Rethinking plastic recycling

2021 ECOS Fall meeting

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National Waste & Recycling Association
September 9, 2021

Sources: Guardian, National Geographic

2018 Word of the year

2018 International Statistic of the Year

Commitments follow…

- Alliance to end plastic waste - 2019 – $1B
- US Plastics pact – brand commitments by 2025:
  - Take measures to eliminate problematic & unnecessary packaging
  - 100% of plastics packaging reusable/recyclable/compostable
  - Take actions to effectively recycle or compost 50% of plastic packaging
  - Average 30% recycled or responsibly sourced biobased content
- Every bottle back (2019)
- Polypropylene recycling coalition (2020)
- Consumer goods forum (CGF) Coalition of action on plastic waste (2020)

But commitments were made before…

- Failure by brands to use 25% recycled content in their bottle by 2015
- Failure by one brand to recycle 50% of US beverage containers by 2018
- Failure by another brand to double recycling of PET bottles to 60% by 2018

- Why? Cost of virgin is cheaper for one…

- Will commitments this time be stickier?

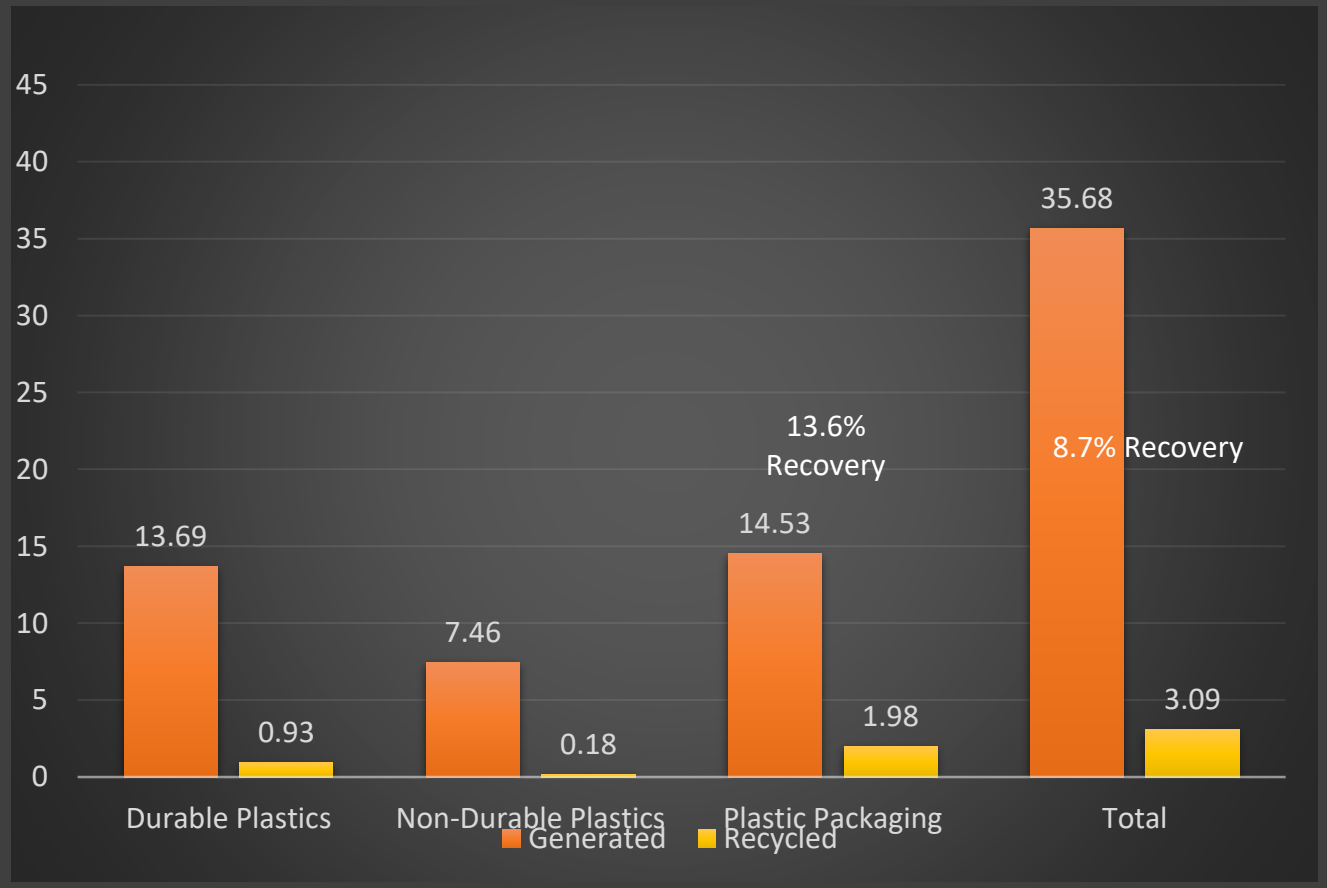
“

Net zero demands a transformation of the entire economy.

Larry Fink
Chairman and CEO

BlackRock.

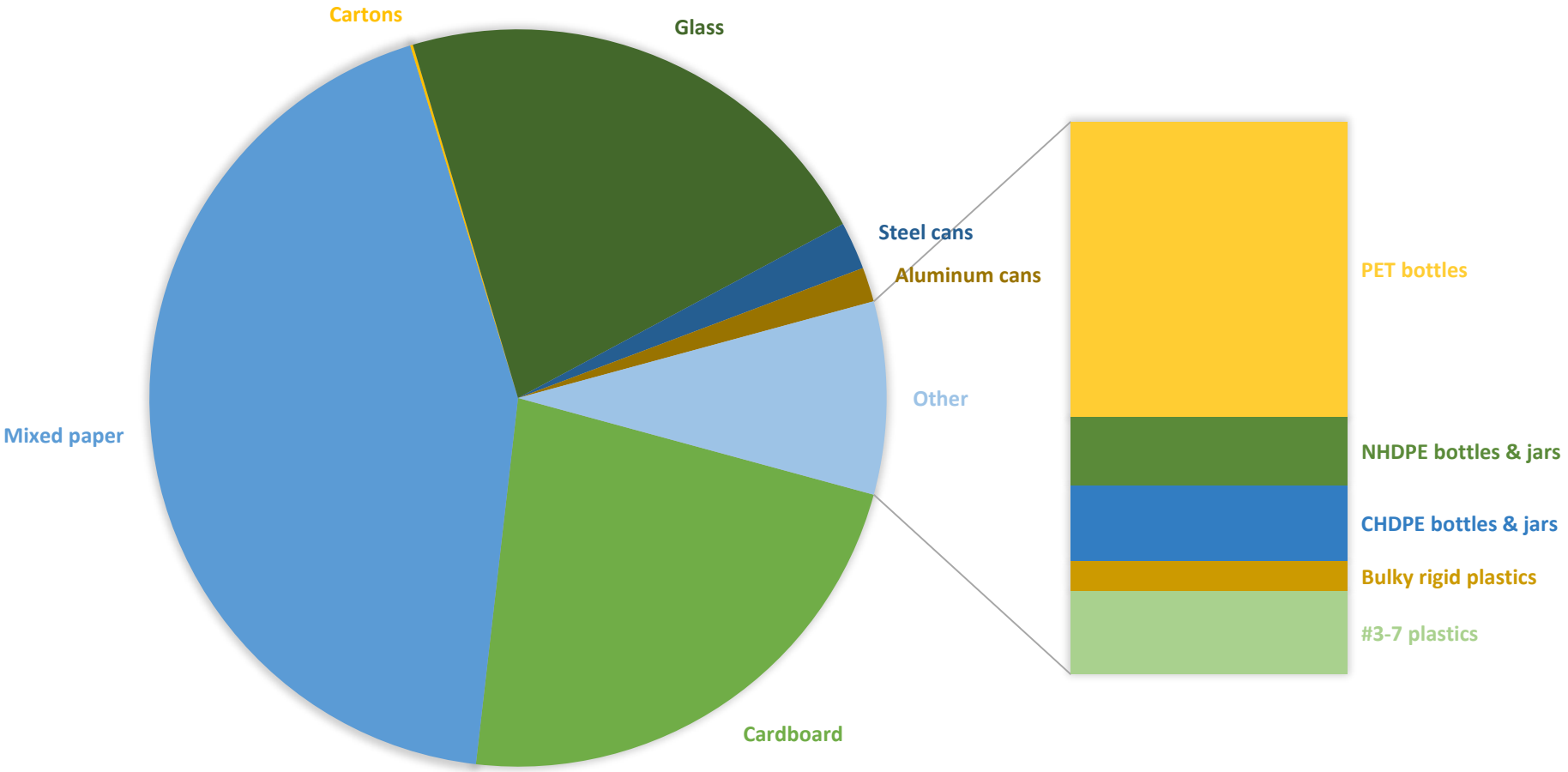
What is plastic waste?



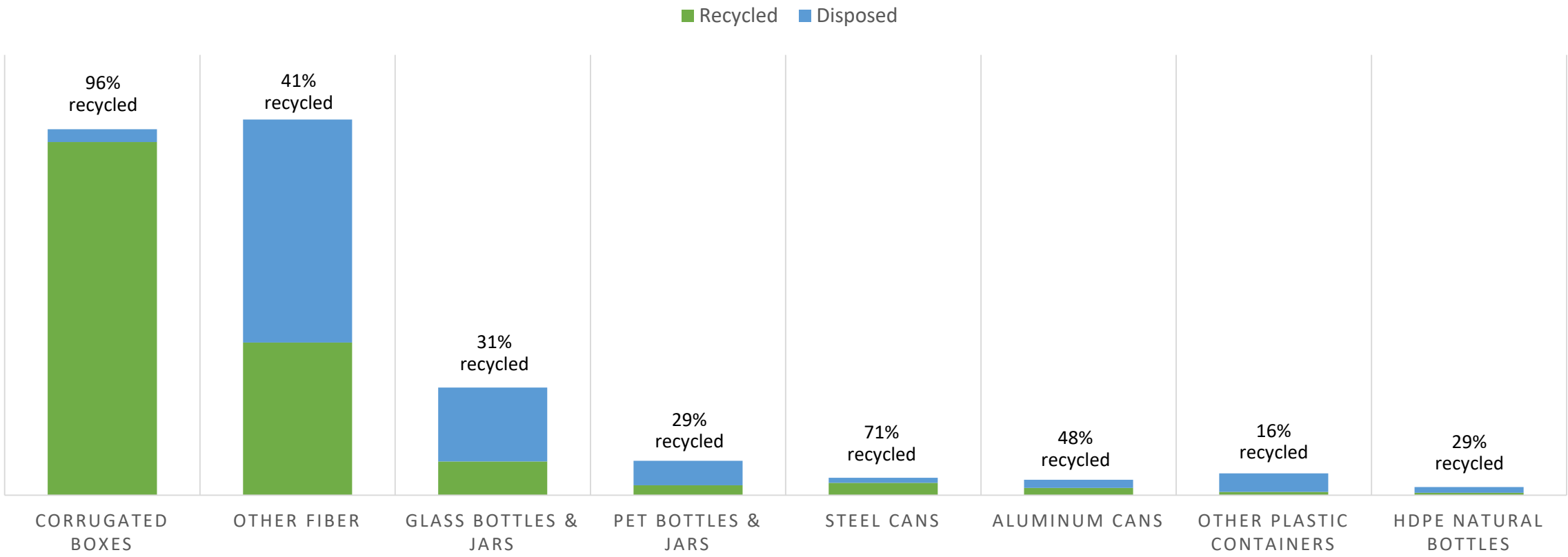
- **292 M tons municipal solid waste generated in the U.S. each year**
- **35.68 M (12.2%) tons are plastic**
- **41% containers/packaging**
- **38% durable** (e.g. car parts, medical equipment, computers, furniture, etc.)
- **21% non-durable** (less than 3 years use: diapers, trash bags, disposable medical supplies, plates, cups, disposable utensils, clothing, etc.)

Current recycling

Single Stream material mix



Materials recycled

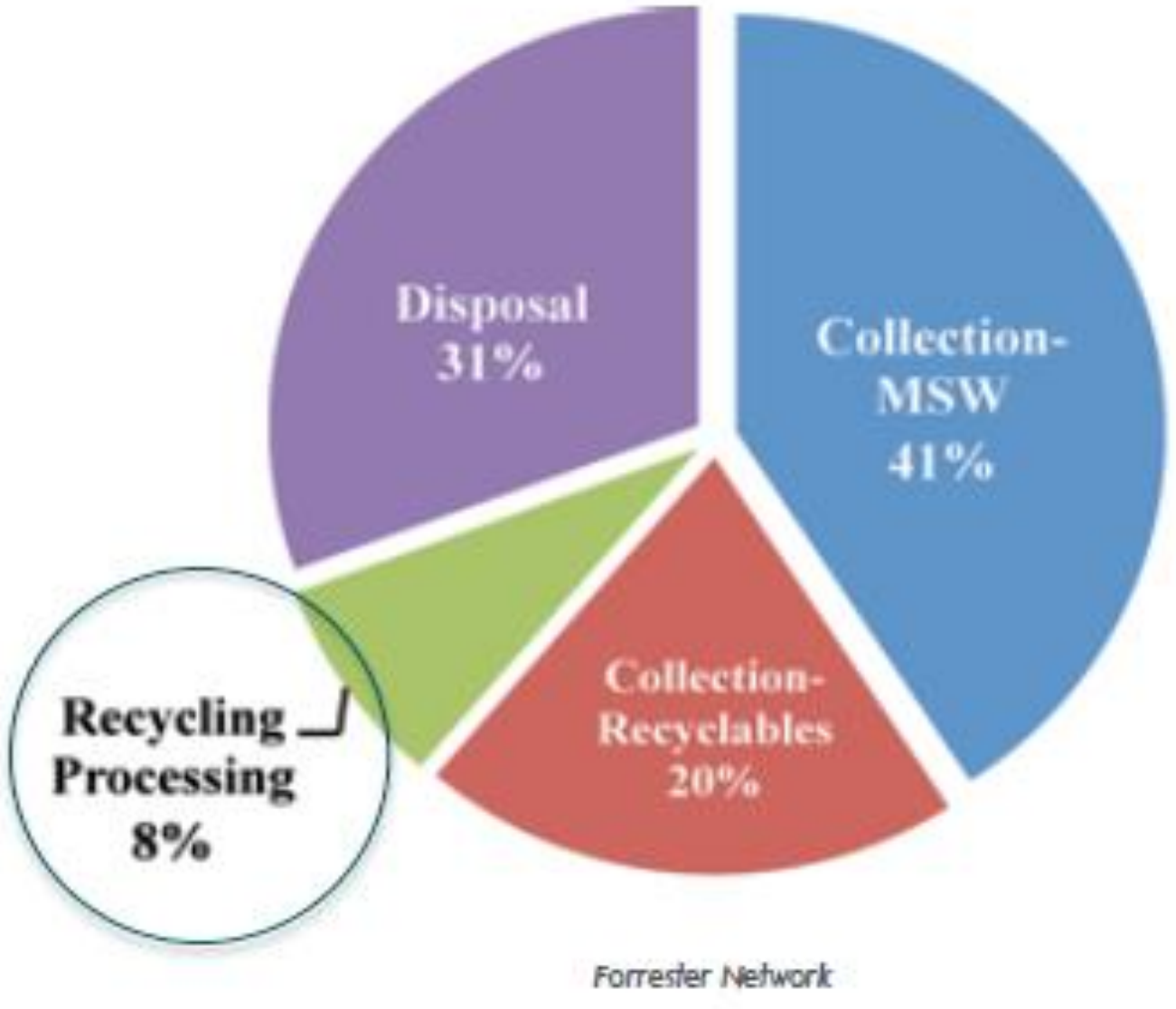


Collection

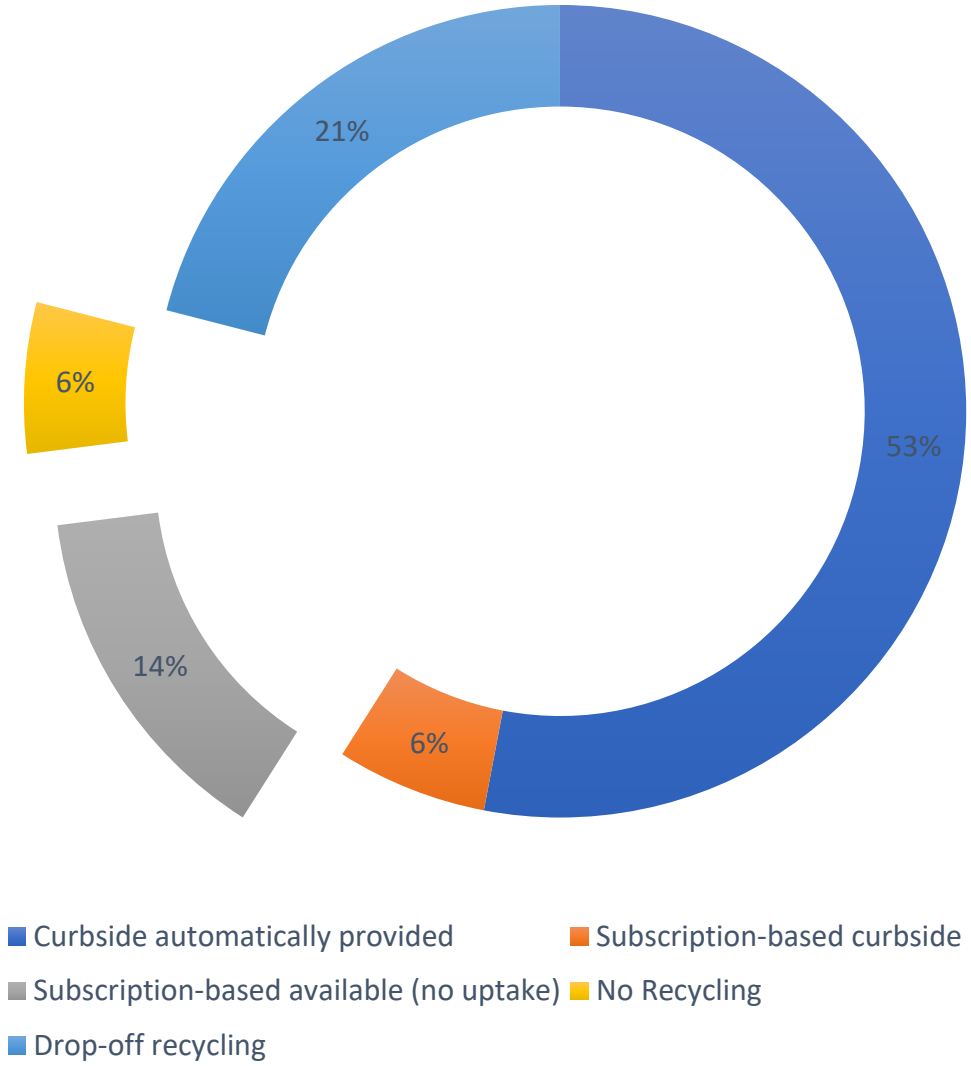
Recycling costs

- Recycling collections costs are typically 2-2.5 x recycling processing
- Cost per household per year*:
  - Processing: $20
  - Collection (cart): $48

*Assumes: $87/ton processing costs; $4/month collection costs; 460 #/year collected

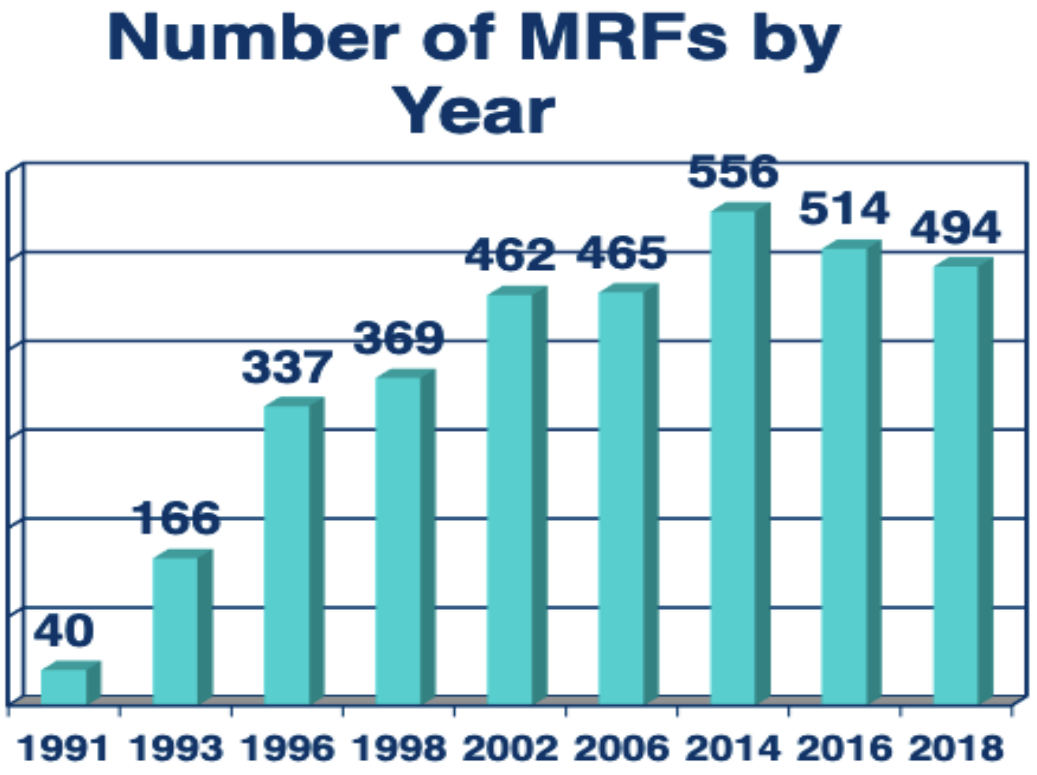


Recycling access

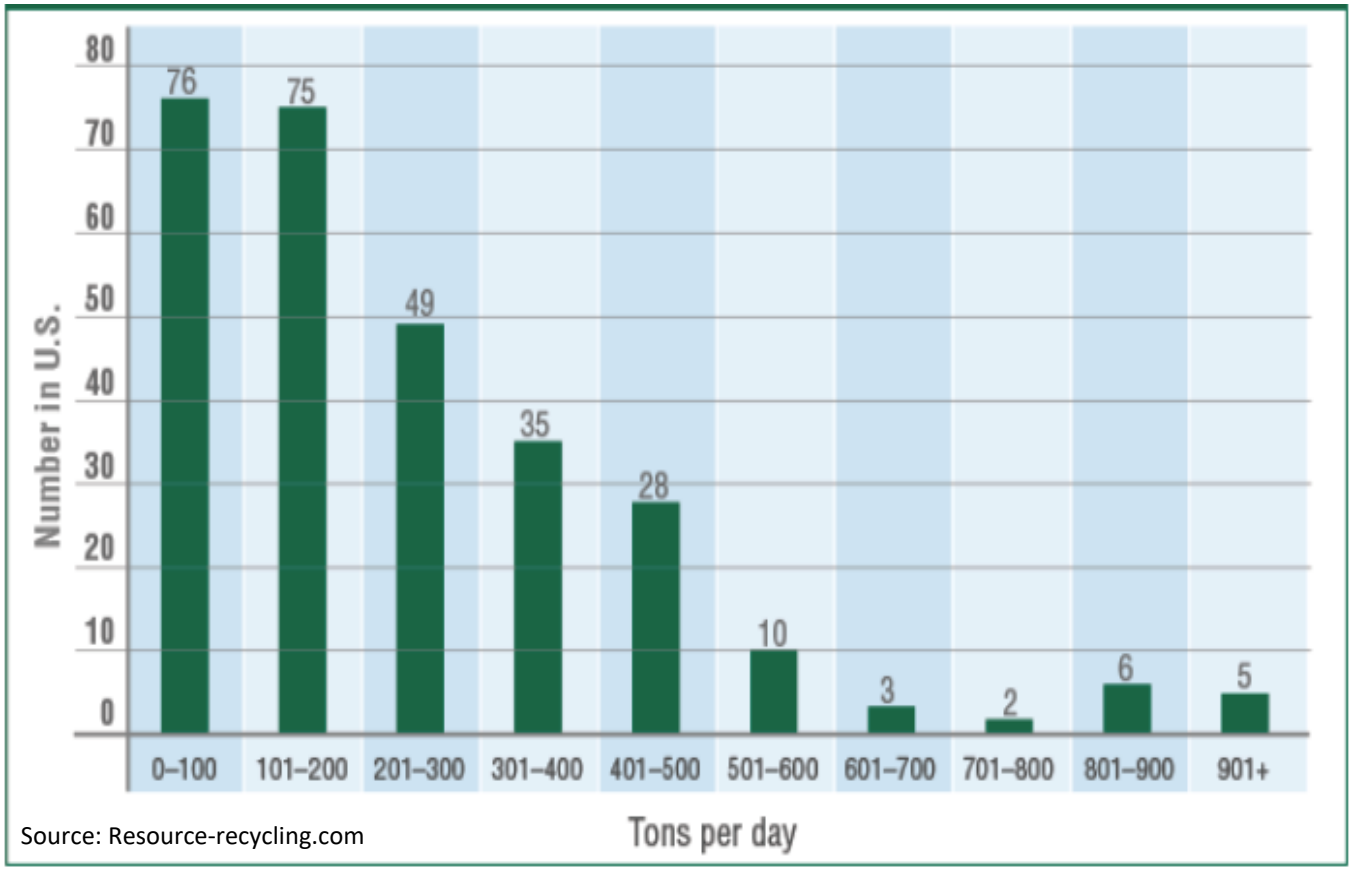


Source: RRS/SPC 2015-2016

Processing



Source: Eileen Berenyi, GAA



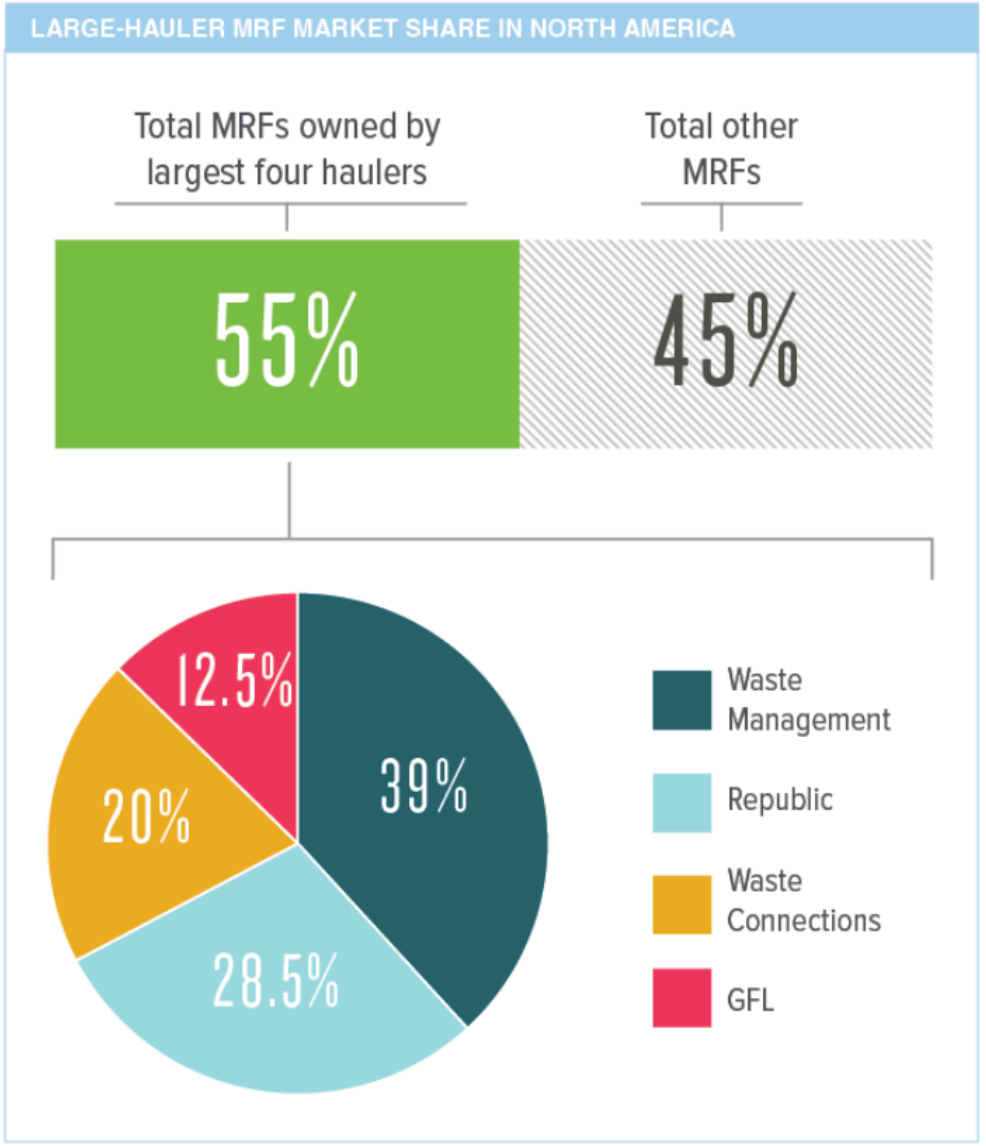
Source: Resource-recycling.com

MRFs

- 2/3 MRFs – single stream
- Average throughput = 200 TPD
- 5 largest MRFs > 76 smallest MRFs

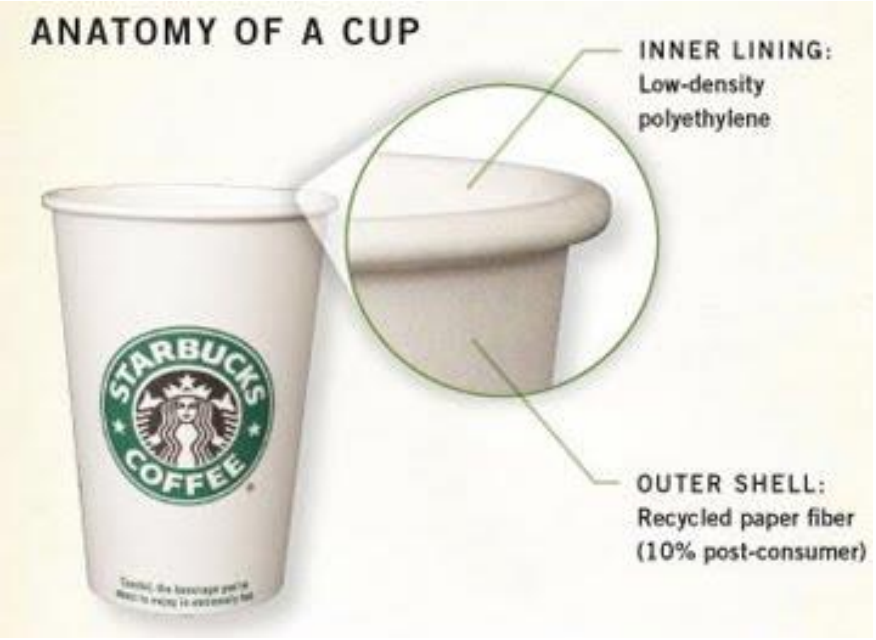
Capacity & Utilization

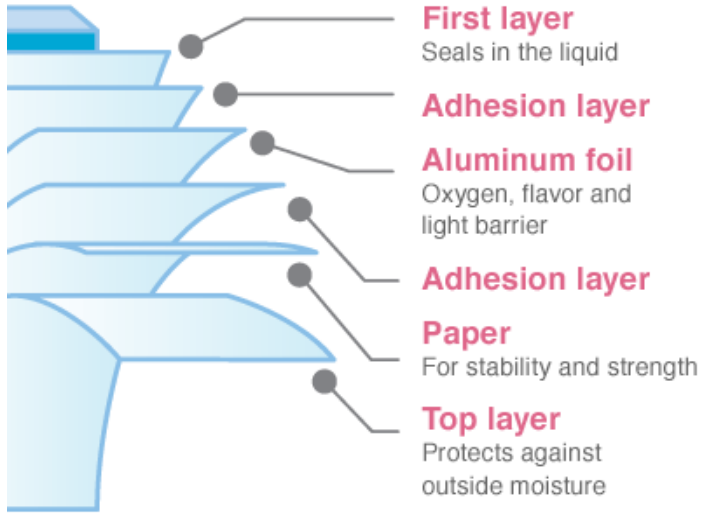
- Average at 60% utilization
- WM – 66% capacity is new or had upgrades in last 2 years; 25% planned upgrade in next 3 years
- Republic – 66% capacity state-of the art or recently upgraded; 32% planned upgrade in next 2-3 years

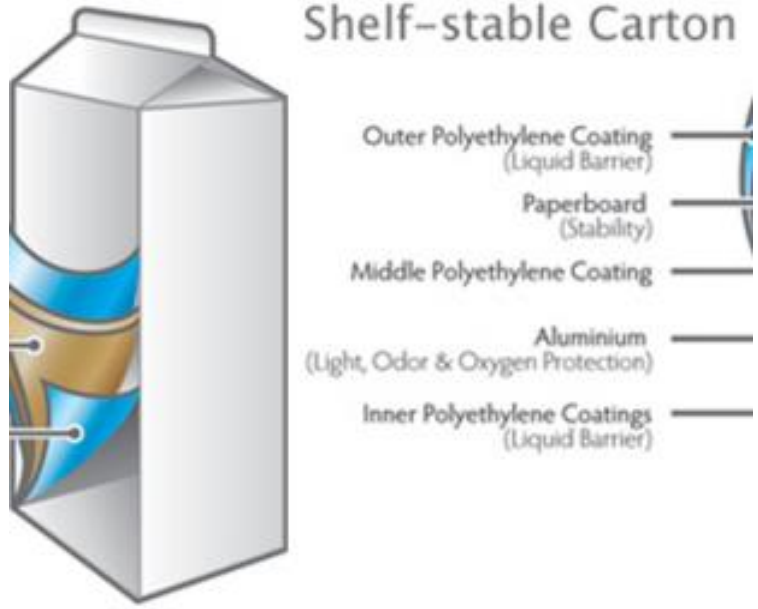


This month's Data Corner was produced by RRS. Learn more at recycle.com.

Evolving ton…







Material complexity: then & now

Table 1: The Impact of Packaging Innovation

PACKAGING	CHARACTERISTICS	INITIAL YEAR OF DATA	INITIAL CHARACTERISTICS	FINAL YEAR OF DATA	FINAL CHARACTERISTICS
Plastic grocery sack	Thickness	1976	2.3 mils	2009	0.5 mils
Plastic fruit sack	Thickness	1970	1.05 mils	2009	0.4 mils
Plastic trash bag	Thickness	1975	2.5–3.0 mils	2009	0.4–1.1 mils
PET 2-liter bottle	Weight	1978	68 grams	2009	48 grams
HDPE milk jug	Weight	1965	120 grams	2009	64 grams
Aluminum can	Weight	1972	20.8 grams	2009	13.3 grams

Source: http://perc.org/sites/default/files/ps47.pdf

Lightweighting by switching packaging

Glass jars, metal cap to **PET jar, PP cap**

- **Light-weighting**
- **Flexible packaging expected to grow 4-6.5% annually in the next few years**

HDPE Bottle, PP Cap to **multi-layer, flexible film pouch**

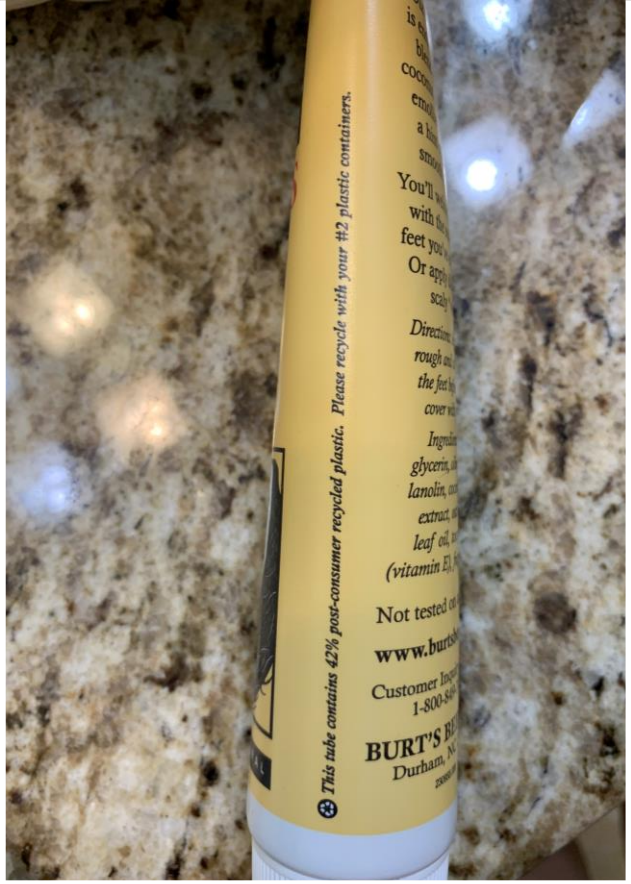
From steel can, paper label adhesive to **multi-layer, foil-lined flexible film pouch**

Source: http://www.scswana.org/resources/Documents/2016%20Spring%20Conference/5-19%206th%20Fairley%20-%20Evolving%20Recycling%20Systems%20and%20Strategies.pdf

Contamination

Is it recyclable?

Have you ever wondered whether a package was recyclable?



Do labels help?

What is the contamination rate?

2009 – 7%

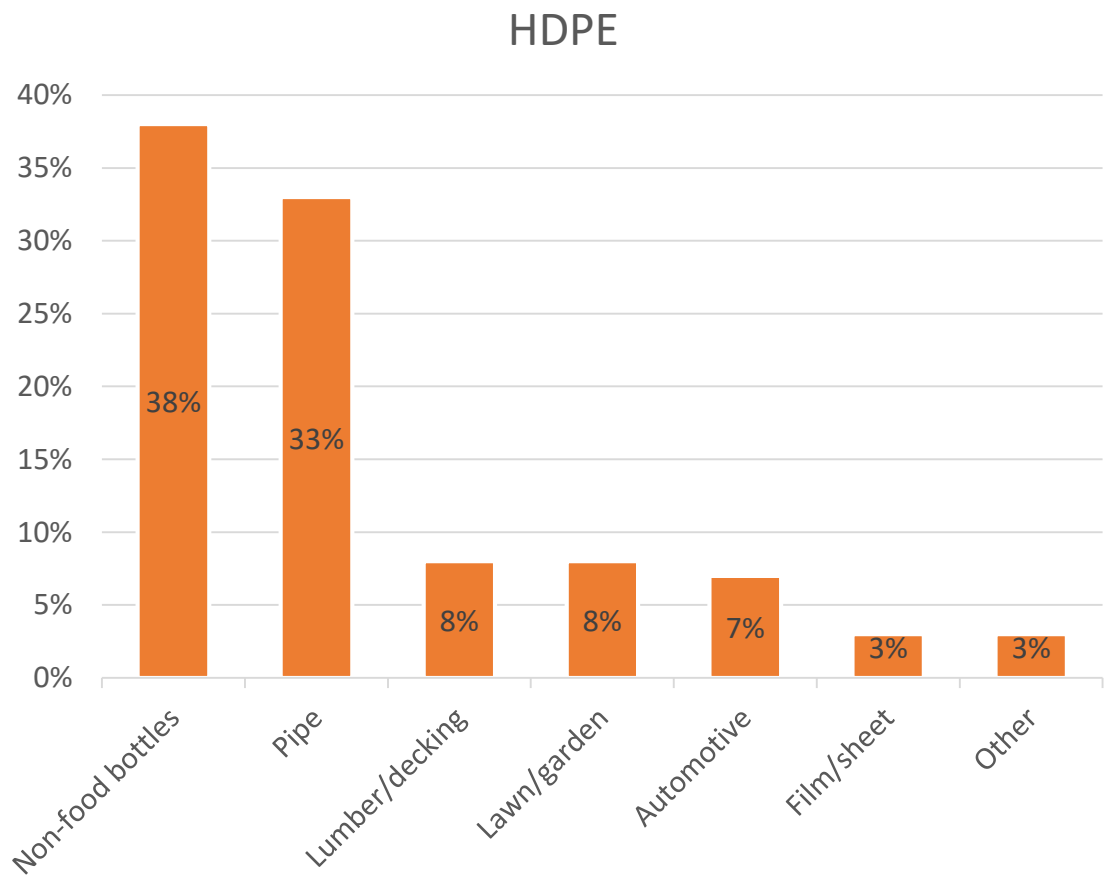
2014 – 16%

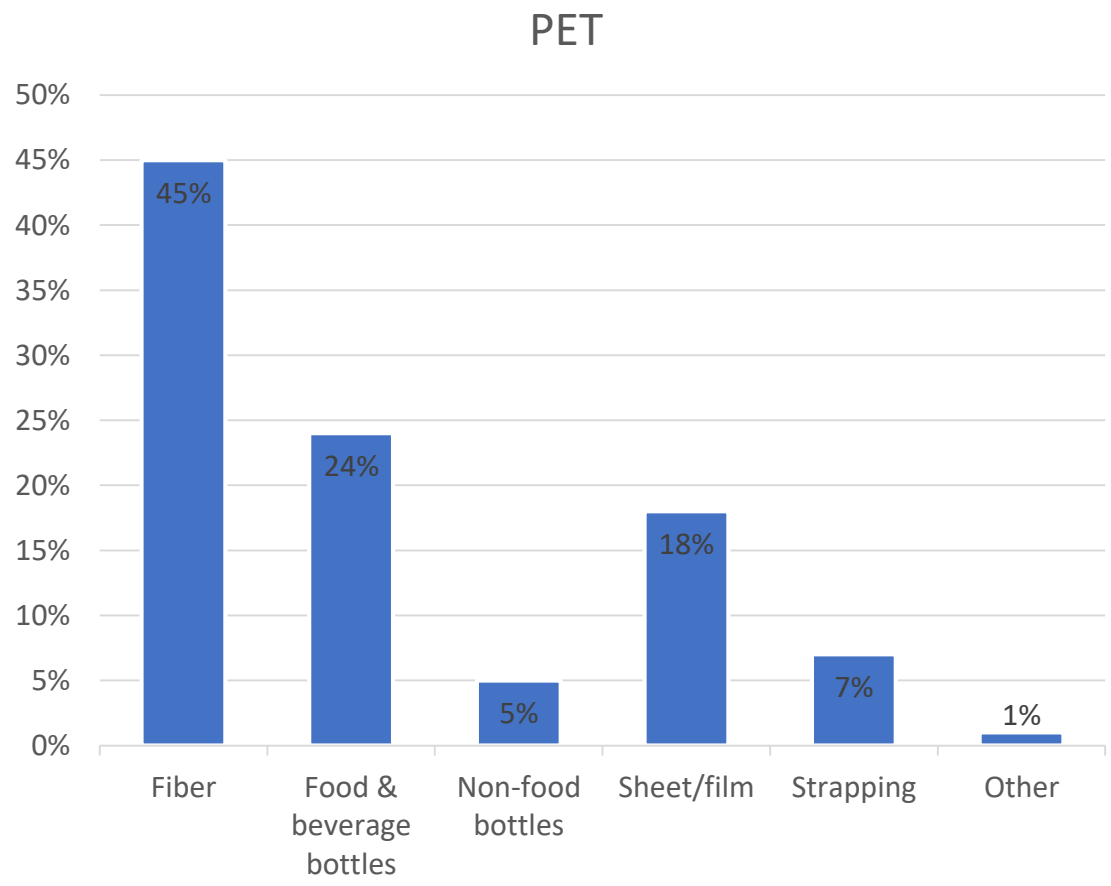
2018 - 25%

2020 - 20%

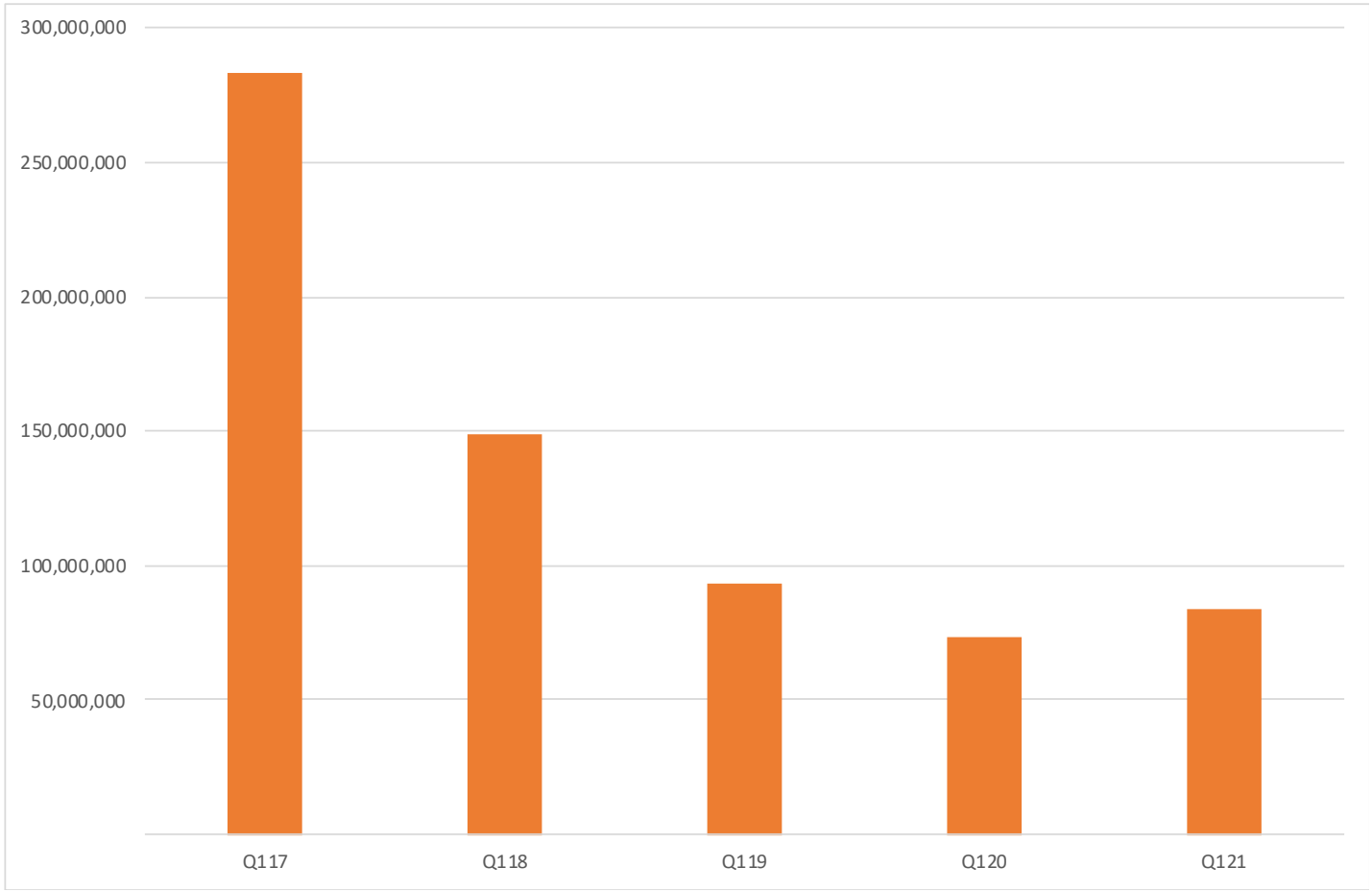
End Markets

HDPE & PET end markets





PET & PE exports Q1 – 2017-2021

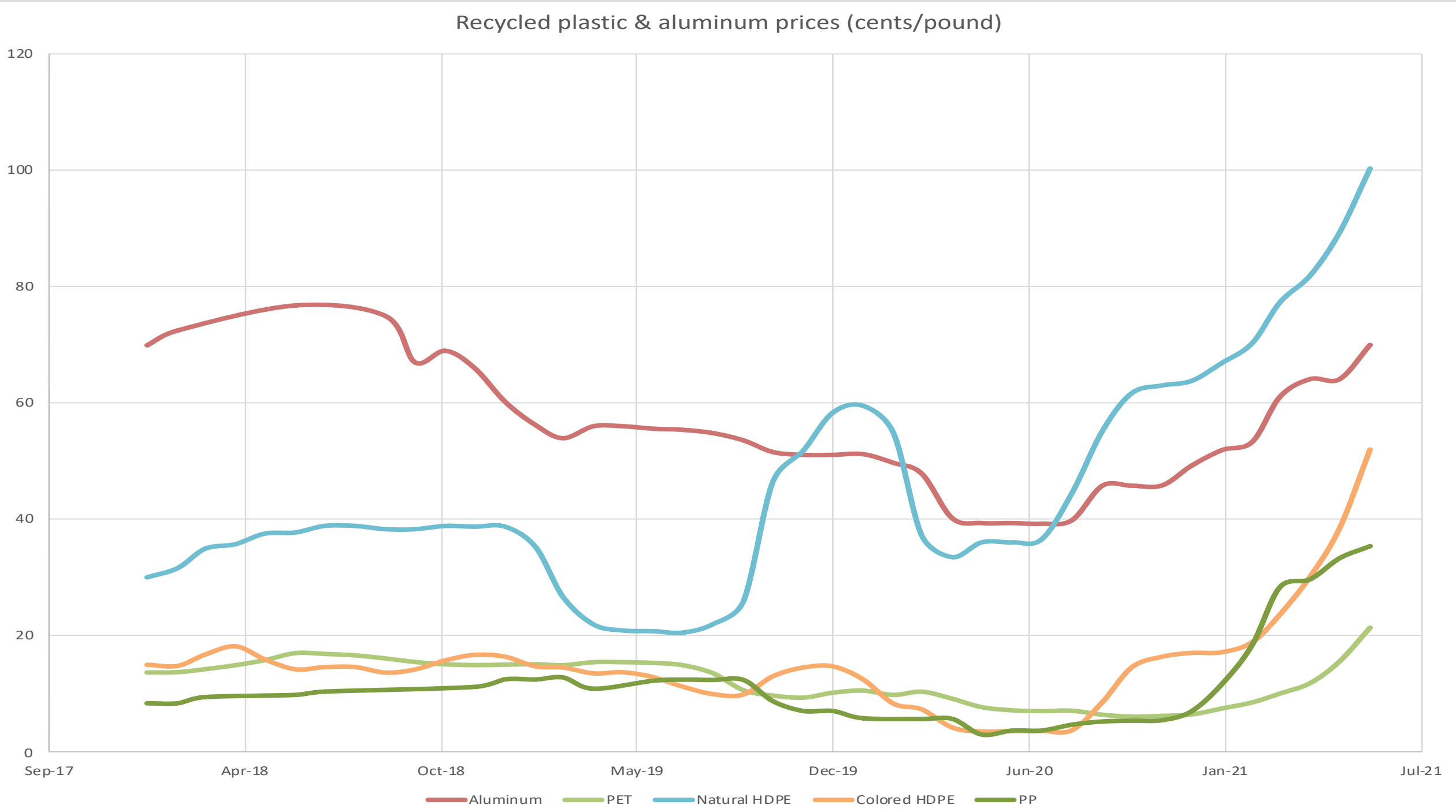


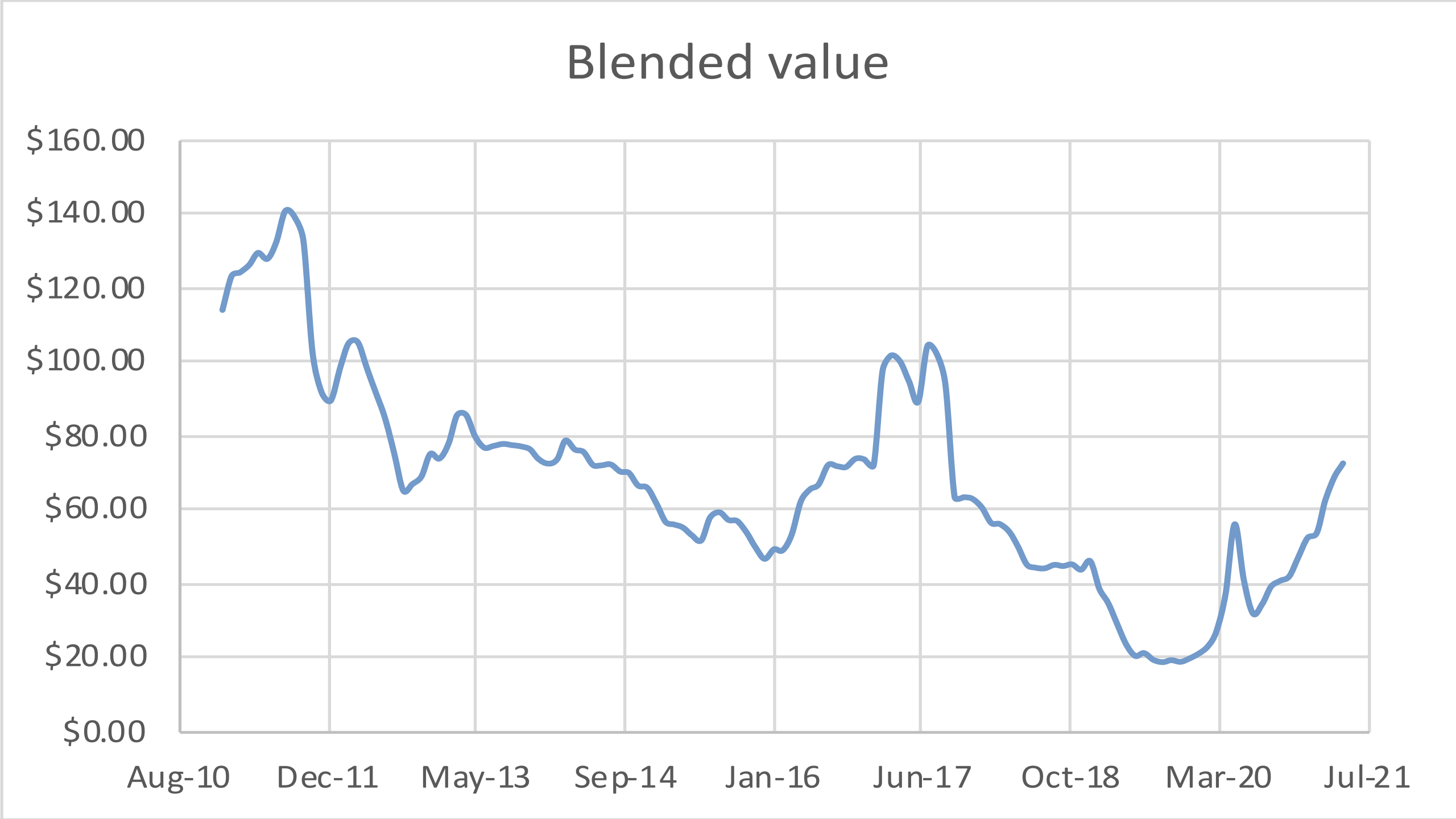
Commitments to eliminate overseas exports of residential MRF plastic

- Republic Services
- Waste Management
- Waste Connections
- Casella
- Resource Management
- Single Stream Recyclers
- TFC Recycling

Source: https://www.wastedive.com/news/cfo-large-us-recyclers-export-plastic/554857/

Prices


Recycled plastic & aluminum prices (cents/pound)
120
100
80
60
40
20
0
Sep-17
Apr-18
Oct-18
May-19
Dec-19
Jun-20
Jan-21
Jul-21
Aluminum
PET
Natural HDPE
Colored HDPE
PP


Blended value
$160.00
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
Aug-10
Dec-11
May-13
Sep-14
Jan-16
Jun-17
Oct-18
Mar-20
Jul-21

Legs/Regs & policies

2021 Extended Producer Responsibility (EPR) Legislation

States with packaging EPR introduced bills this year:

- California, Hawaii, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Vermont, Washington

States that passed EPR legislation:

- Maine & Oregon

Federal bills containing packaging EPR language:

- Break Free From Plastic Pollution Act
- CLEAN Future Act

Other Federal

- **EPA – 50% recycling rate & will release new methodology**
- **Save our Seas (2.0)**
- **Recover Act** –Infrastructure focus
- **Recycle Act** –Education focus
- **Plastic Waste Reduction and Recycling Act –** Focused on recycling and reduction technologies and strategies for plastic

Other State

- **Post-Consumer Content legislation**
- **Labelling requirements**
- **Material bans** – Polystyrene, bags, straws bans
- **Environmental Justice** – Linking operations and social justice/equity.

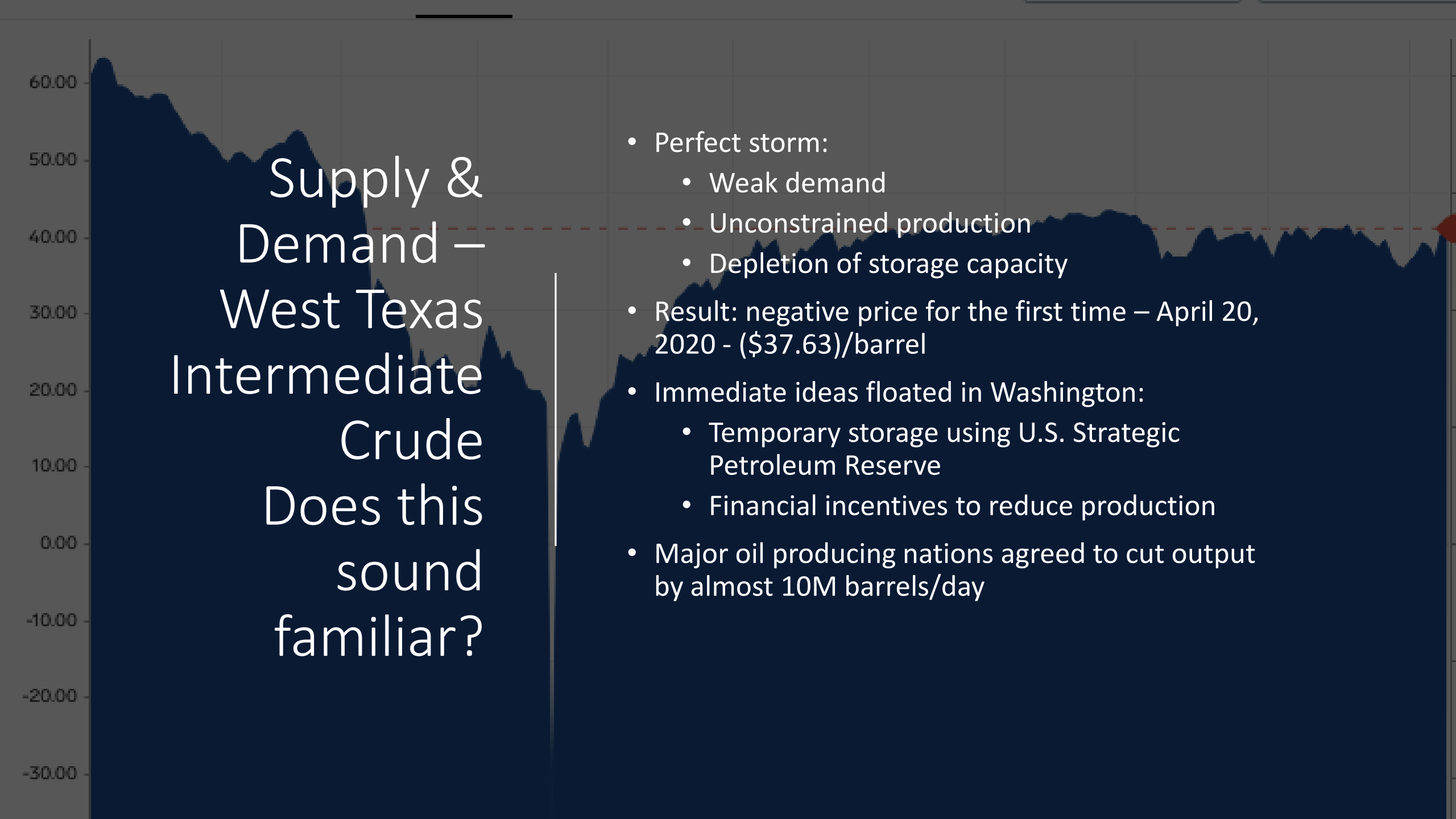
What's the solution?

Not one solution, multiple solutions

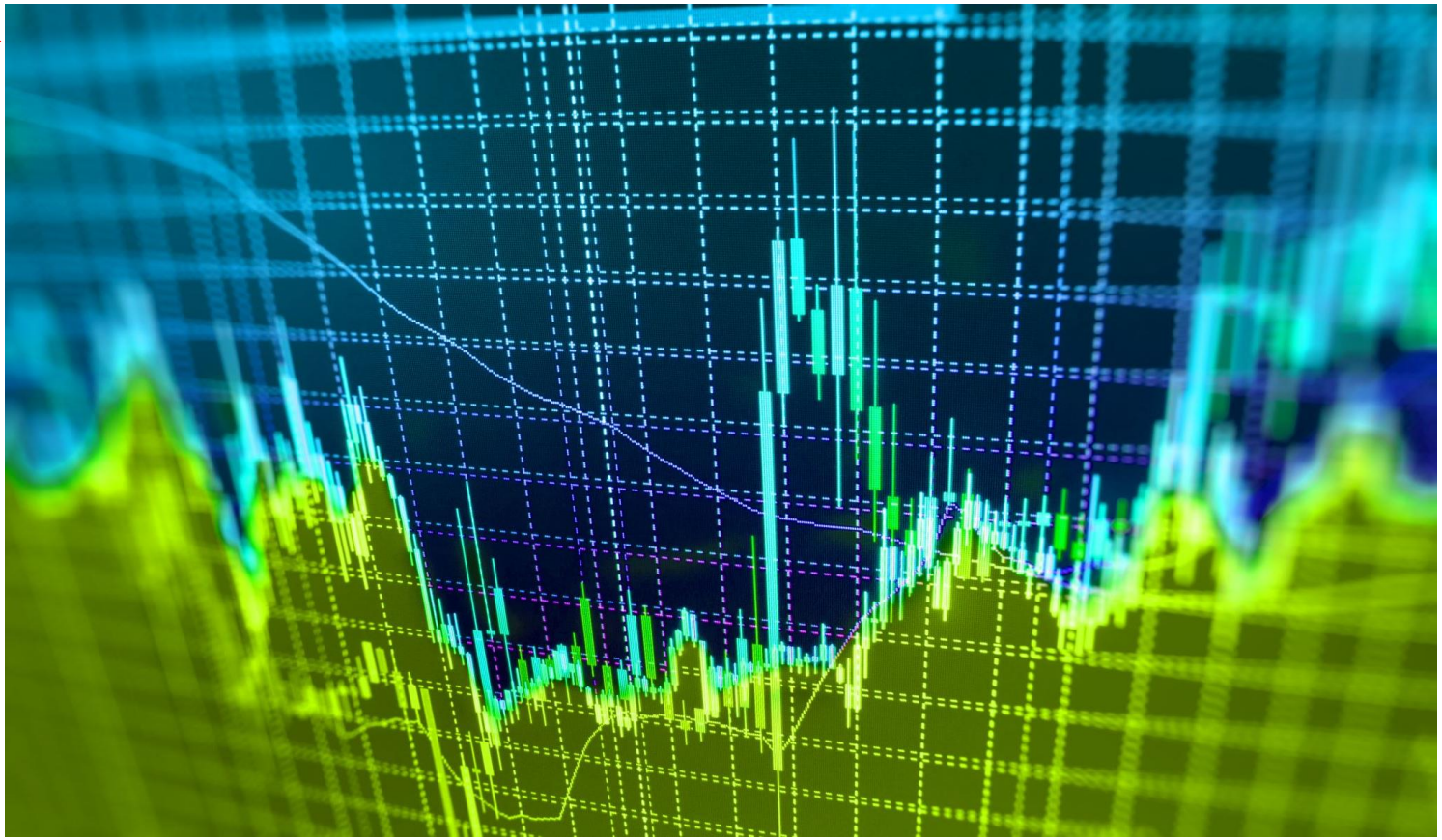
For years, we have been living the “Field of Dreams”:

If you build it, they will come…

Supply & Demand – West Texas Intermediate Crude Does this sound familiar?



- Perfect storm:
  - Weak demand
  - Unconstrained production
  - Depletion of storage capacity
- Result: negative price for the first time – April 20, 2020 - ($37.63)/barrel
- Immediate ideas floated in Washington:
  - Temporary storage using U.S. Strategic Petroleum Reserve
  - Financial incentives to reduce production
- Major oil producing nations agreed to cut output by almost 10M barrels/day

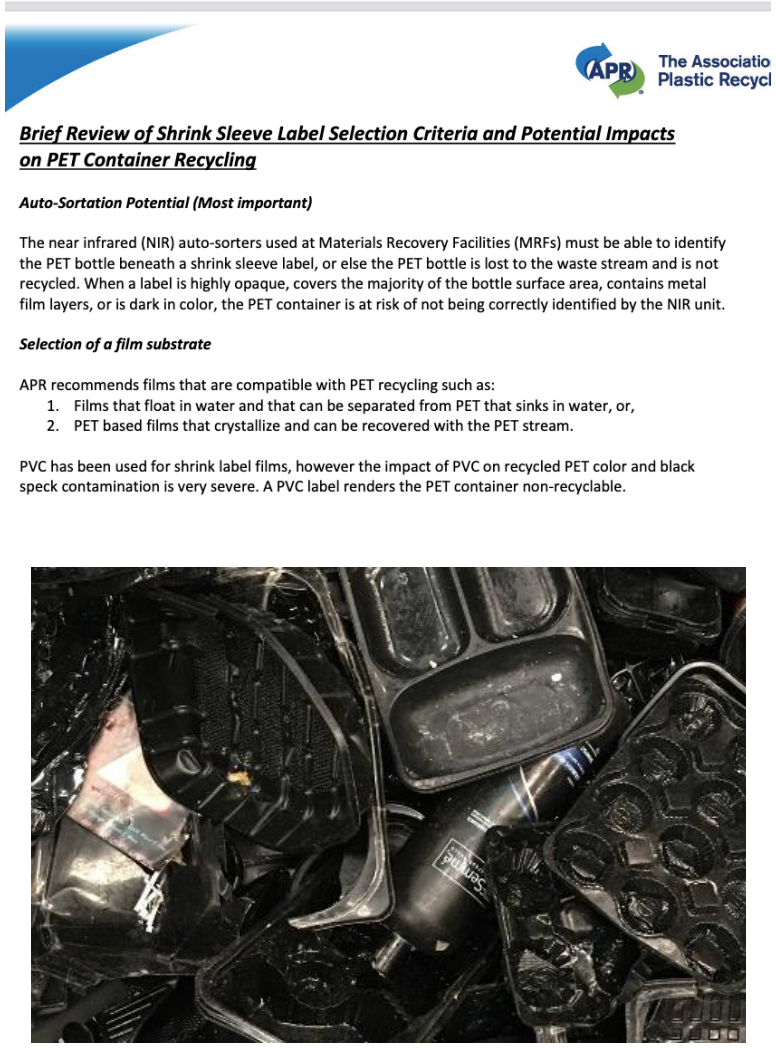


Balancing supply & demand

- Recycling is inelastic supply
- When China exited as a buyer, demand (& prices) plummeted
- Inelastic demand will balance inelastic supply
- Some (not all) brands have already made commitments
- Need minimum content to create that demand!
- CA AB793 – already creating differences in PET pricing in California

Design for recycling

- Package designers need to consider:
- Resin type
- Color
- Size and dimensions
- Closures and dispensers
- Barrier Layers, coatings, and additives
- Labels, adhesives and printing
- Attachments



The Associatio
Plastic Recycl

Brief Review of Shrink Sleeve Label Selection Criteria and Potential Impacts on PET Container Recycling

Auto-Sortation Potential (Most important)

The near infrared (NIR) auto-sorters used at Materials Recovery Facilities (MRFs) must be able to identify the PET bottle beneath a shrink sleeve label, or else the PET bottle is lost to the waste stream and is not recycled. When a label is highly opaque, covers the majority of the bottle surface area, contains metal film layers, or is dark in color, the PET container is at risk of not being correctly identified by the NIR unit.

Selection of a film substrate

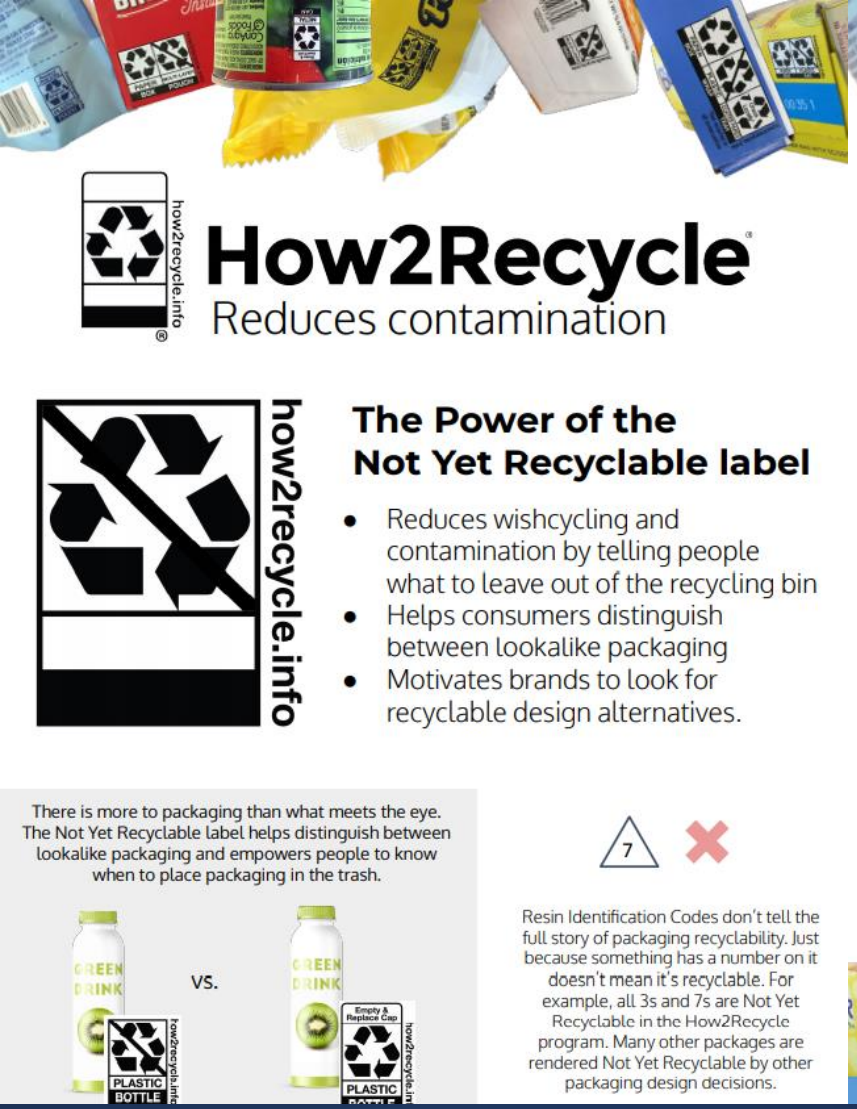
APR recommends films that are compatible with PET recycling such as:

1. Films that float in water and that can be separated from PET that sinks in water, or,
2. PET based films that crystallize and can be recovered with the PET stream.

PVC has been used for shrink label films, however the impact of PVC on recycled PET color and black speck contamination is very severe. A PVC label renders the PET container non-recyclable.

Designed for recycling…

All dressed up & nowhere to go…?



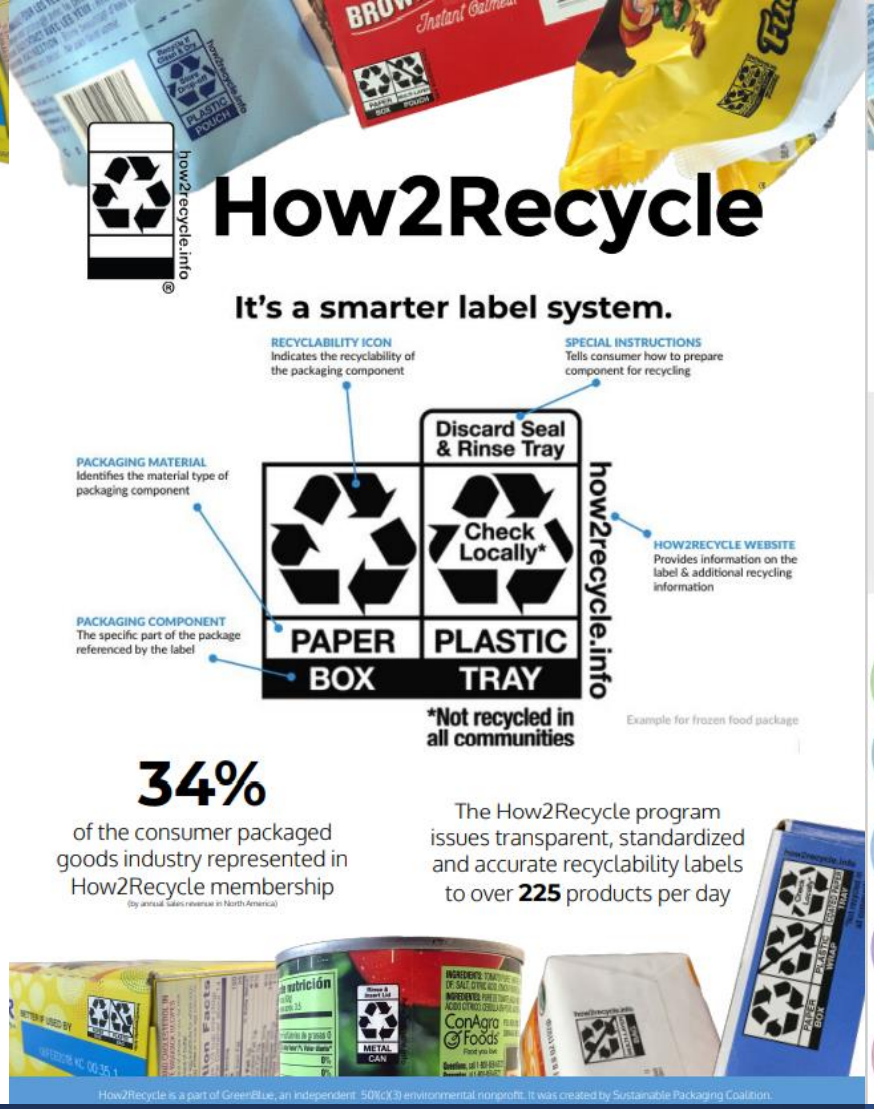
How2Recycle
Reduces contamination

The Power of the Not Yet Recyclable label

- Reduces wishcycling and contamination by telling people what to leave out of the recycling bin
- Helps consumers distinguish between lookalike packaging
- Motivates brands to look for recyclable design alternatives.

There is more to packaging than what meets the eye. The Not Yet Recyclable label helps distinguish between lookalike packaging and empowers people to know when to place packaging in the trash.

Resin Identification Codes don't tell the full story of packaging recyclability. Just because something has a number on it doesn't mean it's recyclable. For example, all 3s and 7s are Not Yet Recyclable in the How2Recycle program. Many other packages are rendered Not Yet Recyclable by other packaging design decisions.



How2Recycle

It's a smarter label system.

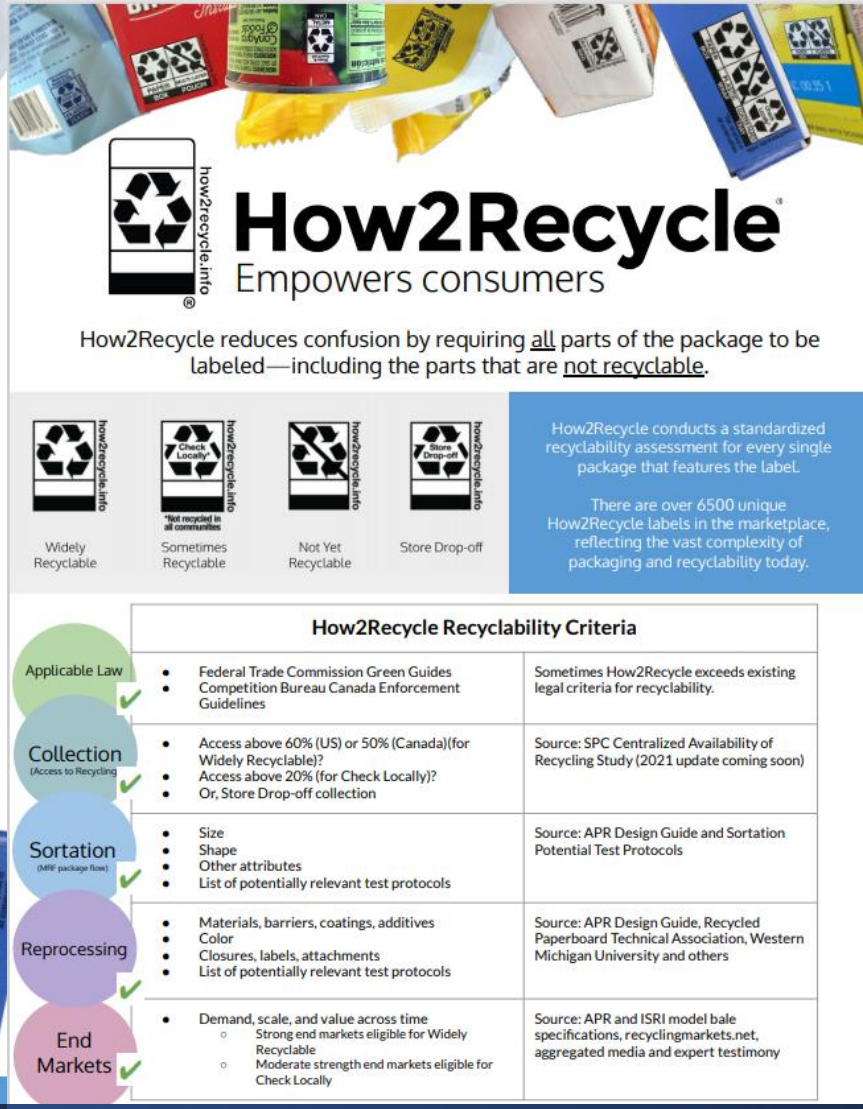
34%

of the consumer packaged goods industry represented in How2Recycle membership

(by annual sales revenue in North America)

The How2Recycle program issues transparent, standardized and accurate recyclability labels to over **225** products per day

How2Recycle is a part of GreenBlue, an independent 501(c)(3) environmental nonprofit. It was created by Sustainable Packaging Coalition.



How2Recycle
Empowers consumers

How2Recycle reduces confusion by requiring all parts of the package to be labeled—including the parts that are not recyclable.

How2Recycle conducts a standardized recyclability assessment for every single package that features the label.

There are over 6500 unique How2Recycle labels in the marketplace, reflecting the vast complexity of packaging and recyclability today.

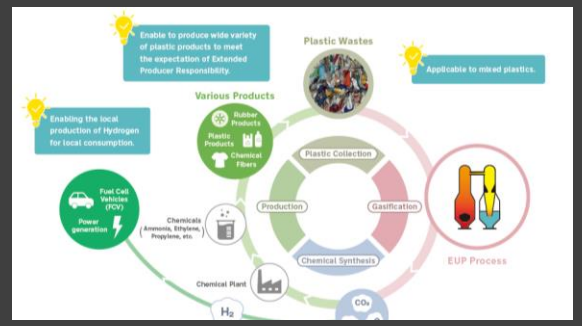
How2Recycle Recyclability Criteria

Applicable Law ✓	• Federal Trade Commission Green Guides • Competition Bureau Canada Enforcement Guidelines	Sometimes How2Recycle exceeds existing legal criteria for recyclability.
Collection (Access to Recycling) ✓	• Access above 60% (US) or 50% (Canada)(for Widely Recyclable)? • Access above 20% (for Check Locally)? • Or, Store Drop-off collection	Source: SPC Centralized Availability of Recycling Study (2021 update coming soon)
Sortation (MRF package flow) ✓	• Size • Shape • Other attributes • List of potentially relevant test protocols	Source: APR Design Guide and Sortation Potential Test Protocols
Reprocessing ✓	• Materials, barriers, coatings, additives • Color • Closures, labels, attachments • List of potentially relevant test protocols	Source: APR Design Guide, Recycled Paperboard Technical Association, Western Michigan University and others

End Markets ✓	• Demand, scale, and value across time
	  ○ Strong end markets eligible for Widely Recyclable
	  ○ Moderate strength end markets eligible for Check Locally
		Source: APR and ISRI model bale specifications, recyclingmarkets.net, aggregated media and expert testimony

Harmonized labeling helps

Digital watermarks



What about the plastic that can't be recycled?

- Chemical recycling?
- Energy conversion?
- Costly
- Historical failures
- Feedstock issues & contamination!
- Eventually…

Thank you!

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