PET Recycling Markets Trends and Challenges

Tuesday January 31, 2017/ 1:30 – 2:45PM ED

Presenter:

Kate Eagles, Program Director
National Association for PET Container Resources (NAPCOR)
PET Recycling
Markets, Trends & Challenges

Kate Eagles — NAPCOR Program Director

National Recycling Coalition
January 31, 2017
Overview

- Introduction to NAPCOR
- PET Recycling Context
- Market Challenges
- Initiatives to address quality and supply
  - Bale Quality
  - Non-Clear PET Bottle Recycling
  - PET Thermoform Recycling
Introduction to NAPCOR

- NAPCOR is the trade association for the PET packaging industry in the United States, Canada and Mexico.
- 51 members encompass all facets of the PET value chain.
<table>
<thead>
<tr>
<th>PET INDUSTRY SUPPLIERS (19)</th>
<th>PET CONTAINER MANUFACTURERS (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Starlinger-Sahm, Inc.</td>
<td>Amcor Rigid Plastics</td>
</tr>
<tr>
<td>AMUT North America, Inc.</td>
<td>Plastipak Packaging, Inc.</td>
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<tr>
<td>BP</td>
<td>Yoshino America Corporation</td>
</tr>
<tr>
<td>ColorMatrix</td>
<td></td>
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<tr>
<td>Erema North America</td>
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<tr>
<td>Husky Injection Molding Systems</td>
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<td>Muehlstein</td>
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<td>National Recovery Technologies</td>
<td></td>
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<tr>
<td>NGR Recycling Machines</td>
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</tbody>
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<thead>
<tr>
<th>PET RESIN MANUFACTURERS (3)</th>
<th>PET SHEET / THERMOFORMERS (8)</th>
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<tbody>
<tr>
<td>Nissei ASB Company</td>
<td>Dart Container Corporation</td>
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<tr>
<td>Penn Color</td>
<td>Direct Pack, Inc.</td>
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<tr>
<td>Plastic Technologies, Inc.</td>
<td>Genpak LLC</td>
</tr>
<tr>
<td>Polymetrix</td>
<td>Nu-B, Inc.</td>
</tr>
<tr>
<td>REPI</td>
<td>Octal Extrusion Corporation</td>
</tr>
<tr>
<td>Sidel Inc.</td>
<td>Polar-Pak, Ltd.</td>
</tr>
<tr>
<td>Sorema Plastic Recycling Sys.</td>
<td>Peninsula Packaging Company</td>
</tr>
<tr>
<td>Sukano Polymers Corporation</td>
<td>Plastic Ingenuity, Inc.</td>
</tr>
<tr>
<td>TABB Packaging Solutions, LLC</td>
<td></td>
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<tr>
<td>TOMRA Systems ASA</td>
<td></td>
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</tbody>
</table>

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<thead>
<tr>
<th>PET RECLAIMERS (18)</th>
<th></th>
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<tbody>
<tr>
<td>BMP Recycling</td>
<td>Perpetual Recycling Solutions</td>
</tr>
<tr>
<td>CarbonLite Industries, LLC</td>
<td>PetStar</td>
</tr>
<tr>
<td>Clear Path Recycling, LLC</td>
<td>Plastrec, Inc.</td>
</tr>
<tr>
<td>Custom Polymers PET</td>
<td>Polyquest, Inc (PQ Recycling)</td>
</tr>
<tr>
<td>Evergreen Plastics</td>
<td>Reterra</td>
</tr>
<tr>
<td>Marglen Industries</td>
<td>Signode</td>
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<tr>
<td>Mohawk Industries Inc.</td>
<td>UltrePET LLC</td>
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<tr>
<td>Parallel Products</td>
<td></td>
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<tr>
<td>Peninsula Plastics Recycling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Verdeco Recycling, Inc.</td>
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<tr>
<td></td>
<td>Wellman Plastics Recycling</td>
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</table>
National Association for PET Container Resources (NAPCOR)

• Mission:
  – Promote the introduction and use of PET packaging
  – Protect the PET package and overcome hurdles to its successful introduction, use and recycling
  – Articulate and communicate the attributes of PET containers and PET thermoformed packaging as environmentally sustainable

Founded in 1987
PET Recycling Rates, Collection & End Markets
PET Recycling / Material Utilization Rates

Recycling Rate

Utilization Rate
Reclamaiton Capacity 2015 – Major Assets USA

Number of Plants

Reclamation Capacity (MMlbs.)


9
NAPCOR’s Goal?

Increasing supply while reducing contamination
Our Approach

Market Signals
Can new bale specification and grading protocol help drive bale quality?

Design for Recycling
Will CPG’s design PET containers to ensure they can be reclaimed?

End Market Evaluation
How do we capture the value from growing non-traditional streams (thermoforms and colored PET) while protecting quality?
NAPCOR Initiatives to Address Supply: Bale Quality
What’s Affecting Bale Quality?

• Increased single stream curbside collection

• Proliferation of packaging of all types

• Not all PET packages reflect design for recyclability guidelines, e.g., full shrink labels, barrier layers

• Ongoing lightweighting means more PET sorting and processing is required per pound of clean flake generated
Driving Bale Quality through Gradings

- **Objective:** to develop a bale grading system and material audit tool to provide:
  - Consistent terminology, clear pathway for improvement
  - Industry-vetted, voluntary standards
  - Approved by both NAPCORG & APR in 2015

The Association of Postconsumer Plastic Recyclers

**Model Bale Specification and Gradings: PET Bottles**

This model is not meant to replace the specifications of individual buyers, many of whom may have different allowances in terms of contents and bale sizes. Rather, it is meant to provide a benchmark to suppliers of all bale types.

Any whole polyethylene terephthalate (PET) bottle with a screw-neck tap that contains the ASTM D7611 “#1, PET or PETE” resin identification code and that is clear, transparent green, or transparent light blue. All bottles should be free of contents or free flowing liquids and rinsed. Closures (caps, lids, and rings) may be left on bottles. Post-consumer is defined as “used for its intended purpose and otherwise directed to disposal.”

<table>
<thead>
<tr>
<th>PET Bale Grade</th>
<th>Grade A</th>
<th>Grade B</th>
<th>Grade C</th>
<th>Grade F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total PET fraction by weight</td>
<td>94% or above</td>
<td>83 – 93%</td>
<td>73 – 82%</td>
<td>72 % or below</td>
</tr>
</tbody>
</table>

“PET fraction” refers to the total weight of PET bottles in a PET bale, inclusive of caps and labels when still attached to PET containers, as a percentage of the total weight of that bale.

**PLEASE CHECK WITH YOUR PET BUYER(S) as to their allowances for:**
- Other Colored PET Containers
- PET Thermoforms, e.g., microwave trays, dishes, bakery trays, deli containers, clamshell containers, drink cups

**ALLOWABLE LEVELS OF CONTAMINANTS:** Total contaminants should not exceed the percentages, by weight, as defined by...
### Bale Gradings
(in Model PET Bale Spec)

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**PLEASE CHECK WITH YOUR PET BUYER(S) as to their allowances for:**
- Other Colored PET Containers
- PET thermoforms, e.g., microwave trays, dishes, bakery trays, deli containers, clamshell containers, drink cups
Test Audit for Incoming PET Material

- A reasonably representative sample is pulled from sample load (preferred sample > 225 pounds)
- Key measurement is PET fraction of unprocessed bale material, taken as a percentage of total sample weight (not a yield)

<table>
<thead>
<tr>
<th>- SAMPLE AUDIT SORT CATEGORIES -</th>
</tr>
</thead>
<tbody>
<tr>
<td>PET Bottles &amp; Jars (clear, light blue)</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Fraction Weight</td>
</tr>
<tr>
<td>TOTAL Sample Weight</td>
</tr>
<tr>
<td>Category Fraction / Total Weight X 100 = PET Fraction %</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Moving forward

• Reached out to bale suppliers and MRFs: “So, what’s changed?”
• Continue to evaluate / refine bale comp data
• Understand key impact points:
  - MRF: Material Flow, Sort, Best Practice
  - Market Changes: Thermoforms, Light-weighting, Non-Clear
  - Design for Recyclability
NAPCOR Initiatives to Address Supply: Non-Clear Material
Non-Clear PET Packaging Recycling Initiative

- **Goal:** Increase recycling and develop additional sustainable markets for non-clear PET containers

- **Strategies:**
  - Identify existing and potential end-markets for “non-clear” PET
  - Identify obstacles to sustainable markets and methods to overcome them
Non-Clear Initiative: Activities to Date

- Collected data
- Developed projections
- Determined pathways of material flow
- Tested material
- Evaluated end markets
Non-Clear Initiative: Obstacles Identified

- Critical Mass
- Disparate Material Flow
  - through MRF, PRF, PET Reclaimer and/or HDPE reclaimer
- Variability in the Stream
  - Colors, labels, and other contaminants are unpredictable
- Low-Value Markets
Non-Clear Initiative: Next Steps

• Facilitate partnerships and market arrangements
• Research end-markets
NAPCOR Initiatives to Address Supply
PET Thermoform Recycling
PET Thermoform Recycling

Goal: To make recycling PET thermoforms as easy as recycling PET bottles, without disrupting bottle recycling infrastructure

Strategies

• Achieve broad acceptance of PET thermoforms by PET reclaimers
• Communicate consistent recycling message to communities and MRF operators
PET Thermoform Recycling Progress

**2007**
NAPCOR expands its membership to include PET thermoform and sheet manufacturers

**2009**
The Canadian Retail Initiative

**2009**
Initial lab trials aimed at identifying potential issues with thermoform recycling

**2011**
PET thermoform recycling is at 45 million pounds

**2012**
Three grant programs to test collection, sorting, and marketing strategies

**2013**
PET thermoform recycling is at 60 million pounds

**2013**
~6% thermoform content in curbside PET bales

**2014**
Technical trials to evaluate the impact on rPET quality and the PET bottle reclaiming infrastructure

**2015 & Beyond**
Continued work on design, technical, and mechanical challenges; ensuring consistent and accurate messaging; and promoting collection volume increases and tracking

Promoting and Protecting the PET Package
PET Thermoforms in Bottle Bales are Increasing

% Thermoforms by Weight, Curbside/Drop-off Bales

Source: NAPCOR commissioned bale analyses, conducted by Moore Recycling Associates
Thermoform Recovery in US & Canada (MMlbs)

- Exported
- Reclaimed Domestically

Promoting and Protecting the PET Package
Are PET thermoforms recyclable?

• Recent "Availability of Recycling" study found that over 60% of US consumers have recycling programs available to them that accept PET thermoforms, meeting FTC "green guides" threshold

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>PERCENT OF US POPULATION WITH RECYCLING PROGRAMS AVAILABLE FOR MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less than 20%</td>
</tr>
<tr>
<td>PET bottles/jugs &amp; jars</td>
<td>X</td>
</tr>
<tr>
<td>HDPE bottles/jugs &amp; jars</td>
<td>X</td>
</tr>
<tr>
<td>PP bottles/jugs &amp; jars</td>
<td>X</td>
</tr>
<tr>
<td>LDPE and LLDPE bottles/jugs &amp; jars</td>
<td>X</td>
</tr>
<tr>
<td>PVC bottles/jugs &amp; jars</td>
<td>X</td>
</tr>
<tr>
<td>Other bottles/jugs</td>
<td>X</td>
</tr>
<tr>
<td>Bottle Caps</td>
<td>X</td>
</tr>
<tr>
<td>PET cups</td>
<td>X</td>
</tr>
<tr>
<td>PET containers/trays</td>
<td>X</td>
</tr>
<tr>
<td>PET clamshells</td>
<td>X</td>
</tr>
</tbody>
</table>

http://www.sustainablepackaging.org/content/?type=5&id=centralized-study-on-availability-of-recycling
Are PET thermoforms recyclable?

- NAPCOR surveyed MRFs and PET reclaimers to ask “What do you do with PET thermoforms?”

For most part, PET thermoforms collected at curbside are being sent to PET markets in bottle bales.

Those who handle curbside materials generally recycle PET thermoforms along with PET bottles.
SPC Guidance on Recyclability Claims

• PET thermoforms will get “widely recycled” label, with these exceptions
  – Black Trays
  – PET thermoforms with paper labels that are not compatible with the APR protocol
PET thermoforms are technically recyclable with PET bottles, but not all thermoforms are PET. Many PET reclaimers accept thermoforms in bottle bales, as long as autosort systems and best practices are in place. Talk to your buyer about their specifications.
Earlier this year, the Sustainable Packaging Coalition’s Centralized Study on the Availability of Recycling found that a substantial majority of Americans have recycling programs available to them that accept all PET packaging. Included in this designation were bottles and jugs but also non-bottle PET packages – the clamshells, cups, tubs, lids, boxes, trays, egg cartons and similar rigid, non-bottle packaging made of PET (No.1) plastic resin that are increasingly common on retailer shelves.

“We were very pleased to see that most Americans can put PET thermoforms in their recycling bins according to the guidelines provided to them by their communities, but we know that this doesn’t tell the whole story of what happens to those containers,” said Michael Westerfield, corporate director of recycling programs for Dart Container Corporation in Mason, Mich. and a National Association for PET Container Resources (NAPCOR) board member.

As use of PET thermoform packaging continues to grow, the industry is being forced to confront an important question: How do we look beyond collection to determine whether a material placed in a recycling bin actually makes it to market?

As of materials recovery facilities (MRFs) and plastics recovery facilities (PRFs), as well as PET reclaimers, to determine how they handle the PET thermoforms that flow through their systems.

We found that, for the most part, PET thermoforms collected at curbside are being sent to PET markets in bottle bales, and most reclaimers who handle curbside materials generally recycle them along with PET bottles.

“While we have worked closely with PET reclaimers to analyze the impacts of thermoforms on the recycling stream and wanted to do our due diligence with the other parts of the value chain to ensure real recyclability before we put messages into the marketplace,” Westerfield noted. He and the NAPCOR leadership recommend that other resins and materials work to the same standard as they assess recyclability.

Do PET thermoforms meet the FTC’s Green Guide’s requirements for unqualified claims of recyclability? The answer is pretty clearly yes. Recycling programs that include this material are available to more than 60 percent of the U.S. population, and once collected, PET thermoforms can be separated and recovered through the existing PET recovery infrastructure.
PET Materials Flows in the US

http://www.napcor.com/PET/pet_reports.html
Thank You!

Kate Eagles
Program Director
(707) 933-0678
keagles@napcor.com
QUESTIONS?

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