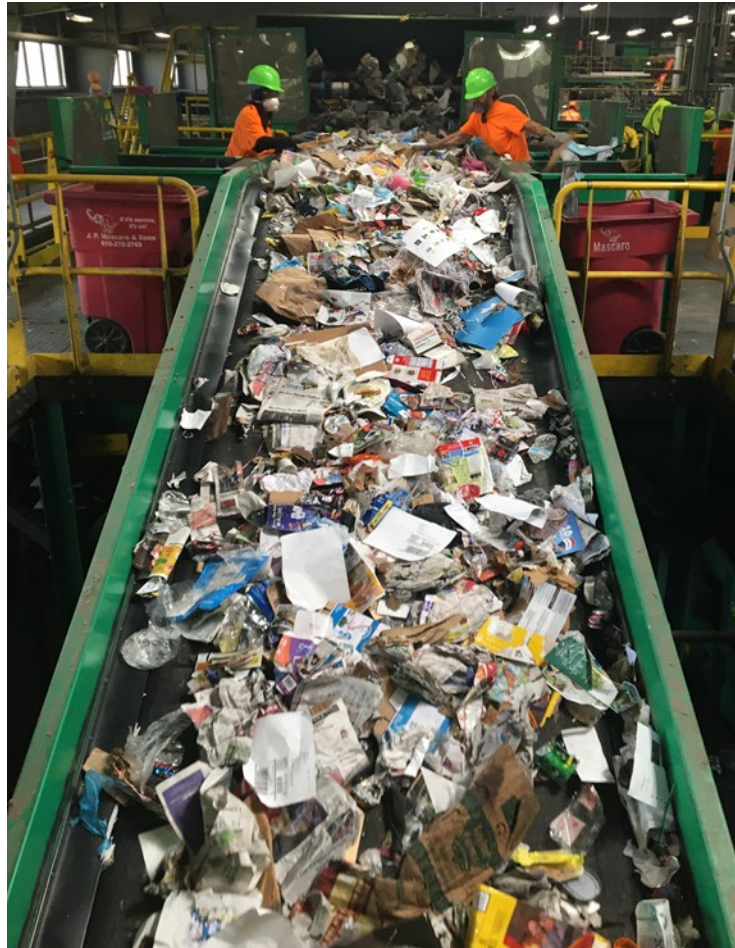


# Recycling Markets – Challenges & Opportunities

March 30, 2021

## Exploring the Potential for Secondary Sorting



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4R Sustainability



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Titus MRF Services

# The Recycling Industry Has Had Ups and Downs

Now is not the time to give up, but rather to **invest** in recycling to keep valuable materials in the stream and out of landfills.

Many in the recycling industry have recognized this.

**RESOURCE  
RECYCLING**

Your trusted source for recycling news and analysis

Resource Recycling ▾ Plastics Recycling Update ▾ E-Scrap News

## Investments contradict 'end of recycling' headlines

Posted on March 26, 2019

by [Colin Staub](#)

Industry stakeholders are pushing back against revived national media focus on the pressures facing U.S.



## Is This the End of Recycling?

TECHNOLOGY

Americans are consuming more and more stuff. Now that other countries won't take our papers and plastics, they're ending up in the trash.

ALANA SEMUELS MAR 5, 2019



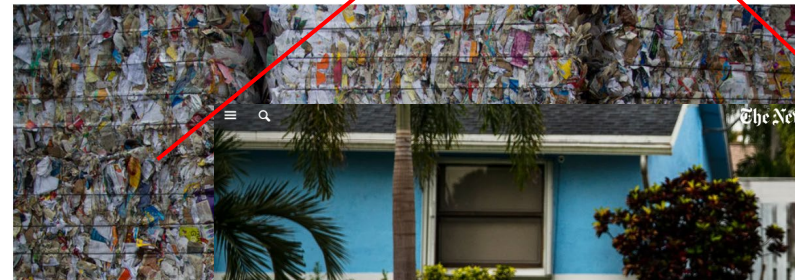
IMPACT

## The Dirty Truth Is Your Recycling May Actually Go To Landfills

America is in the midst of what one official calls an "unprecedented" recycling crisis.

By Dominika Mosbergen

07/24/2018 05:01 am ET | Updated Jul 25, 2018



## As Costs Skyrocket, More U.S. Cities Stop Recycling

With China no longer accepting used plastic and paper, communities are facing steep collection bills, forcing them to end their programs or burn or bury more waste.

# New investments in recycling

- rPlanet Earth and Green Impact Plastics partnered to build a PET thermoform recycling plant in California.
- ACI Plastics partnered with PreZero to build a 3-7 plastics processing plant in SC which became operational in Q4 2020.
- PureCycle Technologies building a 107 mmlbs./y PP recycling plant in OH which will be operational by 2022.
- Merlin Plastics (BC) and Peninsula Plastics (CA) make significant investments in mixed plastics recycling for the west coast.
- Brightmark will begin operating at commercial scale in 2021, processing 100,000 t/y of mixed plastics.
- Eastman is investing \$250 million to build a 100,000 t/y methanolysis facility for polyesters.
- Indorama is committed to adding 600,000 metric tons of capacity from 2021 through 2023 at a cost of approximately \$400 million.



# Investment driven by brand owner goals

NEWS RELEASE

## Achieving U.S. recycled plastics goals by 2030 could cost \$3bn

10 July 2019



**Up to \$3 billion in additional capital investment would be required to achieve current U.S. recycled plastics content goals by 2030, according to new analysis by Wood Mackenzie Chemicals.**

“The issue of sustainability has become an important driver over the past few years, as more brand owners, packaging companies and retailers have announced sustainability targets. These goals have placed an emphasis on using recycled plastic, primarily RPET, as the central component of their products. However, this raises the question of whether there will be enough PET bottles recovered to meet these

# Preparing for tomorrow's recycling industry

## The Challenge

- MRFs in the U.S. are still receiving a wide range of mixed containers, but largely lack the economies of scale to economically sort those into commodity streams.
- While outlets for mixed plastic bales are growing in the U.S., there is much more value to be realized in segregated commodity streams.
- As new recycling capacity comes online, we must find a way to separate commodities to feed these new investments.

**How do we bridge the gap of today's sorting limitations to feed the growing domestic industry?**

# Titus Secondary MRF Overview

# Titus MRF Services



**Founded in 2001 as a Service Provider to Material Recovery Facilities (MRFs)**

## Design/Build Team

- Fontana, CA
- Single Stream Sorting
- Complex MRF Retrofits
- WTE Feed System
- MSW Processing
- Secondary MRF
- "A" Contractor in CA and OR
- 8 employees

## Fabrication Facility

- Fontana, CA
- 30,000 square feet
- UL-certified panel shop
- 38 employees

## Maintenance Services

- Concord, CA
- Service from Seattle to Mexico
- 8 employees

## Secondary MRF

- Los Angeles, CA
- Demonstration Facility
- \$6M Investment
- Solid Waste Permit
- 23 employees



# We work to create...



better solutions for material recovery



new markets for recovered materials



recycling stakeholder connections





# We work to prevent...



the generation of greenhouse gases



the pollution of our oceans

the landfilling of valuable resources



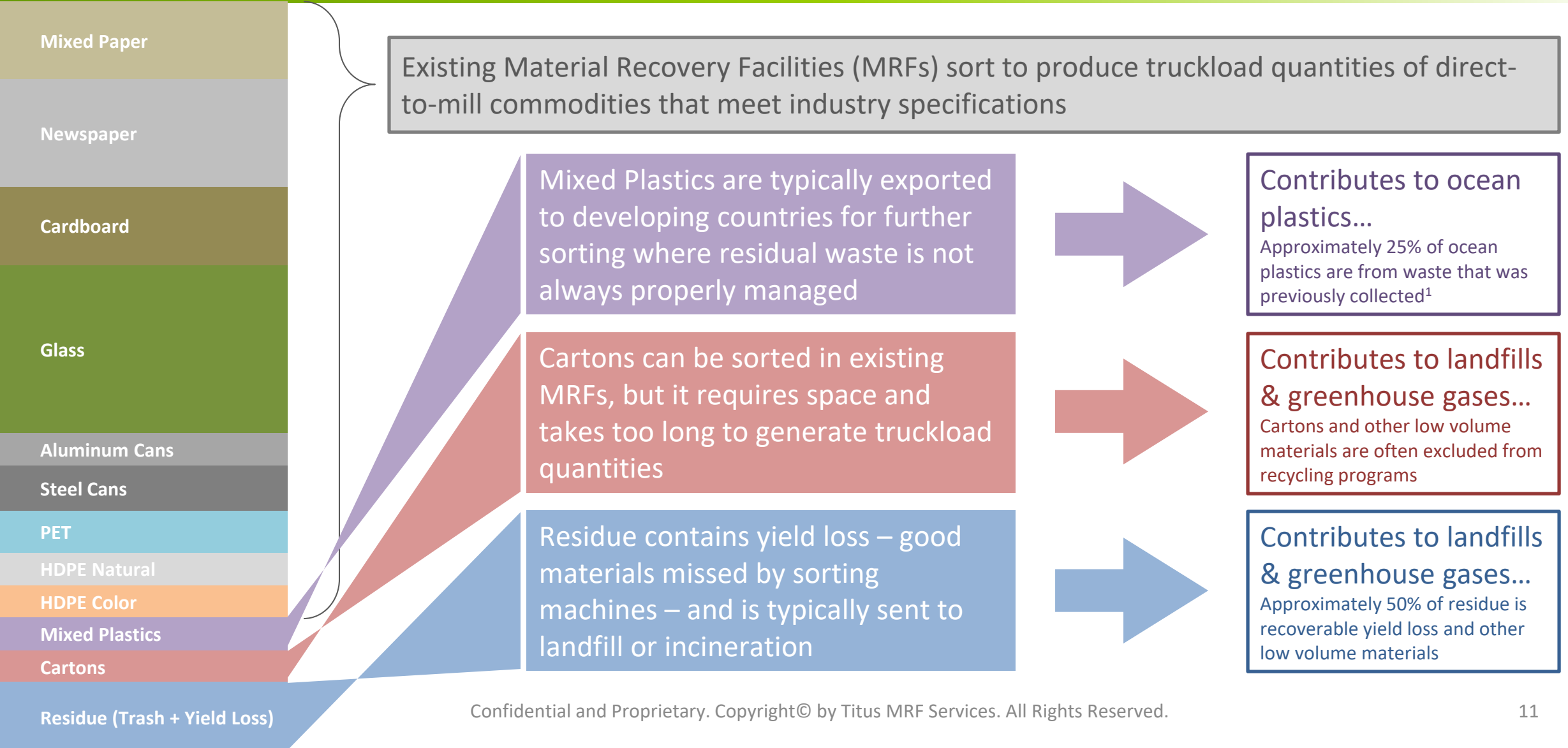


# Secondary MRF Mission



Our mission is to create a pathway for closing the loop for all materials collected for recycling for the benefit of all stakeholders.

# We see an opportunity...





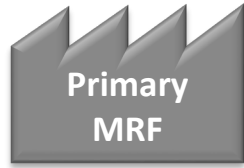
# Economies of Scale vs. Route Optimization



## Recovery Potential at Primary MRF



**0.12%**  
EPS/PS  
in Blue Bin



**4,000**  
TPM  
Capacity



**4.8**  
TPM  
¼ Truckload

## Recovery Potential at Secondary MRF



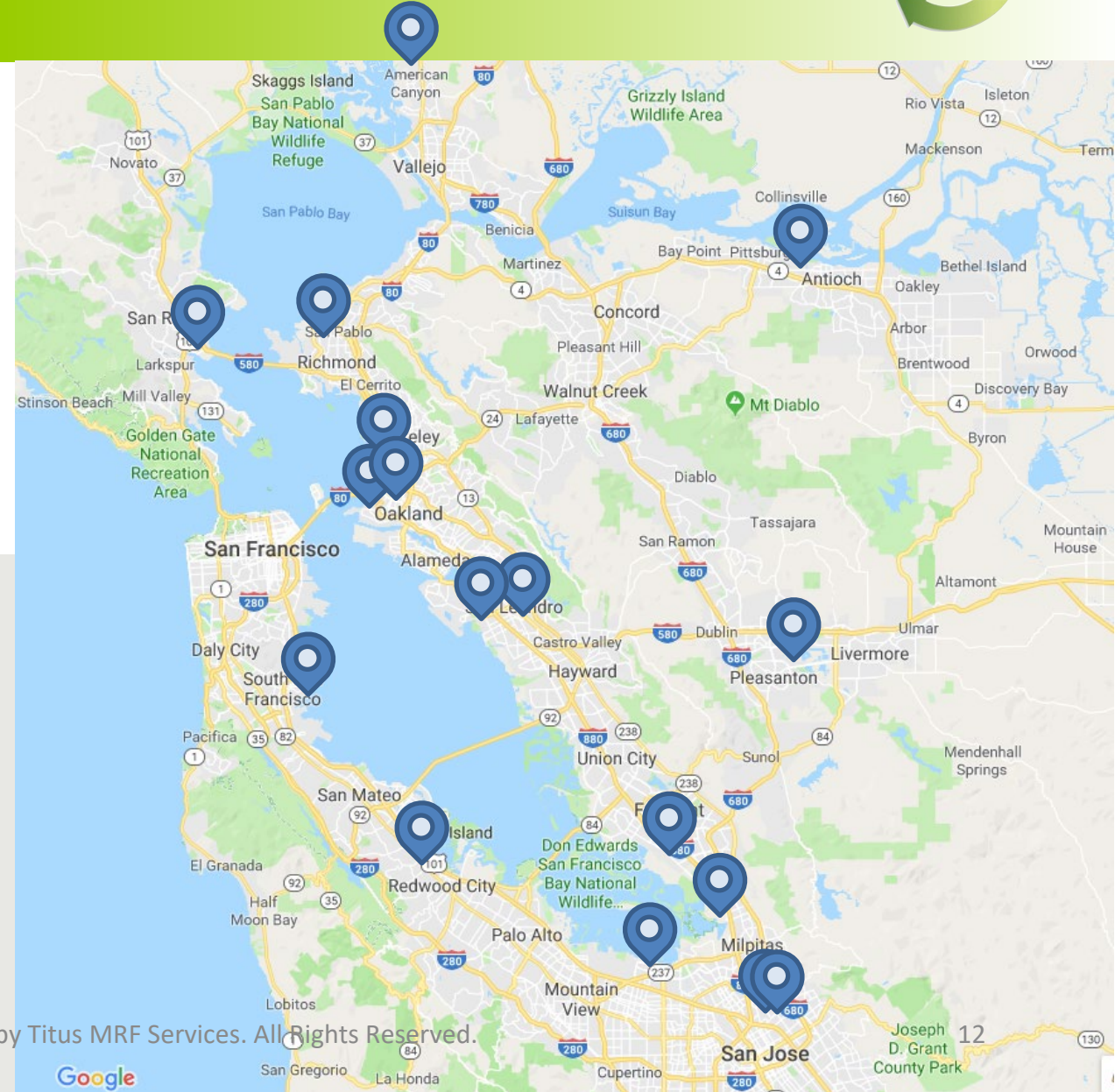
**1.0%**  
EPS/PS  
in Residue



**8,500**  
TPM  
Capacity



**85**  
TPM  
4 Truckloads



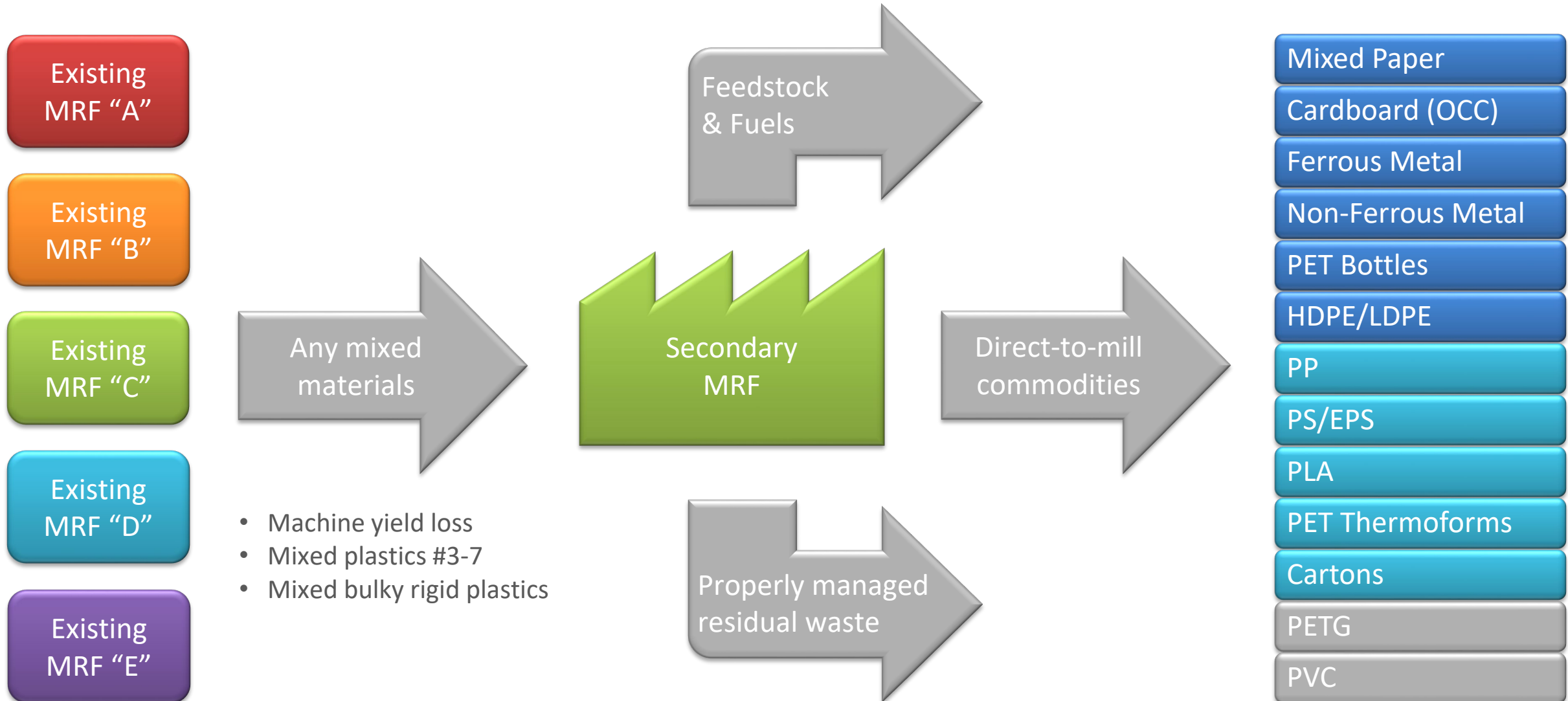
# Opportunity to Optimize



- Optimize Recycling Infrastructure
  - Maximize material recovery on a regional scale
  - Provide operational flexibility to existing MRFs
  - Improve ability to adapt to changing packaging
- Optimize Business Model
  - Limit risk by using a sorting service business model
  - Produce direct-to-mill commodities, feedstock & fuels
  - Develop additional revenue streams



# Our solution: Secondary MRFs





# Who Benefits



## MUNICIPALITIES & RESIDENTS

- Provides “Blue Bin Accountability” and data to encourage product stewardship
- Reduces environmental impacts
- Improves recycling/diversion rates
- Creates domestic clean technology jobs

## DOWNSTREAM MILLS / PROCESSORS

- Increases availability of high-quality feedstock
- Produces feedstock that meets domestic mill requirements
- Processes mill rejects to improve overall yield
- Reacts quickly to support new businesses

## MATERIAL RECOVERY FACILITIES (MRFs)

- Increases operational flexibility
- Decreases reliance on export markets
- Extends ability to adapt to the “evolving ton”
- Reduces costs associated with machine yield loss
- Shares revenue from material sales with MRFs

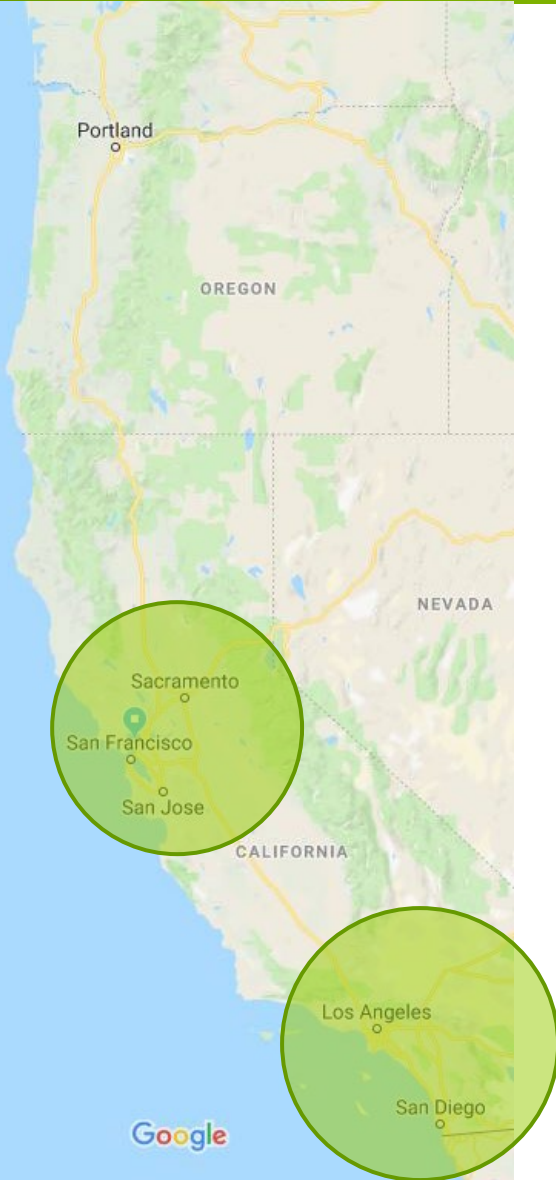
## BRAND OWNERS & PACKAGING PRODUCERS

- Adapts to and facilitates introduction of new packaging formats and/or materials
- Creates markets for low-volume materials
- Provides a cost-effective pathway to product stewardship

# Impact!

- **Blue Bin Accountability** for ~18 million consumers!
- Extends existing MRFs **ability to adapt** to the “ever changing” blue bin
- Conserves **valuable resources** and reduces need for virgin materials
- Reduces **greenhouse gas** generation by 220,000 tons CO<sub>2eq</sub>
- Reduces leakage to the **marine environment** by managing mixed materials domestically
- Creates a platform to design and test **innovative material recovery solutions** that could be deployed in developing countries

Blue Bin Accountability - sorting to recover direct-to-mill commodities and managing residual wastes responsibly



# Projects & Findings



# Growing recycling

As we aim to grow recycling, these secondary sorting projects seek to answer the following questions:

- What additional streams of material could be captured through secondary sorting?
- Can we change the economics of recycling by creating additional value?
- What additional volumes could be created for domestic markets through secondary sorting?
- What additional recovery opportunity can be created for new resins through regional consolidation of volumes?

# Secondary sorting evaluations

## Portland, OR in Summer 2019

- Received and sorted samples from 4 MRFs in Oregon and Washington
- Study findings suggest:

An estimated 50,000 tons per year of additional recyclable materials (3%-6% increase in recovery) could be recovered at a regional Secondary MRF servicing Oregon and Washington, including

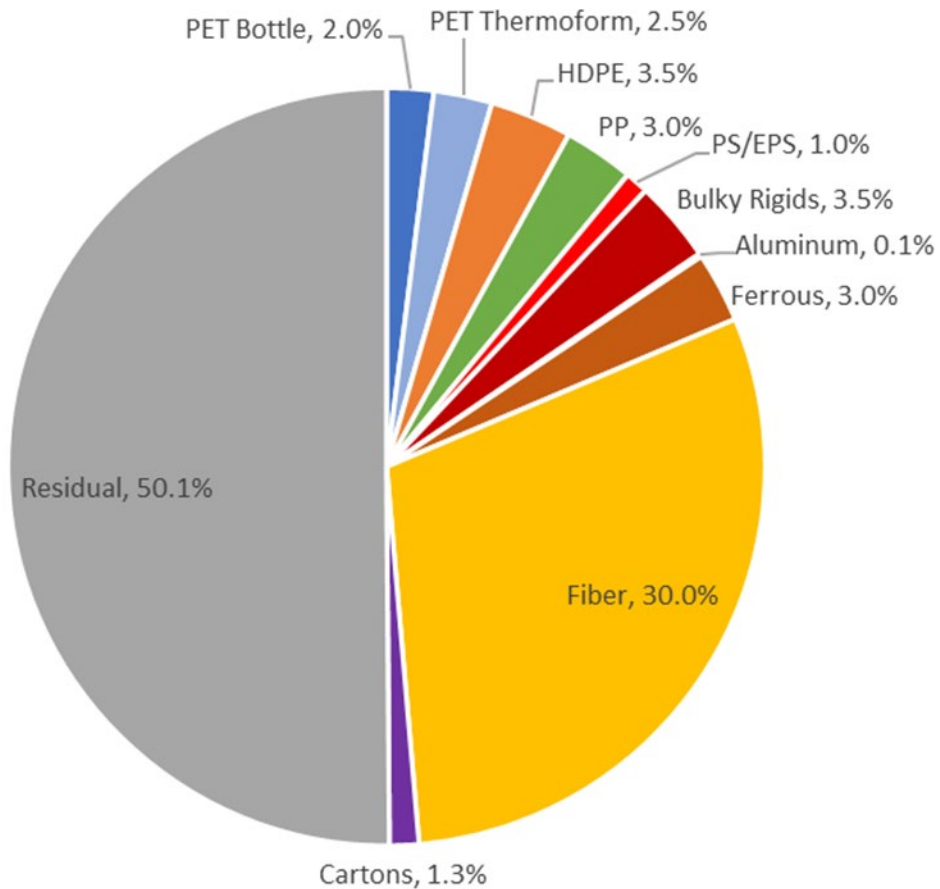
23,000 tons of mixed paper,  
10,000 tons of polypropylene,  
4,800 tons of PET bottles,  
2,800 tons of cartons,  
2,000 tons of polyethylene,  
800 tons of polystyrene.

## PNWSort.org is funded by:

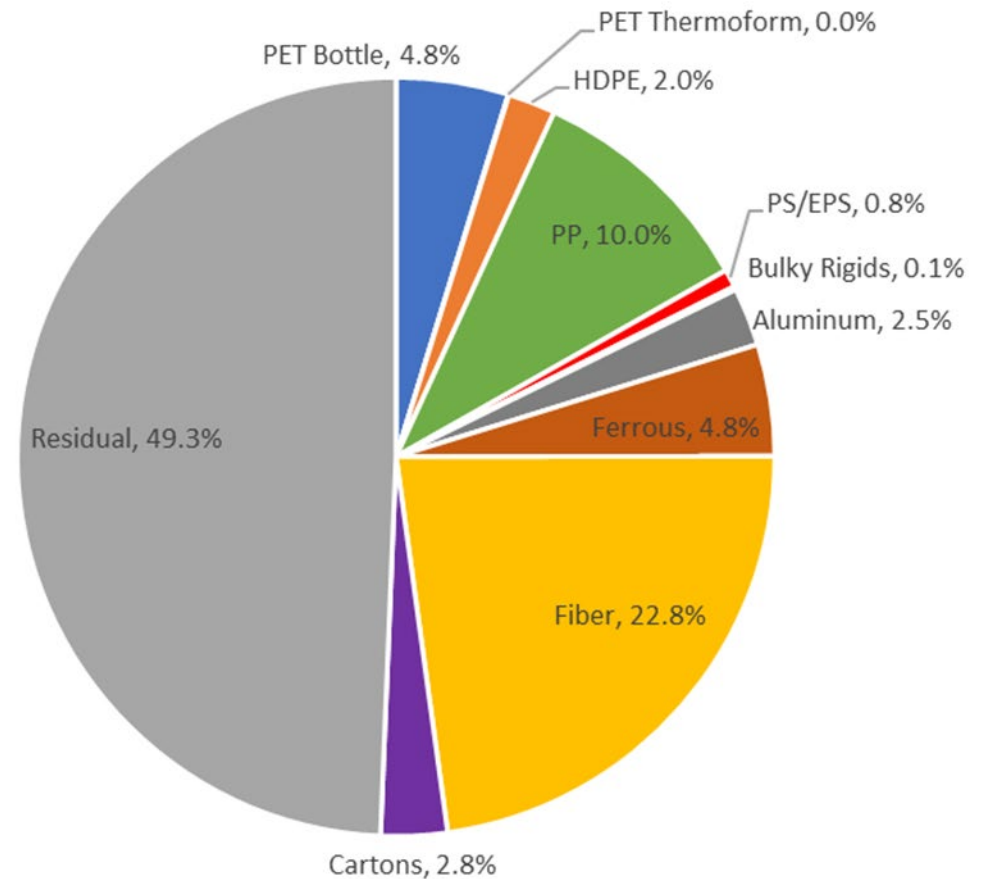


# Secondary sorting evaluations

Mass Balance for California MRF Residue (Typical)

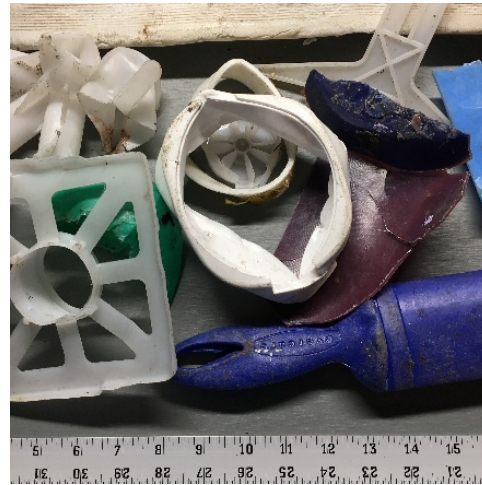


Mass Balance Average for PNW MRF Residue Samples (Adjusted)





# Future program materials?

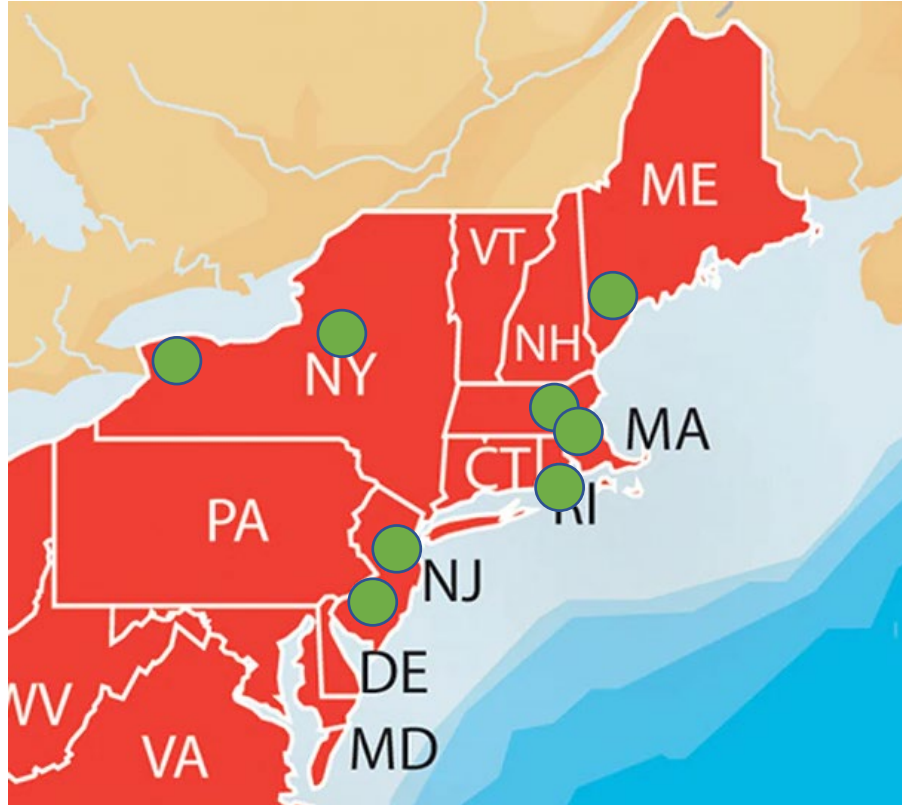


# NE Secondary Sorting Study

- Collect samples from 6-8 MRFs in the Northeast, representing different MRF operators.
- ~500 lbs. samples are collected off of the container line and sent for analysis, according to the sample collection methodology provided by the project team.
- Samples will be sorted to measure material type, resin type for plastics, and categorized into items on the “accepted” list, and those that are not.



# Examples of participating Northeast MRFs



MRF participants in the NE include different sizes and features:

- Publicly owned and privately owned
- Single Stream v. Dual Stream collections
- MRFs that make a 3-7 bale and those that do not
- Manual sort v. automated sort
- PP v. non-PP recovery

# Data management

- Participating MRFs will be given their individual data. The benefits of participation include a better understanding of:
  - Where additional value exists in your container line
  - How much additional value could be realized when secondarily recovered commodities are recovered
  - What additional recovery rates could be offered to communities if secondary sort were in place
- Any data shared publicly will be aggregated, so facility-specific data is not disclosed.
- Information will be shared similarly to data presentation in the [PNW report](#).



# Public use of Data

- An outcome of the audit may be a full-scale demonstration project funded by industry to confirm the findings of the audit.
- Information can help inform where investments can be made, on a regional scale or individual MRF basis, to help improve recovery.
- Reveal opportunities to add materials to the curbside programs when new recovery technologies are brought into the system.
- Show what additional recycled feedstocks could be generated to meet the needs of the growing domestic recycling industry.

## **Project Lead for the ACC**

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