New York State Association for Reduction, Reuse and Recycling

New Technologies

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Today's Agenda

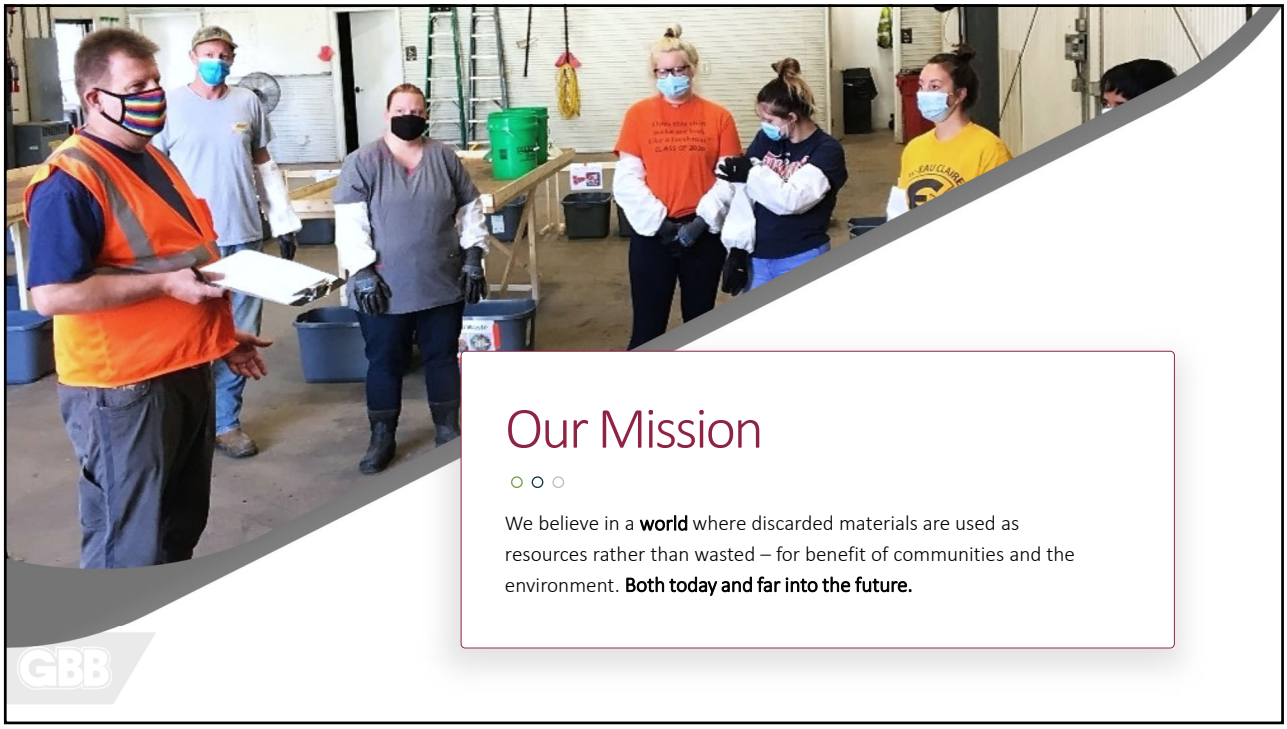
- Introduction to GBB
- Single Stream Materials
- Single Stream Processing
- State of US Recycling Circularity
- Increasing Recycling
- Q&A

Our Story

GBB is an international solid waste management consulting firm that helps public- and private-sector organizations craft practical, customized and technically sound solutions for complex solid waste management challenges.

Since 1980, GBB has been a trusted resource at the forefront of the industry, creating success stories that integrate smart planning with effective management of solid waste services. Our staff enables our clients to do more with less.

ENVIRONMENT SOCIAL GOVERNANCE CARBON neutral



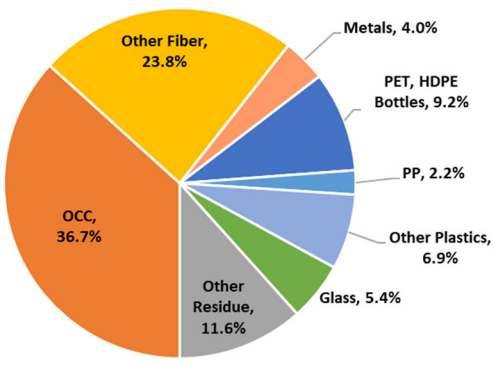
Our Mission

We believe in a **world** where discarded materials are used as resources rather than wasted – for benefit of communities and the environment. **Both today and far into the future.**

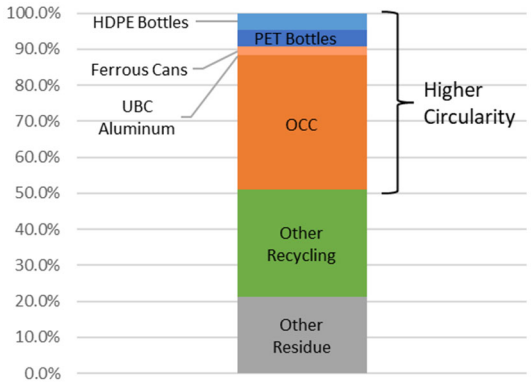
Single Stream Materials
(Post Covid)

MRF Material
Single Stream Contents (Post Covid)

(Data is limited but SWIFR Grants Should Help w/ New Data)

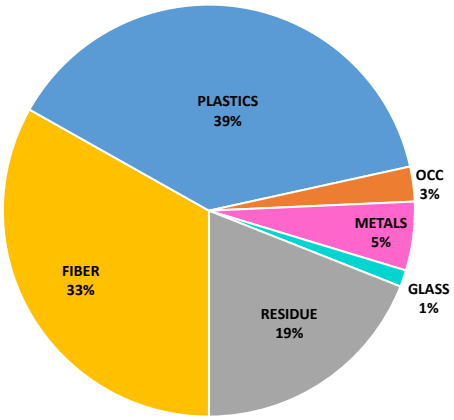


Source: GBB – Kent County, MI 2021

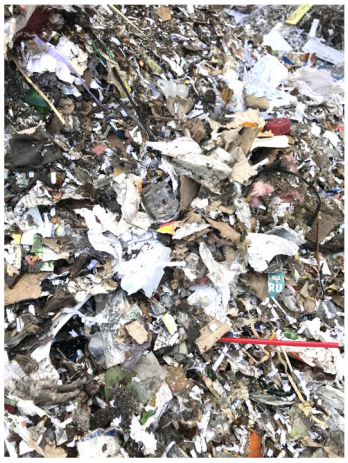


Single Stream Composition

MRF Residue



Source: RR – Kent County, MI 2021



Fines Residue - GBB

Single Stream Processing

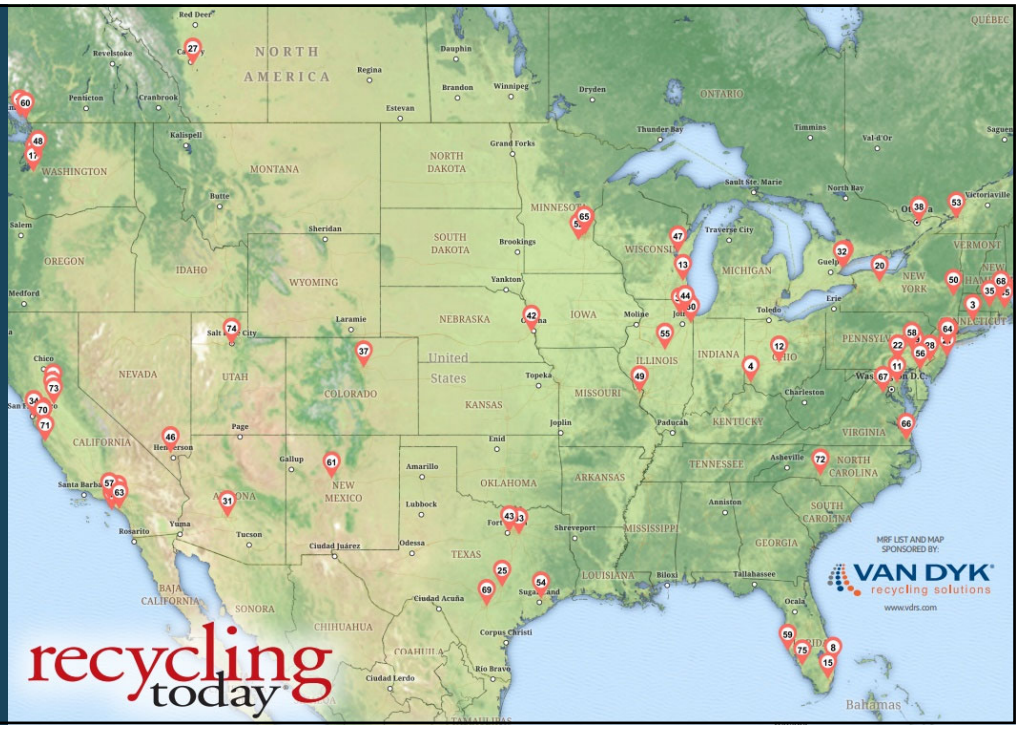
Automated MRF Processes
(8,000 TPY +)

- Infeed
- Pre-Sort
- Fines Separation
- 2D/3D Screening
- Metals Removal
- Optical Units for Containers/Film/Fiber
- Commodity Storage & Baling

Source: Van Dyk – Murphy Rd. MRF

Single Stream Processing

Map of 75 Largest MRF Locations (2023)



Optical Units

If you can see it, you can collect it....

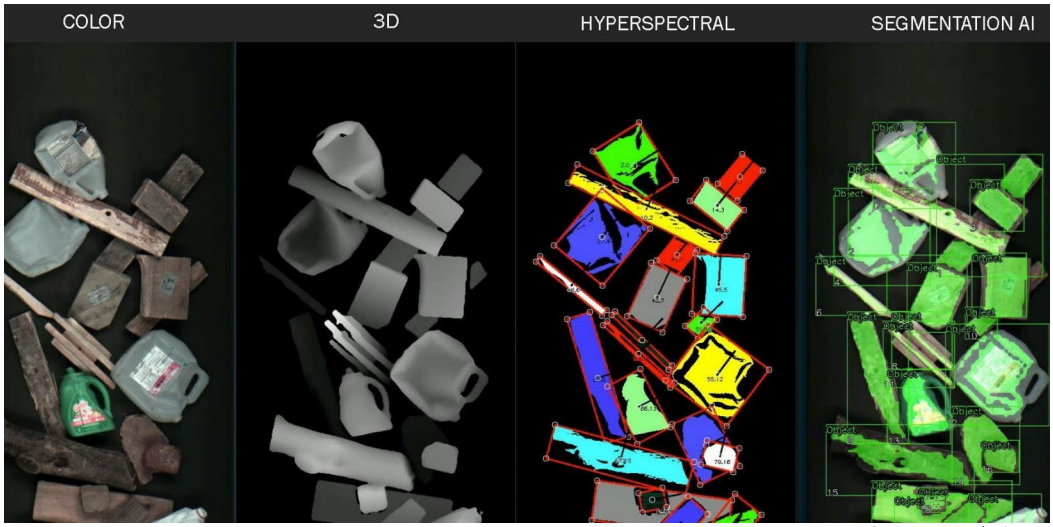
Source: CP Group

Source: BHS

- Require:
  - Clean and dry compressed air to operate
  - Space (some modern MRFs have 16+ units)
- Able to process up to 10 TPH, but can only eject 10%-20% of that stream
- Most cannot see small or black items/plastics

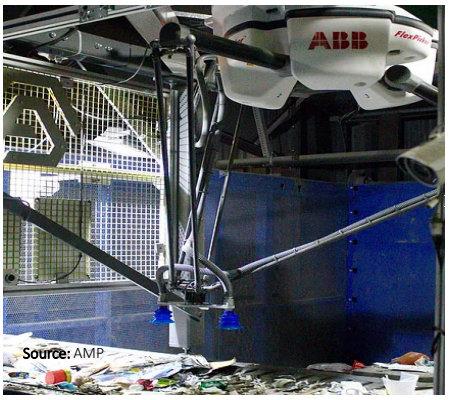
Smart Technologies for MRFs - Robots

Robotic Sensors with AI – What they See



Source: Waste Robotics

Robotic Units
Reduce Labor, Improve Quality



Source: AMP

Source: Machinex

- Identification rate is very high (95%+)
- Capture rate is lower (75%-80%)

- Small space requirements
- Limited on allowed belt width per machine
- Most used to replace Quality Control labor after Optical Units

Modern MRF Processing

AI and sensors will

✓ Increase the knowledge regarding what is in both inputs and outputs from processing systems

Optical units and robotics will

✓ Easily target materials not traditionally recovered

✓ Require additional infrastructure to collect

✓ Reduce labor needs and improve quality

✓ Require more space and more capital to install

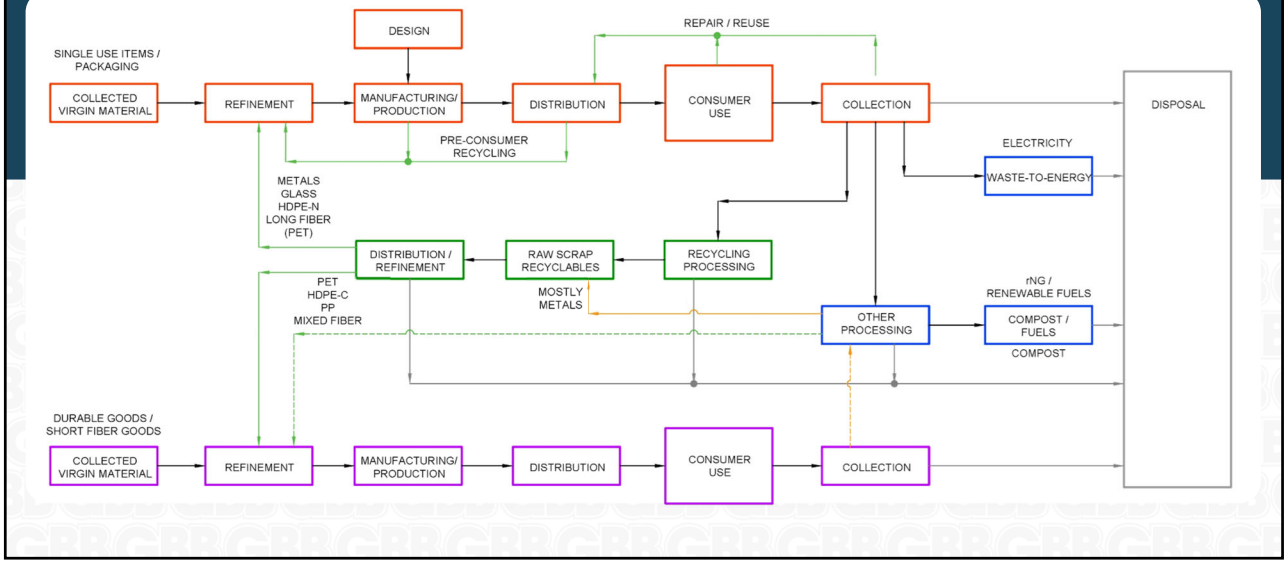
The very nature of the processing systems will create **new commodity streams** that without a market will become residue

State of US Recycling Circularity

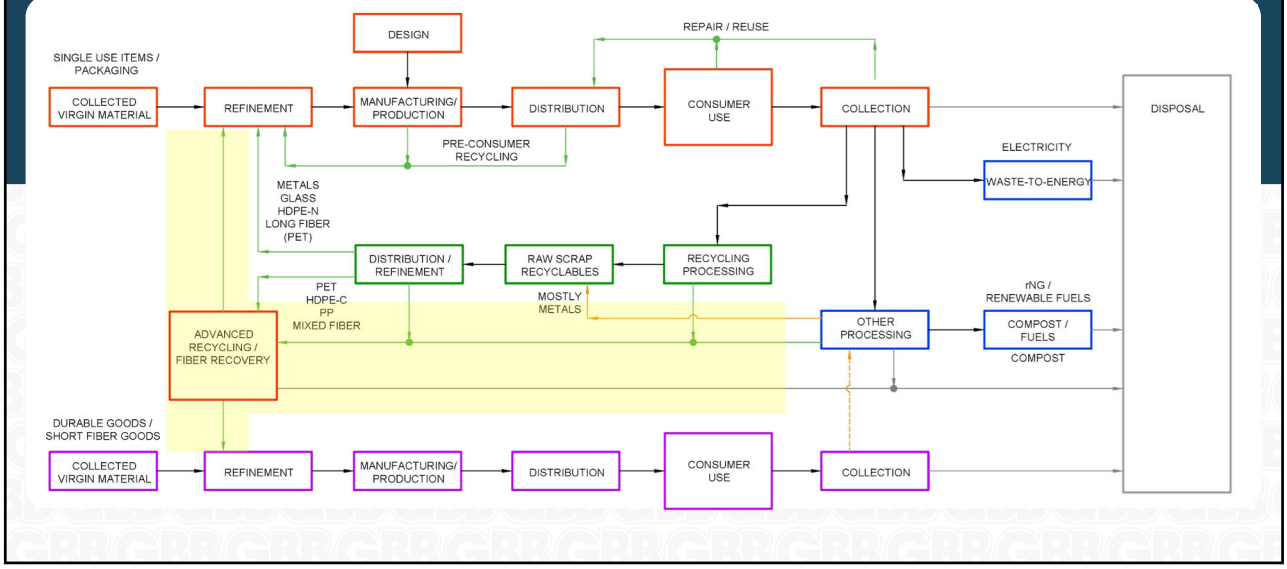
Circular Economy and Recycling

The Idealized Goal

Circular Economy and Recycling
Current Infrastructure and Process



Circular Economy and Recycling
Future Infrastructure and Process



Increasing Recycling

Improving Recycling

Funding Assistance for Capital Expenditures

Inflation Reduction Act

Grants / Loans / Loan Guarantees / Tax Credits

- ✓ $386 billion directed toward energy & climate
- ✓ 40% reduction in GHG emissions from 2005 by 2030
- ✓ Unleash new clean energy technology investments
- ✓ Supercharge transition to clear energy economy

Closed Loop Partners

- ✓ 4 separate funds for improving recovery of recycling

Recycling Partnership

- ✓ Grants for collection carts for recycling

Increasing Recycling and Circularity

Improving Rural Collection
- ✓ Overall recycling numbers would increase by improving collection access to more rural locations

Investing in Infrastructure
- ✓ Infrastructure to process collected recyclables would need to be improved/added

Going Beyond Traditional Recycling
- ✓ Mechanical recycling can only go so far in the Circular Economy

Adapting to New Technologies
- ✓ Collections (Wet/Dry, etc…) may need to adapt to new recovery technologies

Questions & Answers

Thank You!

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