Recycling is Broken
Update – January 2019

Recycling: Simple as 1-2-3

1. Know What to Throw
3. Keep it Loose
Recap - Trends Strain Existing Model

**Trends**

- Some material changing faster than capital investment cycles
  
  *18M tons in 2000 → ~2M in 2015*

- Some material has limited end markets
  
  *HDPE (Good) → off-spec PET (Limited)*

- Material Light-weighting skews current success metrics
  
  *Water Bottles → Almost 2x transactions*

**Implications**

- Commodity markets have steadily declined
  
  *OCC down 40% → Mixed Paper down 95%*
Recap - China Sword Explained

For decades, China has been the largest importer of the world’s recycled commodity, and the U.S. was 40% of the inbound stream.

In 2017, China announced efforts to clean up the country, which included dramatic changes for acceptance criteria of imported recyclables.

- A significant reduction in acceptable contamination levels (From ~3% to 0.5%) in any recovered paper and plastic grades.

- Additionally, China banned all mixed paper from import, regardless of contamination levels. (20% of historical stream).

Reductions took effect in March 2018, which drove costs and changes at most recycling facilities in the country to meet new standards.
Post China – Shift in Commodity Markets

- China consumed a majority of Commodities globally
- Alternate markets are saturated; Some countries unprepared for influx

Supply and demand economics kick in as commodities flood alternate markets world wide

Source: Financial Times, Oct 24, 2018
Post China – Dramatic Shift in Values

- Normal supply and demand theories in play
- Excess material results in low/negative value for most commodities (Mixed Paper and Mixed Plastics)
- Only 35% of processed commodities have current positive value (Metals and OCC)

Source: NLC Report, 2018

Recycling Processors move the material, but average values are down 50%+ from recent years
Recycling Costs: Then and Now

**THEN**

<table>
<thead>
<tr>
<th>Industry Avg</th>
<th>THEN</th>
<th>NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household cost artificially low to foster adoption</td>
<td>Costs lower due to inbound material being cleaner and heavier</td>
<td>Low contamination averages, attributed to focus on basics and no diversion mandates</td>
</tr>
<tr>
<td><strong>Industry Avg</strong></td>
<td><strong>Net Position</strong></td>
<td><strong>Industry Avg</strong></td>
</tr>
<tr>
<td>$2.00/Mo</td>
<td>$(3.00/Mo) + ($1.50/Mo) + $4.60/Mo + ($0.10/Mo) = $0.00</td>
<td><strong>Net Position</strong></td>
</tr>
<tr>
<td>$60/Ton</td>
<td><strong>$200/Ton</strong></td>
<td>$100/Ton</td>
</tr>
<tr>
<td><strong>$25/Ton</strong></td>
<td><strong>$100/Ton</strong></td>
<td><strong>$50/Ton</strong></td>
</tr>
</tbody>
</table>

**COLLECTION**

- Still artificially low but with higher costs to run Collection service

**PROCESSING**

- Dramatically higher costs from labor, technology and equipment, along with lighter material

**COMMODITY**

- Average values down significantly, further impacted by China Sword

**RESIDUAL**

- Contamination average up to 30%, requiring more transport and disposal
**Recommended Business Model**

**Durable Recycling Model**

<table>
<thead>
<tr>
<th>COLLECTION</th>
<th>PROCESSING</th>
<th>RESIDUAL</th>
<th>COMMODITY SALES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Includes costs for truck, driver, container and to collect material and transport to a processing facility&lt;br&gt;• Comparable to trash collection</td>
<td>• Includes costly facility, equipment and labor to separate material and remove contamination&lt;br&gt;• Results in ready-to-ship baled material</td>
<td>• Includes all contaminated or non-recyclable material, which has no marketability and must be transported and disposed at a landfill for additional cost</td>
<td>• Sale of processed material to buyers around the world&lt;br&gt;• Cleaner material has greater value</td>
</tr>
</tbody>
</table>

**THE COST OF RECYCLING**

\[
\text{Collection Fee} + \text{Processing Fee} + \text{Disposal of Residual} - \text{Commodity Sales} = \text{The Cost of Recycling}
\]

The cost of a recycling program is the sum of fees for two services; the *Collection Fee* and the *Net Processing Fee*. 
Residential Willingness to Pay for Recycling

Based on third-party research, residents are willing to pay a fair price for recycling.
Informing the Public

- Public needs to understand the issue
- Economic reset is needed for long term viability
- Public awareness on what and how to recycle

Over 1 Billion media impressions on the topic, on articles interviewing Republic Services team alone
Public Education – Clean Up The Stream

New simplified educational collateral that can be distributed to residents and businesses.

<table>
<thead>
<tr>
<th>Container Labels</th>
<th>Container Tags</th>
<th>Door Tags</th>
<th>Reference Guides</th>
<th>Brochures</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="container_labels.jpg" alt="Image" /></td>
<td><img src="container_tags.jpg" alt="Image" /></td>
<td><img src="door_tags.jpg" alt="Image" /></td>
<td><img src="reference_guides.jpg" alt="Image" /></td>
<td><img src="brochures.jpg" alt="Image" /></td>
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<tr>
<th>Post Cards &amp; Bill Inserts</th>
<th>Posters</th>
<th>Billboards</th>
<th>Emails</th>
<th>Print Ads</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image](post_cards_bill Inserts.jpg)</td>
<td><img src="posters.jpg" alt="Image" /></td>
<td><img src="billboards.jpg" alt="Image" /></td>
<td><img src="emails.jpg" alt="Image" /></td>
<td><img src="print_ads.jpg" alt="Image" /></td>
</tr>
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</table>

Most collateral is available on www.RecyclingSimplified.com, or from your Municipal Sales Manager.
Measurements of U.S. Recycling Success

- Current metrics focus on weight (e.g. 50% recycling goal)
- This incentivizes “any” rather than the “right” diversion
- Some of the more beneficial carbon dioxide equivalent (CO₂e) materials are lighter

Tons of CO₂e Savings per ton of Material Recycled (Greenhouse Gas Benefit)

% by Weight of Commodities Sold by Republic Services

<table>
<thead>
<tr>
<th>Material</th>
<th>% Recycled Out of Total Manufactured</th>
<th>Tons of CO₂e Savings per ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>18%</td>
<td>9.10</td>
</tr>
<tr>
<td>Other Metal</td>
<td>37%</td>
<td>4.30</td>
</tr>
<tr>
<td>Paper</td>
<td>67%</td>
<td>3.50</td>
</tr>
<tr>
<td>Plastics</td>
<td>9%</td>
<td>1.00</td>
</tr>
<tr>
<td>Glass</td>
<td>26%</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Source: Advancing Sustainable Material Management 2015 Fact Sheet, EPA, 2018

Summary:
- Weight-based goals do not correlate to greenhouse gas benefits
- Reconsider “Any Diversion” (weight) vs “Most Beneficial Diversion”

We’ll handle it from here.
Reassessment of Accepted Materials

- Programs have drifted to focus on total diversion rates, rather than what materials are truly beneficial to recycle.
- Some collected materials are recyclable, but lack local end markets, or have a negative recycling value. These realities render the processed materials unmarketable.
- Municipalities need to shift program focus to Sustainable Materials Management-based views, which looks at the overall benefits of each accepted material in the stream.

Recycling programs must focus on Sustainable Materials Management, not simply diverting material that may have no beneficial use.
Republic Services® Expands Capabilities at Indianapolis Recycling Center

December 12, 2018
Republic Services, an industry leader in U.S. recycling and non-hazardous solid waste disposal, today announced a recent $6 Million investment in new recycling processing equipment and technologies at the Central Indiana Recycling Center, located at the northwest corner of Marion County.

The renovation will significantly increase efficiencies in the processing, sorting and baling of recyclables at the facility, however recycling truly starts at in the home or at the local businesses. This is everyone’s opportunity to contribute to a sustainable material management process that will help generations to come.

The new plant covers up 35,600 square footage of space, and is currently processing 270 tons of single stream each day on a single 10 hour shift.
Key Topics Going Forward

- Evaluate Program Recyclables that offer best benefit to planet
- Consider better metrics to track success
- Increase Public Education, leading to lower contamination and better commodity values
- Update the Business Model – Two services provided in a recycling program (without reliance on commodity value)

The path to creating a durable recycling program requires multi-faceted approach
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