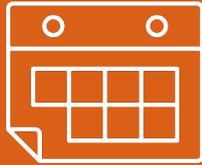


# THE GROWING MARKET FOR RECYCLED POLYPROPYLENE

December 2, 2020

Prepared for: California Commission on Recycling Markets and Curbside Recycling  
by: The Recycling Partnership and The Association of Plastic Recyclers

# AGENDA



## POLYPROPYLENE RECYCLING TODAY

- Challenges
- Opportunities



## POLYPROPYLENE RECYCLABILITY CONSIDERATIONS

- Collection & Separation
- Sorting & Aggregation
- Quality & Quantity to Sustain Market Value
- Processing & Reclamation
- Feedstock in New Production



## CLOSING THOUGHTS

# POLYPROPYLENE (PP) RECYCLING IN CA: OVERVIEW



- Polypropylene (PP) has been collected for recycling for less than a decade, but collection and sortation is growing, with major investments being made by MRFs, some fueled by support from The Recycling Partnership and others
- PP markets are recovering from the disruption that occurred post Chinese National Sword policy; the market is responding, but it will take time for investments to come to fruition
- California MRFs are sorting PP into commodity bales with a positive market value
- PP reclaimers are actively buying material from California MRFs, and investments are being made in in-state reclamation
- Demand for recycled PP feedstock is growing, supported by major corporate commitments

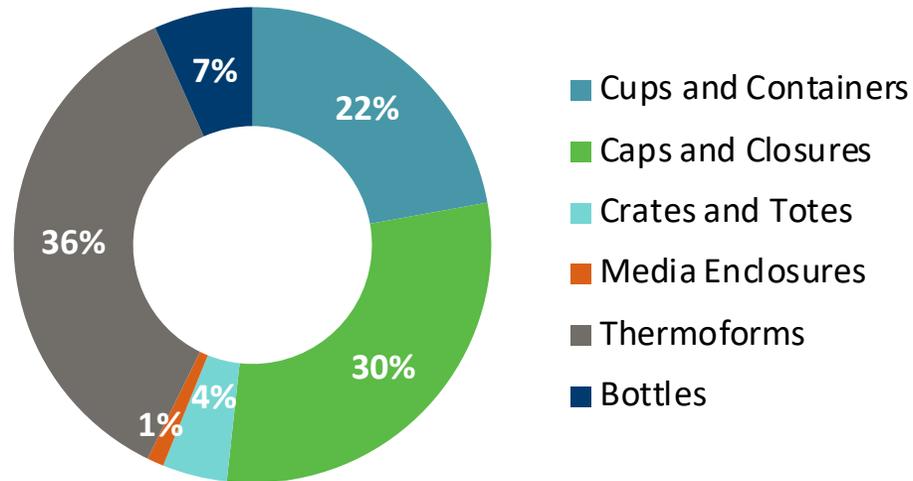
# POLYPROPYLENE (PP) RECYCLING TODAY

Framing the Challenges  
and Opportunities

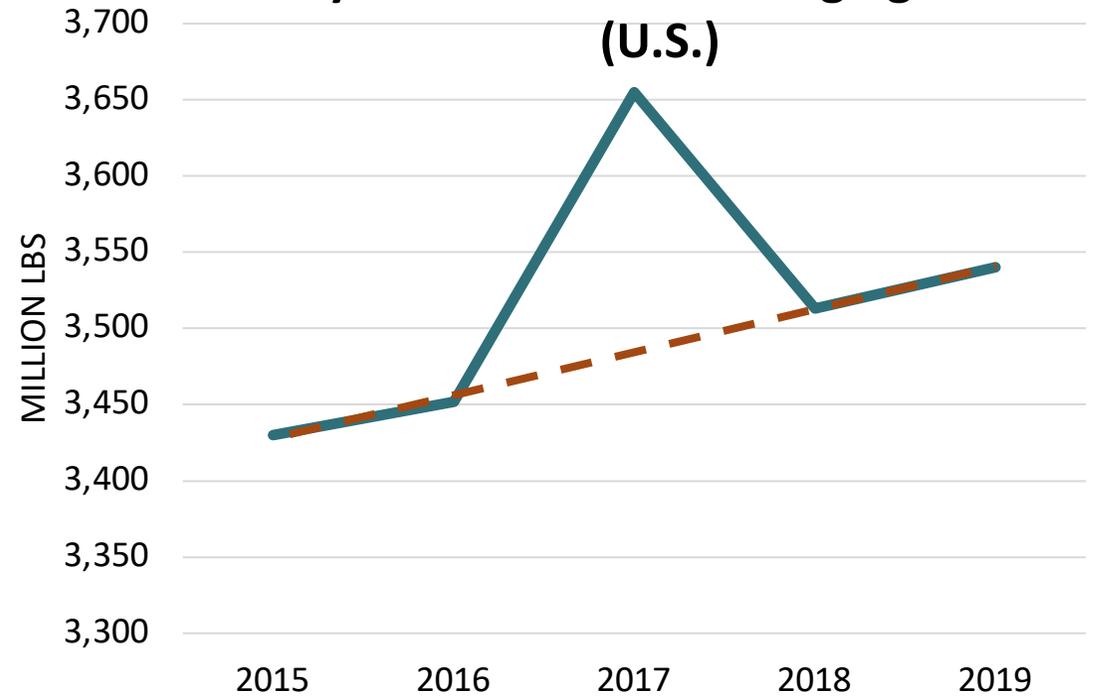
# PP IS A LARGE AND GROWING SEGMENT OF RIGID PLASTIC PACKAGING



## PP CONTAINERS AND PACKAGING APPLICATIONS (U.S. 2018)



## 5-year Trend in PP Packaging Sales (U.S.)



~3.5 billion lbs generated in the U.S. (2018)

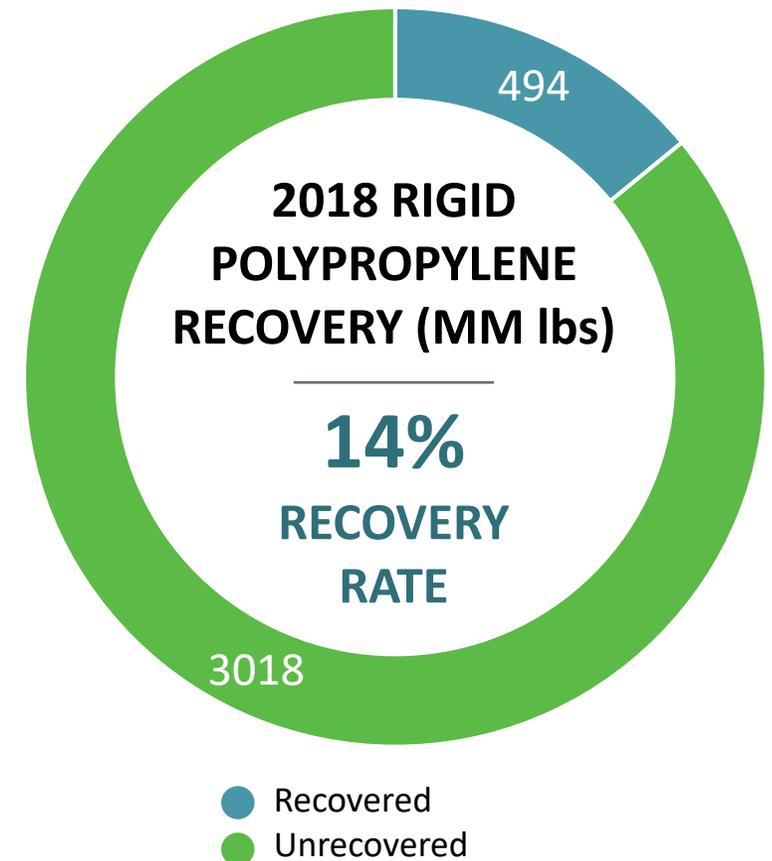
3.2% growth from 2015-2019

~420 mm lbs estimated generated in CA

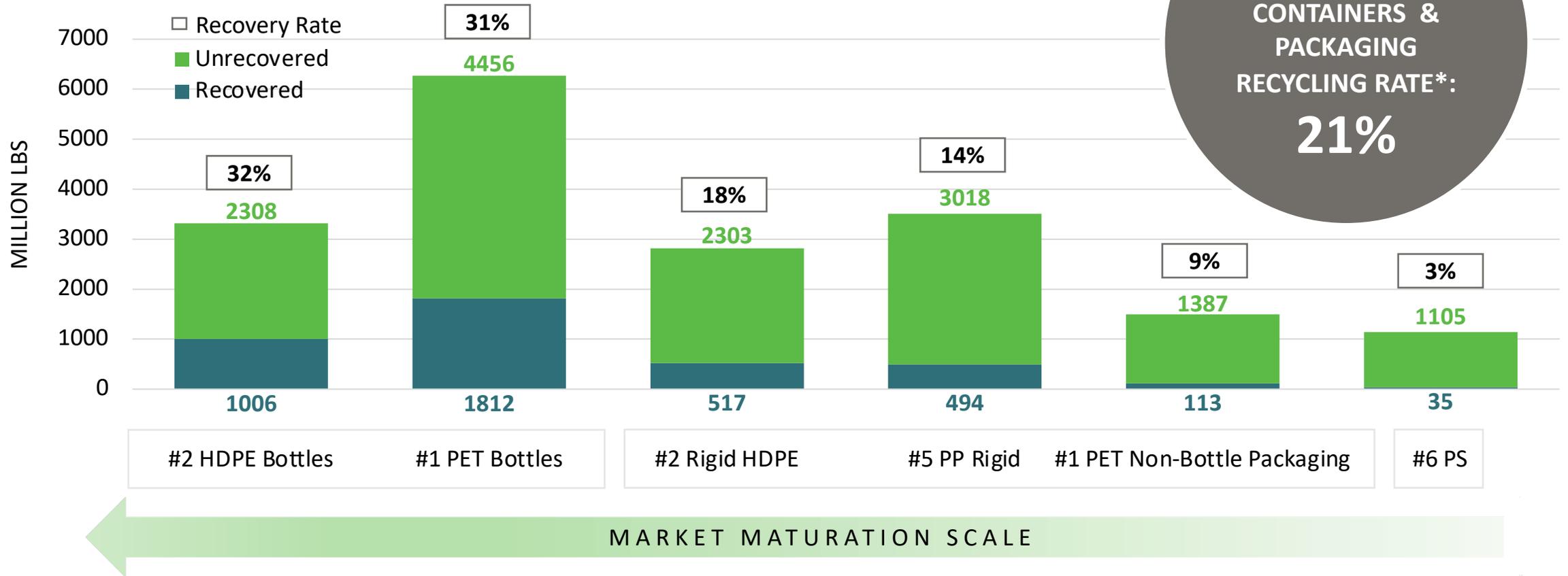
# PP RECYCLING TODAY - CHALLENGES



- Approximately 3.5 billion pounds of rigid PP packaging is sold every year; the diversity of size, form, and applications of PP in packaging make it more challenging to sort and process than PET or HDPE
- Reliance on export markets fostered the mixed plastic bale and hamstrung development of domestic value chain for PP until recently
- Post-National Sword market shifts negatively impacted PP collection across the U.S.
- Areas without regional reclamation, notably the West Coast, were more severely impacted by dislocation post-National Sword
- PP has been commonly recycled for less than a decade, so reclamation is still maturing as compared to PET and HDPE, but investment in PP sorting and demand by end markets is growing



# RIGID PLASTIC PACKAGING: US 2018



TOTAL RIGID PLASTIC CONTAINERS & PACKAGING RECYCLING RATE\*:  
**21%**

Recovered = collected for recycling and sold to end markets  
Unrecovered = total generation minus total recovered

# PP RECYCLING TODAY - OPPORTUNITIES



- Recycled PP (rPP) is commonly used in caps, cups, automotive parts, paint cans, transport packaging, housewares and other products
- The demand for rPP is growing in high value markets, such as food grade rPP
- Consumer brands with recycled content commitments use food grade rPP for personal care and nutraceutical applications (vitamins, supplements, etc.)

# PP RECYCLING TODAY - OPPORTUNITIES



- Currently, there is very little food grade rPP produced, but the demand exists, and PP reclaimers are responding by investing in capacity and filing for FDA Letters of Non-Objection
  - Current rPP LNOS – Envision Plastics, KW Plastic
  - Pending rPP LNOs - EFS Plastics, Merlin, Erema
- Major retailers, dairy brands and quick service restaurants (QSR) are shifting from polystyrene to PP, particularly in food and food service applications, because they seek a material that has preferred material health characteristics, improved recyclability and potential for recycled content
- The rPP food contact market (i.e., foodservice and food packaging) can unlock when more food grade rPP supply is available

# PP RECYCLING TODAY – EFFORTS TO GROW RECOVERY



- Substantial investment is being made to grow PP collection, improve the quantity and quality of recovered PP. Demand is driving higher value markets and recycled content.
  - **Collection & Sortation:** The Recycling Partnership - PP Coalition \$35M
  - **Sortation:** Technologies like artificial intelligence (AI) & robots addressing PP sortation challenges; MRFs transitioning from mixed plastic to PP sorting
  - **Reclamation Capacity:** PP reclamation capacity growing, especially in CA
  - **Quality:** Growth in LNOs to produce food grade rPP
  - **End Markets:** Brands are demanding recycled content and requiring progress reporting to meet US Plastic Pact and other commitments
  - **New Markets:** Virgin PP producers are investing in recycling and recycled content
  - **Innovation:** Investment and commercialization of new reclamation technologies like [PureCycle](#) open the door to reclaiming hard-to-recycle forms producing food grade rPP with virgin like properties
  - **Innovation:** Digital watermarks and fluorescent markers on packaging are improving near infrared (NIR) detection and sortation



**75 activators /  
34 brands and  
recyclers  
working to  
meet global  
commitments  
to recyclability  
and recycled  
content**

# PP AND PLASTIC RECOVERY INVESTMENTS



## Resin producer plans huge increase in PCR sales

“Polyolefins giant Braskem has set its sights on expanding post-consumer resin production as part of the company’s new sustainability commitments. The Brazil-headquartered company this month announced a goal to sell 300,000 tons of recycled content products by 2025, increasing that to 1 million tons by 2030...” *Plastics Recycling Update– November 18, 2020*

## Brand owner invests \$30 million to bolster plastics recycling

The company (Nestle), a major global producer of food and drink products, on Sept. 7 announced a \$30 million investment in the Closed Loop Leadership Fund, a private equity arm of investment firm Closed Loop Partners. Nestlé said the investment will help in the “shift from virgin plastics to the use of food-grade recycled plastics in the U.S.,” according to a release. *Resource Recycling–Sept 15, 2020*

## PureCycle Technologies Raises \$250 Million

Bond will be used to complete company’s first commercial plant in Ironton, OH, which is expected to produce more than 100 million pounds of ultra-pure recycled polypropylene annually. *Plastics Today – Oct 15, 2020*

## New Investments in U.S. Plastics Recycling

Announced since July 2017

**64**  
projects in the U.S.

Combined projects valued at

**\$5.3**  
billion

Potential to divert

**4.0**  
million metric tons of waste\*  
from landfills

ACC– New Investments in Advanced  
Plastics Recycling, Aug 2020

# INNOVATION AND INVESTMENT FOR MRF SORTING OF PP



## Upgrade your MRF to Recover PP #5 with a Grant from The Recycling Partnership

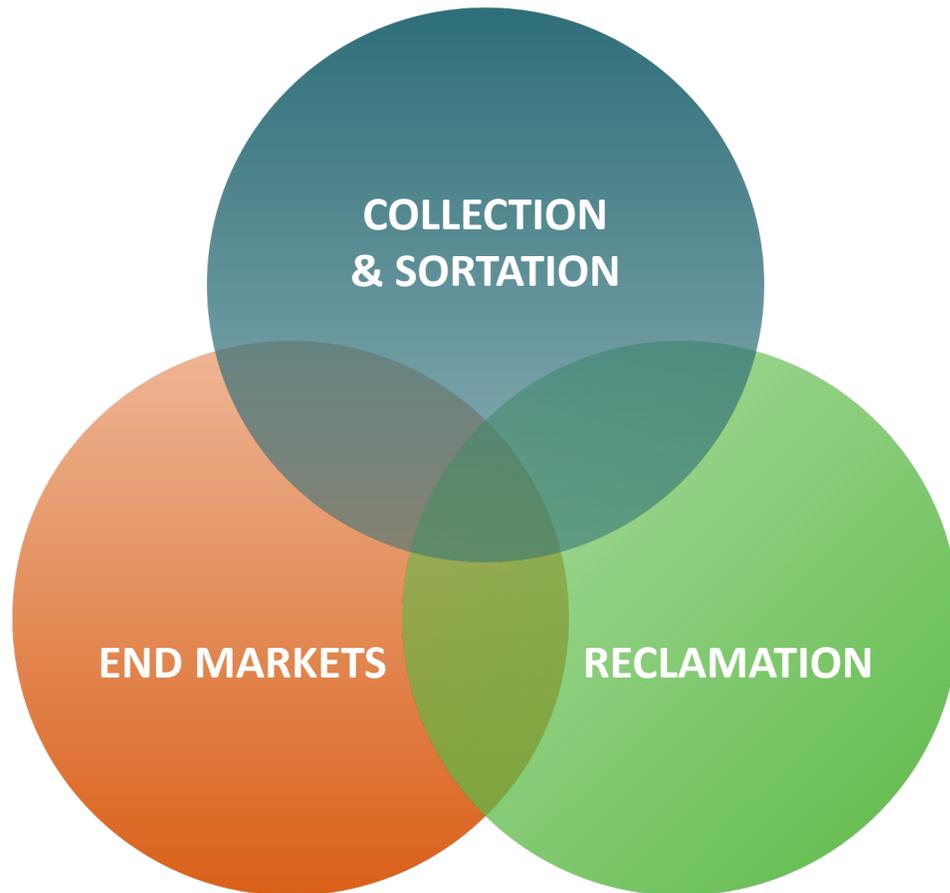
The Coalition also opened up a Request for Proposals (RFP) for Material Recovery Facilities (MRFs) to apply for financial grants that enable improved sorting of Polypropylene and widen acceptance through consumer education programs in communities.

**How AI and robotics are shaping the MRF of the future**  
AI can transform the economics of the entire system, increasing the efficiency and consistency of sorting and processing of valuable recyclables.

Greenbiz, Sep 1, 2020

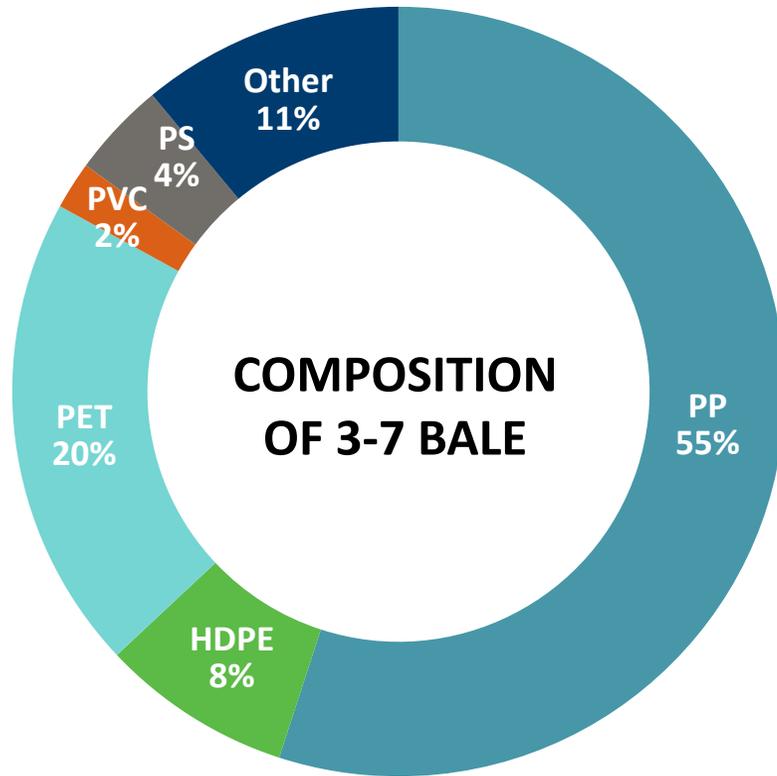
# PP RECYCLABILITY CONSIDERATIONS

# COLLECTION AND SORTATION OF PP FOR RECYCLING IS GROWING



- The Recycling Partnership's PP Coalition is focused on increasing collection and sortation, making grants available to MRFs to improve PP sorting and to communities for outreach and education
- The need to improve MRF economics by improving bale quality is driving technology improvement through additional optical sorting, AI and robotics (e.g., AMP robotics, WM MRF of the Future).
- Capability of Advanced Recycling Technologies to accept mixed polymers and hard to recycle forms is creating additional demand for the collection and sorting of plastics (e.g., Recent \$100M investment in PRF by IRG).

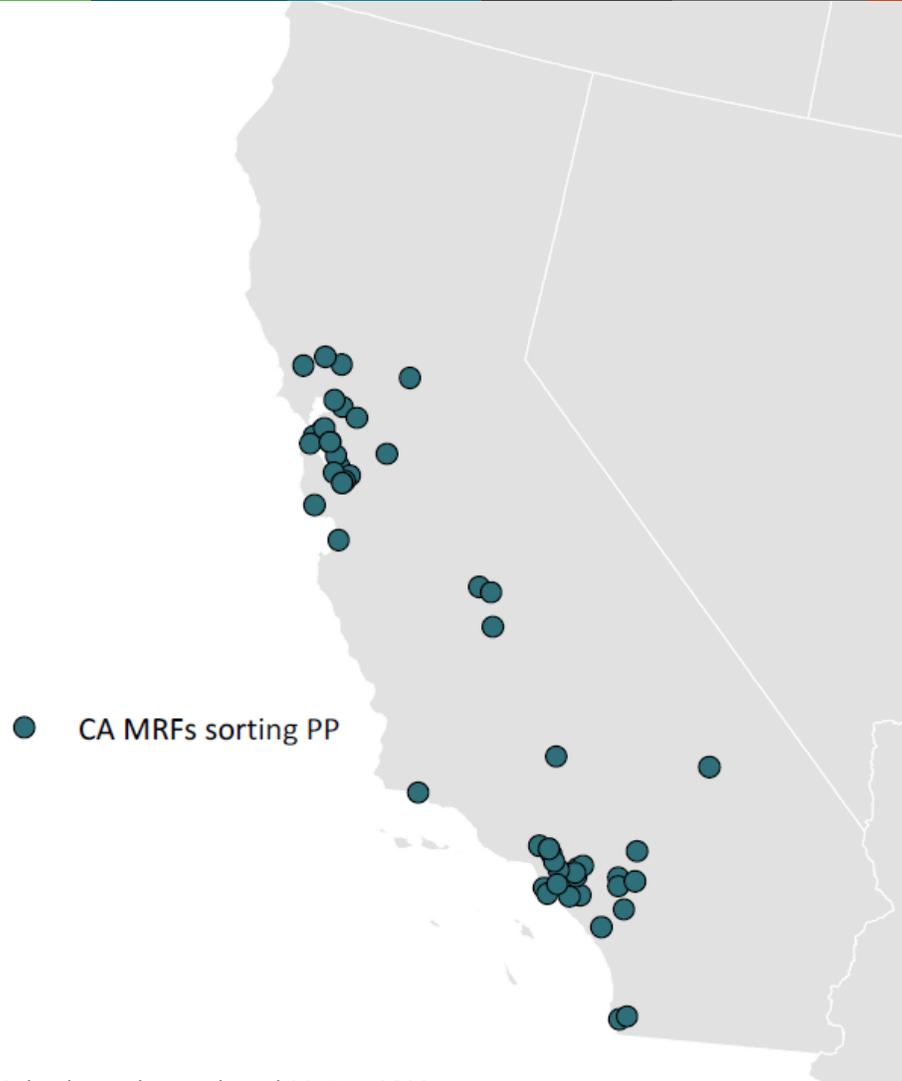
# PP IS SORTED INTO DEFINED STREAMS FOR RECYCLING PROCESSES



- PP is sorted into either #3-7 bales, or #5 bales for sale to reclaimers
- PP content brings value and drives the market for the #3-#7 bale
- PP is emerging as a desired recyclable commodity, though still impacted by the recalibrating effects of National Sword
- Growing end market demand for food grade material and investments in processing capacity will grow demand for #3-#7 and PP bales

Source: APR 2015

# CALIFORNIA MRFS REPORTING SORTING PP



- 53 MRFs in California, with a combined throughput of greater than 4.5 million tons per year, report sorting and marketing PP

Source: RRS database; data gathered 2017 to 2020

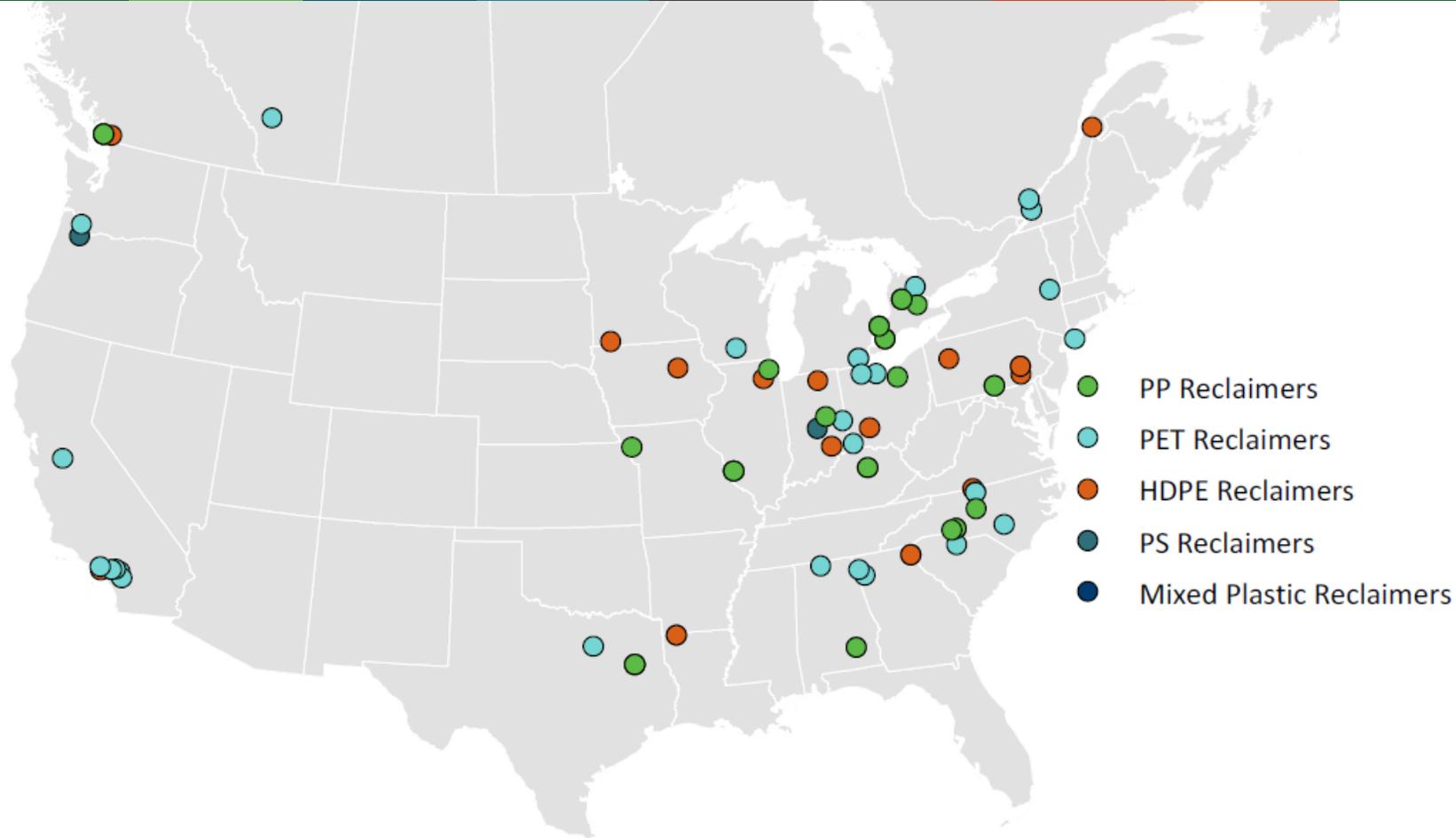
# PP HAS A POSITIVE MARKET VALUE: PP BALE PRICES COMPARED TO OTHER COMMODITIES



- PP is marketed either in #5 bale or in a #3-7 bale
- To offset transportation costs, CA / SW PP market is valued consistently lower (~\$.01 - \$.03 per lb) than the SE where reclamation capacity is high
- Improved sorting infrastructure is needed to expand availability of #5 bales
- MRF sorting of PP bales is a growing trend

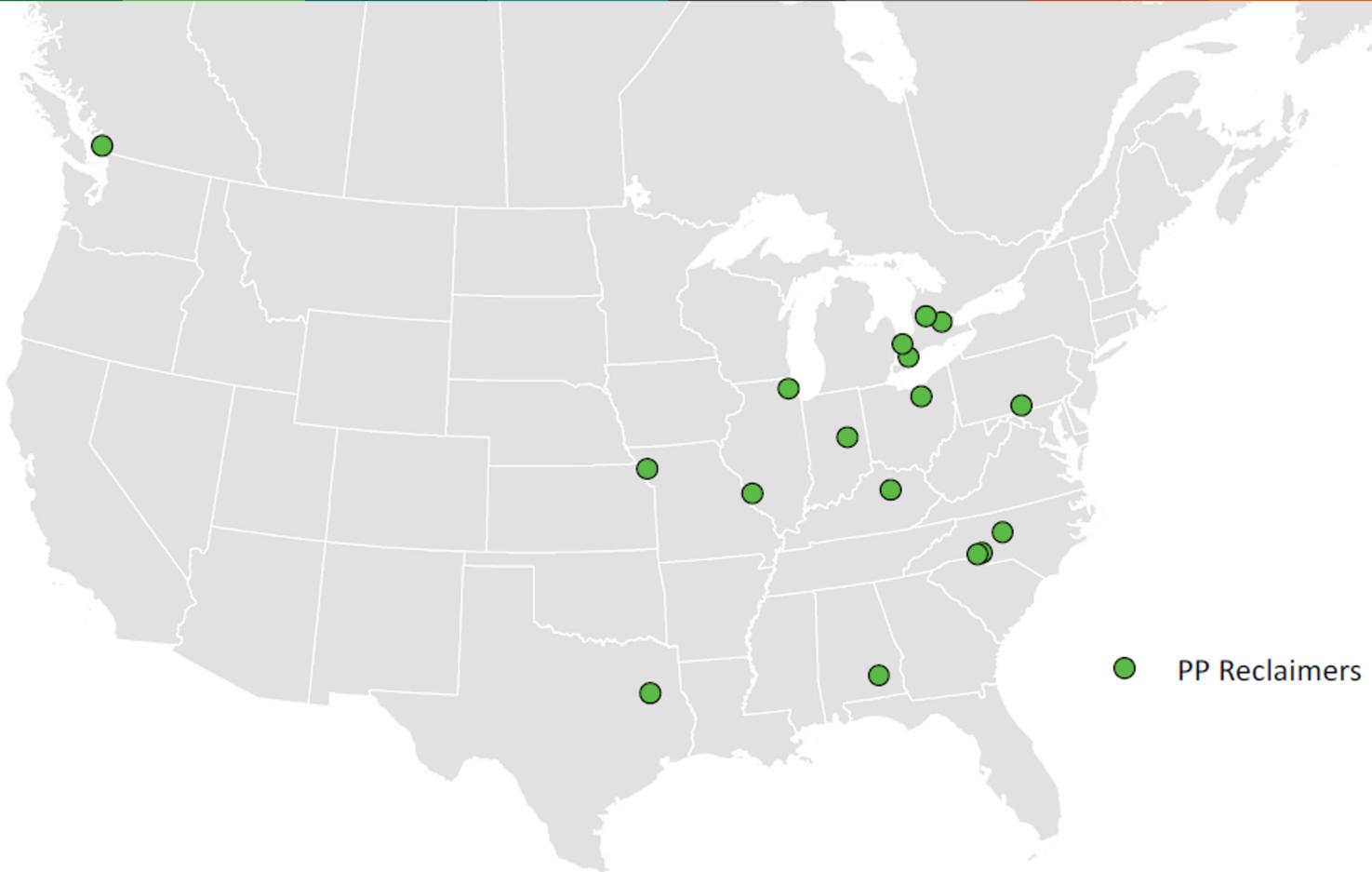
Source: RecyclingMarkets.net

# ALL RIGID PLASTIC RECLAIMERS: US AND CANADA



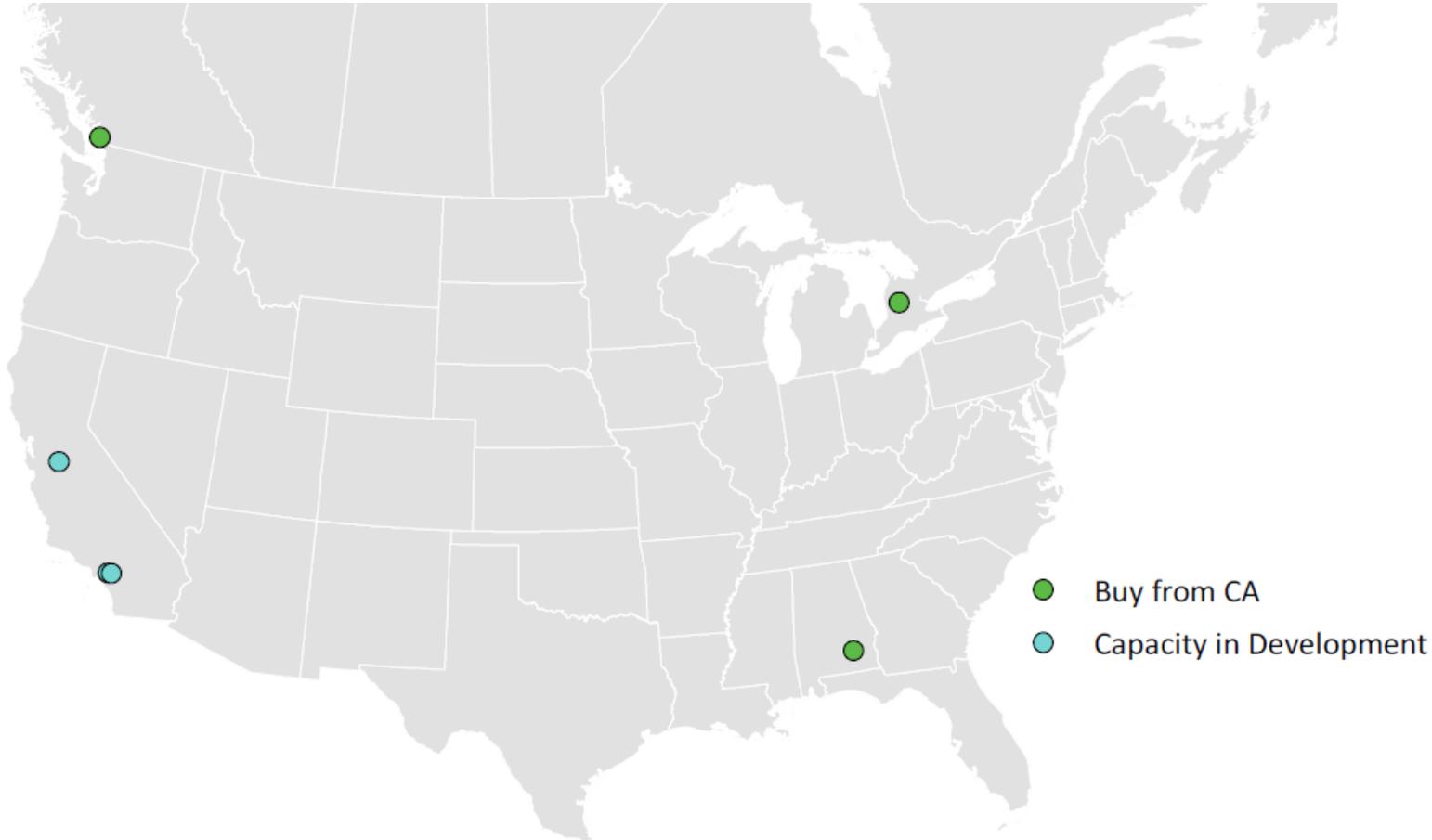
- Nationally there is broad reach and capacity for PET and HDPE reclamation which has evolved over 35 years
- This allows ready access to markets for PET and HDPE
- PP reclamation is still maturing as it has been collected for recycling for less than a decade, and much was exported prior to National Sword

# PP RECLAIMERS: US AND CANADA



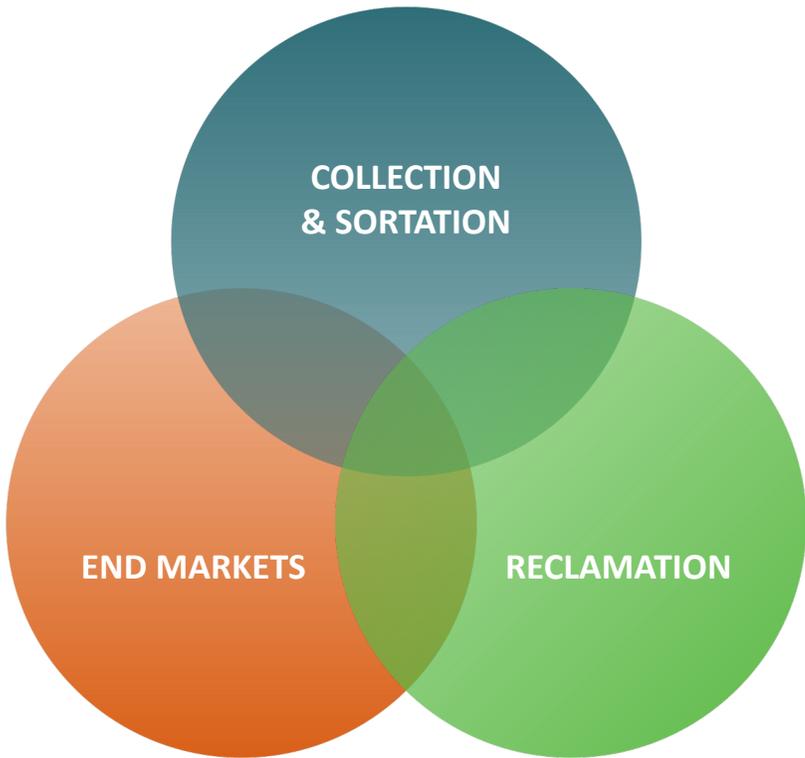
- The majority of PP reclamation takes place east of the Rockies
- Significant deficit of PP reclamation capacity on west coast, but capacity in development
- Some PP reclaimers buy recovered supply nationally

# RECLAIMERS BUYING FROM PP FROM CA

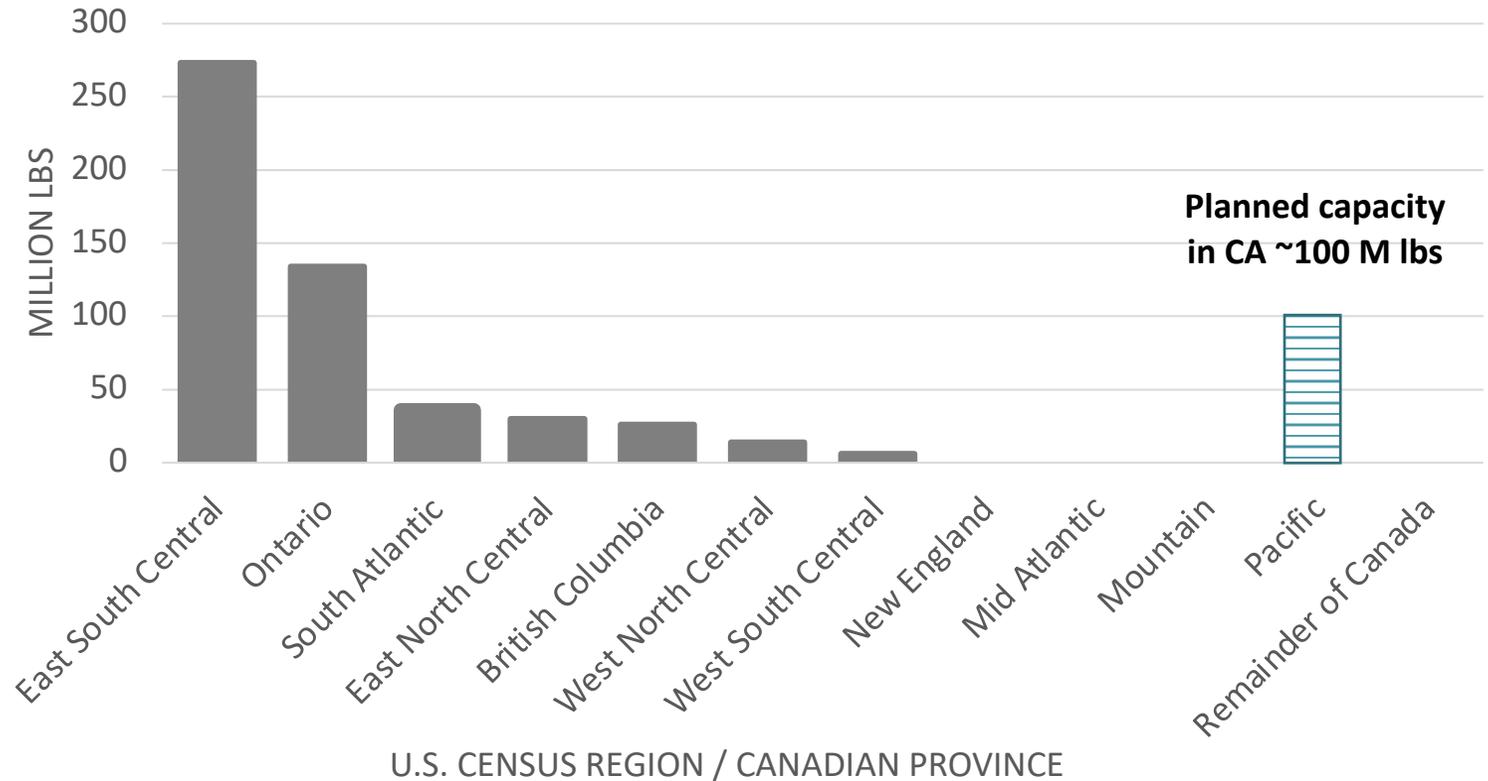


- Existing PP reclaimers in Canada and the SE are actively buying PP from CA
- New PP reclamation capacity is planned for California
- New capacity will unlock PP recycling throughout the West Coast

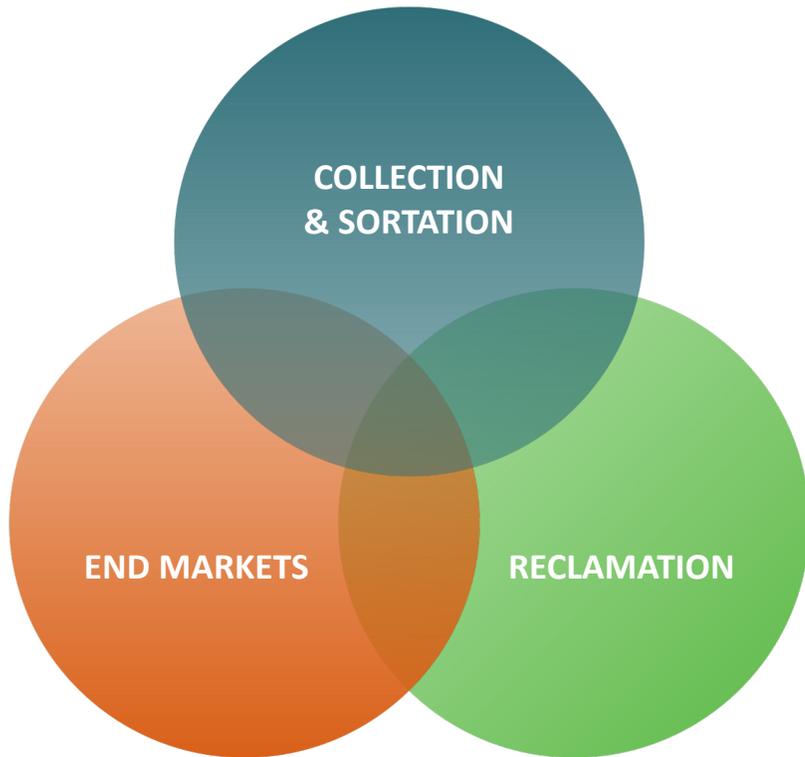
# PP RECLAMATION CAPACITY



## ESTIMATED REGIONAL PP RECLAMATION



# RPP BECOMES FEEDSTOCK IN THE PRODUCTION OF NEW PRODUCTS: DEMAND AND RELATED INVESTMENTS



- rPP is commonly used in a host of end products, such as automotive, housewares, paint cans, caps and closures, and transport packaging

- Corporate commitments to use recycled content are a critical end market driver. The U.S. Plastics Pact is driving accountability to fulfill these commitments.



- Personal care and nutritional brands are looking for food grade material including:



- California is home to several brands and companies that are actively using recycled content today



# CLOSING THOUGHTS



# RESTRICTING COLLECTION OF PP COUNTER TO LARGER MARKET TRENDS



- There is strong national growth in the sale and use of polypropylene because it is a polymer of choice for food service and packaging due to its positive health profile and potential for recycling collection and recycled content
- China's National Sword policy caused significant dislocation in rPP markets; the private sector is responding with significant investment to build a sustainable system to collect, sort and use recycled PP
- California is a critical market and national player to address the infrastructure gaps that currently exist for PP and grow the market for recycled PP
- To restrict access to post-consumer PP in California would add challenges to the maturation of a relatively young national PP recovery system
- What California can do to grow PP recovery system
  - Continue to drive demand for rPP – especially in higher grade applications
  - Enhance MRF capabilities and technology to sort and produce quality PP bales
  - Support the development of PP reclamation capacity – especially for food grade
  - Re-establish and grow PP collection, including foodservice ware, and drive participation through strong and consistent public education

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