Global Changes and the need to Rethink Recycling

Connecticut Business Industry Association
May 18, 2018

Global Changes in Recycling

Through 2017, over 25% of the world’s recyclables were imported by China, including over 50% of the paper and plastics recycled across the globe. On 1/1/2018, China implemented an import ban of 24 materials, including Mixed Waste Paper and Mixed Plastics. In addition, a new policy limiting contamination of imported recyclables to 0.5% was implemented on March 1, 2018. China appears to be on a path to eliminate imports of all post-consumer recyclables by 2021.

Following the Path of Commodities
Waste Management exports material to commodity markets around the world.
How do China’s policies impact recycling in the U.S.?

China consumed 28.5 M tons of paper in 2016 (50% of all paper recycled in the world)

13.2 millions tons per year of recyclables diverted from China to secondary markets.

Mixed Paper and Mixed Plastics banned. 0.5% contamination limit on any other recyclables enforced at the port (Operation Blue Sky)

On May 3rd all recyclable imports from the U.S. into China were suspended

Reduced overall demand, supply surplus, increased quality requirements = increased processing cost and low commodity values for paper

Blended Value of Recyclables: 2017-2018

<table>
<thead>
<tr>
<th>Composition</th>
<th>2018 Pricing</th>
<th>2018 Blended Value</th>
<th>Composition</th>
<th>2017 Pricing</th>
<th>2017 Blended Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed Paper</td>
<td>22.1% $10.00</td>
<td>$2.21</td>
<td>Mixed Paper</td>
<td>22.1% $14.37</td>
<td>$14.37</td>
</tr>
<tr>
<td>OCC</td>
<td>36.2% $95.00</td>
<td>$34.39</td>
<td>OCC</td>
<td>36.3% $172.00</td>
<td>$62.26</td>
</tr>
<tr>
<td>Glass</td>
<td>21.0% $25.00</td>
<td>$5.25</td>
<td>Glass</td>
<td>21.0% $25.00</td>
<td>$5.25</td>
</tr>
<tr>
<td>Aluminum</td>
<td>0.3% $1,530.00</td>
<td>$4.59</td>
<td>Aluminum</td>
<td>0.3% $1,058.00</td>
<td>$3.17</td>
</tr>
<tr>
<td>Steel</td>
<td>0.3% $240.00</td>
<td>$0.72</td>
<td>Steel</td>
<td>0.3% $170.00</td>
<td>$0.51</td>
</tr>
<tr>
<td>PET</td>
<td>0.9% $195.00</td>
<td>$1.76</td>
<td>PET</td>
<td>0.9% $200.00</td>
<td>$1.80</td>
</tr>
<tr>
<td>HDPE</td>
<td>0.3% $320.00</td>
<td>$0.96</td>
<td>HDPE</td>
<td>0.3% $250.00</td>
<td>$0.75</td>
</tr>
<tr>
<td>Mixed Plastics</td>
<td>2.6% $50.00</td>
<td>$1.30</td>
<td>Mixed Plastics</td>
<td>2.6% $112.00</td>
<td>$2.91</td>
</tr>
<tr>
<td>HDPE Natural</td>
<td>1.3% $580.00</td>
<td>$7.54</td>
<td>HDPE Natural</td>
<td>1.3% $425.00</td>
<td>$5.53</td>
</tr>
<tr>
<td>Residue</td>
<td>15.0% $(50.00)</td>
<td>$(7.50)</td>
<td>Residue</td>
<td>15.0% $(50.00)</td>
<td>$(7.50)</td>
</tr>
<tr>
<td>Total</td>
<td>100.0% $40.72</td>
<td></td>
<td>Total</td>
<td>100.0% $78.55</td>
<td></td>
</tr>
</tbody>
</table>

| Change in blended value/ton from 2017: | $ (37.84) |
| Percent change in blended value from 2017: | -48.2% |

Material value $ (37.84)/ton or -48.2% from 2017 to 2018 creating a challenging economic environment for MRFs and their customers.
Commodity value: Mixed Paper

The average price paid to recyclers for a ton of mixed paper in the Pacific Northwest and across North America has plummeted in the last year.

What Recycling Looks in 2018 in the U.S?

- Single Stream recycling - simple & convenient. Increases volume & participation
- We educated residents & businesses about the importance of recycling to raise diversion rates - “recycle often”
- Must change our focus to “recycling right” over the last few years to reduce confusion.

- What hasn’t changed:
  - People still want to recycle & do the right thing
- What has changed:
  - Recyclables are scrutinized
  - China is enforcing their 0.5% contamination limit.
  - All consumers have tighter quality specifications
  - Processing costs are increasing
Unique challenges for curbside recyclers

- Supply is inelastic. MRFs are expected to recycle curbside materials regardless of end markets.
- Consumers expect whatever they put into their carts to be recycled.
- Consumers expect “free” recycling.

Recycling needs a paradigm shift!

Rethinking Recycling: What should it look like?
Our industry is evolving

- Weight-based recycling has been our measure of material management performance
- Pressure to add more materials to recycling programs has created unintended consequences: Many of these materials are difficult to process and market.
- As the waste stream has changed, contamination has increased.
- The global impact of China’s new import policies have been significant, with ongoing volatility on the horizon.

We are ReThinking how we manage materials

From Weight to Environmental Impact

Unrealistic solid waste goals create unintended consequences

- To achieve weight-based recycling goals, cities have added materials that increase recycling processing costs, or are hard (impossible) to market
- As the waste stream becomes more complex, contamination has increased, which increases the cost of recycling
- Achieving unrealistic goals will become even more difficult and expensive with the changing waste stream and China’s new policies.
Shifting Perspective

Is our goal to recycle more tons?

Or reduce environmental impact?

The goal is to reduce environmental impacts. Recycling is one way to achieve the goal, but reduction is a better way to achieve the goal.

What is Sustainable Materials Management (SMM)?

SMM is an approach to serving human needs by using/reusing resources productively and sustainably throughout their life cycles, generally minimizing the amount of materials involved and all associated environmental impacts.
Connecticut Waste Characterization

Material Specific Recovery Goals

- 25% recovery by 2025
- 25% reduction by 2020
- 25% recovery by 2020
Implementing Food Reduction Goals

In 2017, Oregon released their plan to achieve their 25% food reduction goal.

- **Preventing one ton of food** from being wasted results in 6X larger lifecycle GHG benefits than composting, and 7X the GHG emission benefits of anaerobic digestion
- **Their plan focuses solely on upstream prevention** and recovery – rather than EOL recycling.

The plan identifies key priorities focusing on upstream prevention and recovery, instead of end-of-life:

<table>
<thead>
<tr>
<th>1. Wasted Food Measurement Study</th>
<th>6. Edible Food Rescue</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Messaging</td>
<td>7. Labelling</td>
</tr>
<tr>
<td>3. Consumer Outreach</td>
<td>8. Coalition of Interested Regional Parties</td>
</tr>
<tr>
<td>4. Schools</td>
<td>9. Research Not included elsewhere</td>
</tr>
<tr>
<td>5. Commercial Sector</td>
<td>10. Guiding Principles for Project implementation</td>
</tr>
</tbody>
</table>

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**Commercial Generator**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>GHG Emissions</th>
<th>Cost/ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario</td>
<td>Baseline</td>
<td>Source Separated</td>
</tr>
<tr>
<td>Mixed waste</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foodwaste</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td></td>
<td>$40/ton</td>
</tr>
<tr>
<td>Mixed Recyclables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardboard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost/ton</td>
<td>$42/ton</td>
<td>$35/ton</td>
</tr>
</tbody>
</table>
Summary

- **Tension is increasing around the pressure to recycle more in spite of the global market constrictions.** The changing waste stream magnifies this challenges as non-recyclable packaging replaces traditional recyclables.
- **Recycling markets are expected to be volatile.**
- **We are seeing a paradigm shift in how we think about how we manage materials,** shifting efforts towards reducing broader environmental impacts.
- **Lifecycle thinking and data** allows for a prioritization of programs for the best overall environmental results.

Thank you!
We stand for innovators and the promise of technology.
# Technology Industry Packaging Considerations

<table>
<thead>
<tr>
<th>Product Protection</th>
<th>Availability and Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Preference</td>
<td>Sustainability</td>
</tr>
</tbody>
</table>

Finding the right balance

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**Amazon Certified Frustration-Free Packaging**

**Same Product, Better Packaging**

Amazon's Frustration-Free Packaging is specially designed to keep products safe and protected during shipping and handling. It also helps reduce packaging waste, making it a better choice for both customers and the environment.

- **Frustration-Free Packaging**:
  - Easy to Open
  - Recyclable & Sustainable Packaging
  - Protective Packaging

- **Traditional Packaging**:
  - Difficult to Open
  - Not Fully Recyclable
  - More Packaging Waste

One of the first products to launch in Frustration-Free Packaging was the Fisher-Price Imagination Adventures Pirate Ship. This example helps highlight the improvements Frustration-Free Packaging has made in protecting products while reducing packaging waste.
HP’s packaging direction

**Focus areas**
- Reduce material usage
- Optimize shipping densities
- Utilize renewable materials

**CO₂e reductions**

**FY17 Results**

- Reducing materials
  - 3,600 tonnes of material reduced
- Utilizing recycled materials
  - 16,700 tonnes used
- Driving CO₂ reduction
  - 8,300 tonnes CO₂e
- Recycling straw waste
  - 50,000+ pallets made from over 2,500 tonnes of straw

Corporate goal of Zero Deforestation from paper-based product packaging by 2020

Sustainable materials are the foundation of a circular economy. Dell’s leadership in packaging is delivering benefits for our customers and the environment

**Dell’s Legacy of Good Packaging Goals to achieve by 2020**

- Ensure 100% of product packaging is sourced from sustainable materials
- Ensure 100% of packaging is either recyclable or compostable

To learn more, visit: legacyofgood.dell.com
Overall Industry Trends

- Source reduction
- Packaging choices - environmental impacts and trade-offs
- What do we measure as sustainable?
- How are we measuring?

Source Reduction

<table>
<thead>
<tr>
<th>Coffee Packaging Choices and Associated Enviro Impacts</th>
<th>Steel Can</th>
<th>Rigid Plastic Container</th>
<th>Flexible Pouch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packaging Weight oz./11.5oz of coffee</td>
<td>4</td>
<td>3</td>
<td>0.4</td>
</tr>
<tr>
<td>Recycling rate by consumer</td>
<td>73%</td>
<td>28%</td>
<td>0%</td>
</tr>
<tr>
<td>MSW landfilled after recycling (lbs./100,000oz of coffee)</td>
<td>598</td>
<td>1,171</td>
<td>217</td>
</tr>
<tr>
<td>Packaging GHG emissions (lbs. CO2e/11.5oz of coffee)</td>
<td>0.77</td>
<td>0.28</td>
<td>0.05</td>
</tr>
<tr>
<td>GHG benefit of packaging recycling (lbs. CO2e/11.5oz of coffee)</td>
<td>-0.45</td>
<td>-0.16</td>
<td>-0.02</td>
</tr>
<tr>
<td>Packaging net GHG emissions (lbs. CO2e/100,000oz. of coffee)</td>
<td>3,800</td>
<td>1,996</td>
<td>413</td>
</tr>
<tr>
<td>Packaging net energy consumption (MJ/100,000oz of coffee)</td>
<td>33,489</td>
<td>76,721</td>
<td>7,722</td>
</tr>
</tbody>
</table>
Measuring Packaging Diversion - Today

One Ton of Recycled Material

Measuring Packaging Diversion – Future?

GHG Impact of One Ton of Recycled Material (MTCO2e)
Industry Investments and Partners

Thank you!

Katie Reilly
Senior Manager, Environmental and Sustainability Policy
kreilly@cta.tech
Packaging and Sustainable Waste Management

- Size of CT Recycling and Waste Industry
  - 6,000 direct jobs
  - 19,000 jobs - *cumulative with our industry and related industrial/commercial activity*
- $1.8 billion direct economic impact
- $3.4 billion economic impact - *cumulative with our industry and related industrial/commercial activity*
CT has a vibrant recycling and waste industry; the state should support and incentivize its robust recycling programs and infrastructure to meet its needs.

CTs system has produced a 35% diversion rate; with only 17% of designated recyclables in trash

CT should revisit its 60% diversion of MSW from disposal goal

- CTs current collection and processing system produces quality recyclables for markets
- The costs for recycling services in CT are reasonable and competitive.
- CT should focus on recycling behavior of all generators -- improve education and enforcement
Packaging and Sustainable Waste Management

Contact Information:
Steve Changaris
CT NWRA Chapter Director
800 679 6263
schangaris@wasterecycling.org

www.wasterecycling.org