



The following slides presented here were provided by
The Recycling Partnership and Close Loop Partners
from an August 14, 2019 webinar hosted by TRP titled:

Demystifying Chemical Recycling

The webinar can be viewed in its entirety from the TRP
website

<https://recyclingpartnership.org/webinar-wednesdays/>

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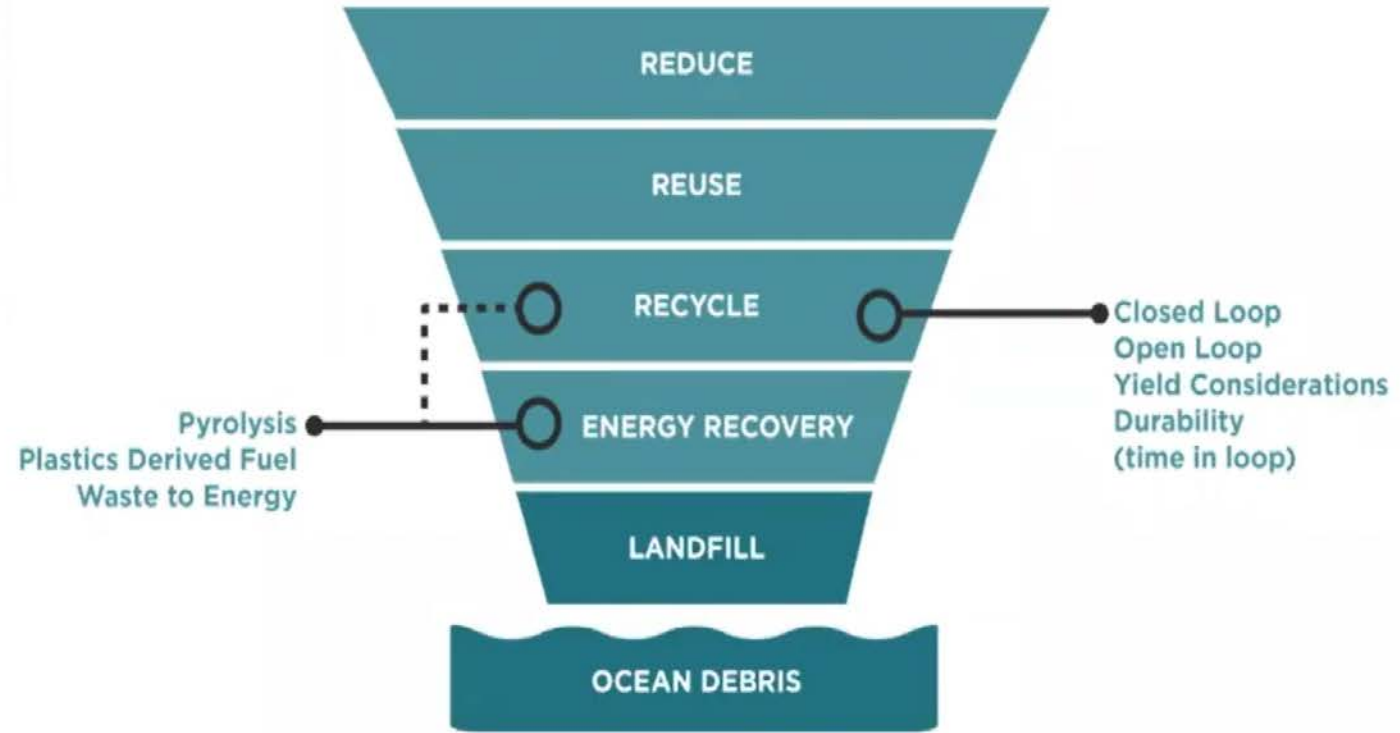
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Waste management hierarchy





Estimated Recycling Rates for PE Film



Residential

136 million lbs (4% of 3.4 billion lbs)

+

Commercial

861 million lbs (21% of 4.1 billion lbs)

=

Total

1 billion lbs (15% of 7.5 billion)

[Closed Loop Foundation Film Investment Report p. 17](#)



Demand vs Supply

Demand for plastics is strong and growing, but current supply of recycled plastics meets just 6% of demand

Total Demand:
38 million
metric tons



PCR Supply:
2.5 million metric tons
6% of total demand



Source: IHS Markit

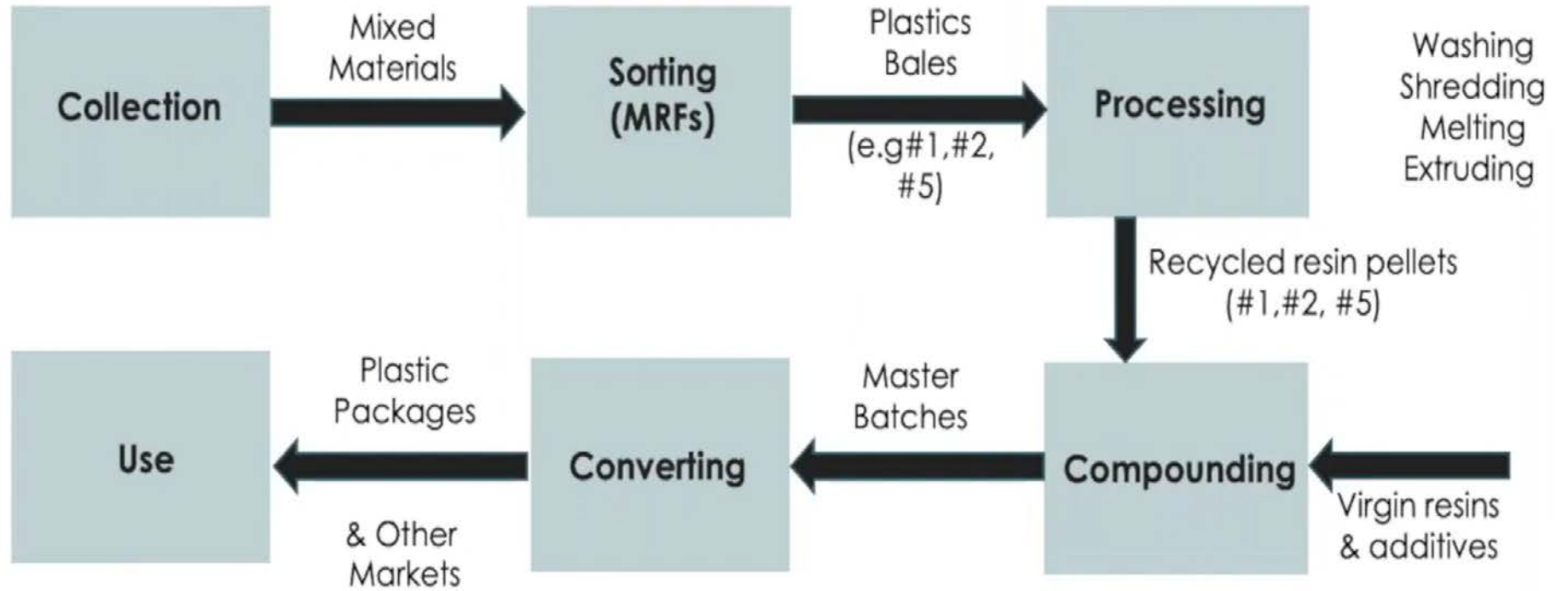


Taken from CLP report available at:
www.closedlooppartners.com/plastics/





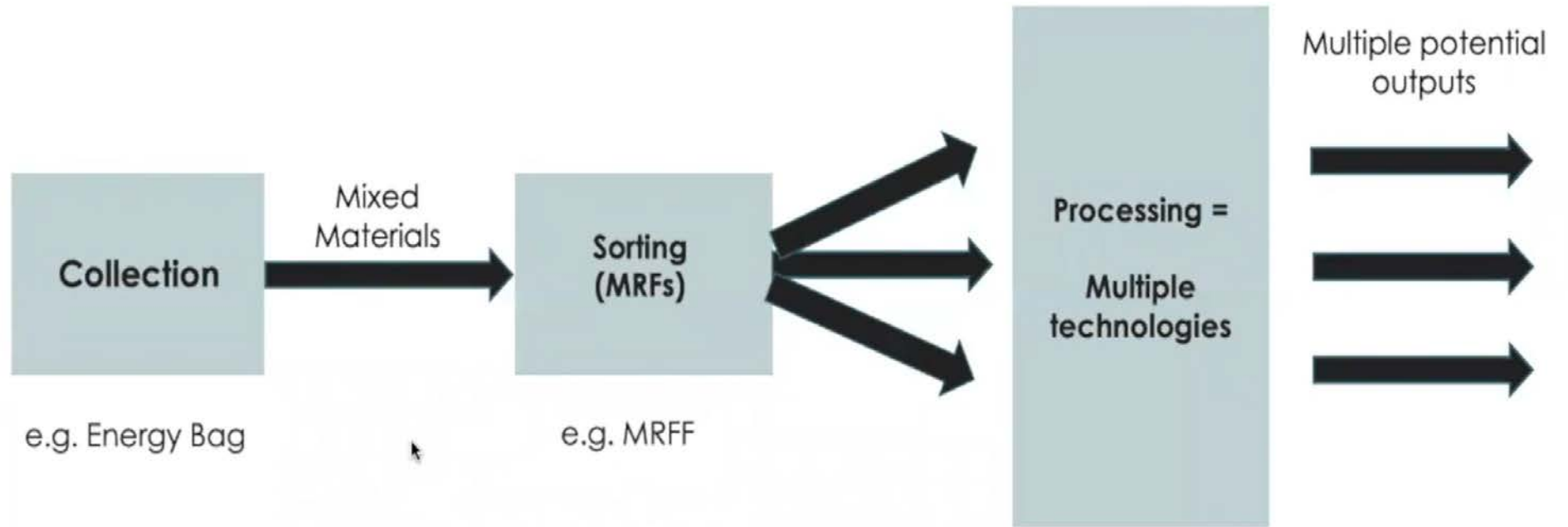
Traditional Mechanical Recycling



Processing: Resin In = Resin Out



“Chemical Recycling” is not one thing



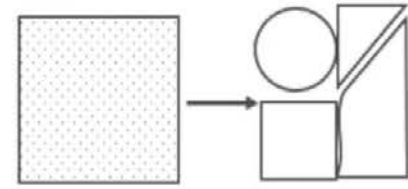
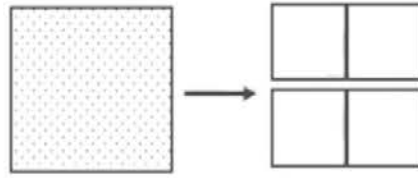
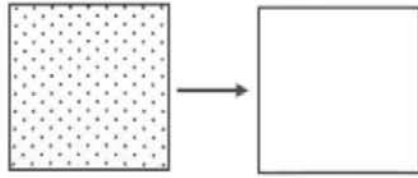
Broadly speaking:

Chemical recycling processes change the chemical structure and convert plastics to smaller molecules





Transformational technologies that exist to repurpose plastics waste into valuable building blocks



1. Purification

Dissolving plastic in a solvent, then separating and purifying the mixture to extract additives and dyes to ultimately obtain a "purified" plastic. The purification process does not change the polymer on a molecular level.

2. Decomposition

Breaking molecular bonds of the plastic to recover the simple molecules ("monomers") from which the plastic is made. This process, sometimes referred to as "depolymerization", can be biological, chemical, or thermal, and in some cases, a mix of two or three of these methods.

3. Conversion

Like decomposition in that the process involves breaking the molecular bonds of the plastic. A key difference is that the output products from conversion processes are often liquid or gaseous hydrocarbons similar to the products derived from petroleum refining. These raw materials may enter different supply chains, such as fuels for combustion, and/or petrochemicals (e.g., naphtha) that can be made into monomers for new plastics.





Complementary approaches

Mechanical Recycling



- Does not remove colorants
- Can be difficult to reach food grade quality (depends on resin)
- Properties degrade with subsequent “heat history”
- Not well suited for laminated materials (e.g. flexible packaging)

Chemical Recycling + Transformational Technologies



- Can remove colorants
- Can achieve to food grade quality (depends on technology)
- Monomers create same properties as virgin materials
- Can handle mixed plastics and other contaminants



Looking Ahead

- **Keep learning:** reach out with questions
- **Be open to change:** look ahead e.g. collection mixes, MRF contracts
- **Maintain perspective:** this is a long journey
- **Stay engaged:** we need partners for pilots; Join efforts to understand how the supply chain can evolve to integrate these technologies
- **Some states may need policy support:** regulatory issues and definitions of waste
- **Funding:** funding is needed to build the appropriate infrastructure
- **Industry stakeholders:** Join efforts like Closed Loop Partner's Circular Plastics Initiative & The Recycling Partnership's Film & Flexibles Taskforce