (ca 2000)</td>
<td>Take-back</td>
</tr>
<tr>
<td>Developed</td>
<td>HV Batteries (now)</td>
<td>Competing for Reman</td>
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</tbody>
</table>

• Useful Question:
  What is the current EOL infrastructure?