Welcome to the DOE-BETO Workshop –

Advancing Synergistic Waste Utilization as Biofuels Feedstocks: Preprocessing, Co-products, and Sustainability

Login and Optional Networking Activities: 9:30 - 10:00am ET

Workshop will start 10:00am ET

Morning Networking – Please feel free to answer these questions in the chat!

1) What motivated you to participate in this event?

2) Do you know anyone who is logged in right now?

3) What would you like other participants to know about you or your organization?

U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

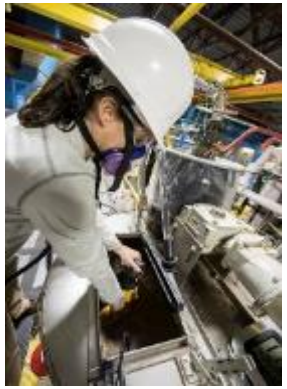
Advancing Synergistic MSW Utilization as Biofuels Feedstocks: Preprocessing, Co-products, and Sustainability

Chenlin Li, Technology Manager, DOE-BETO

April 14, 2021



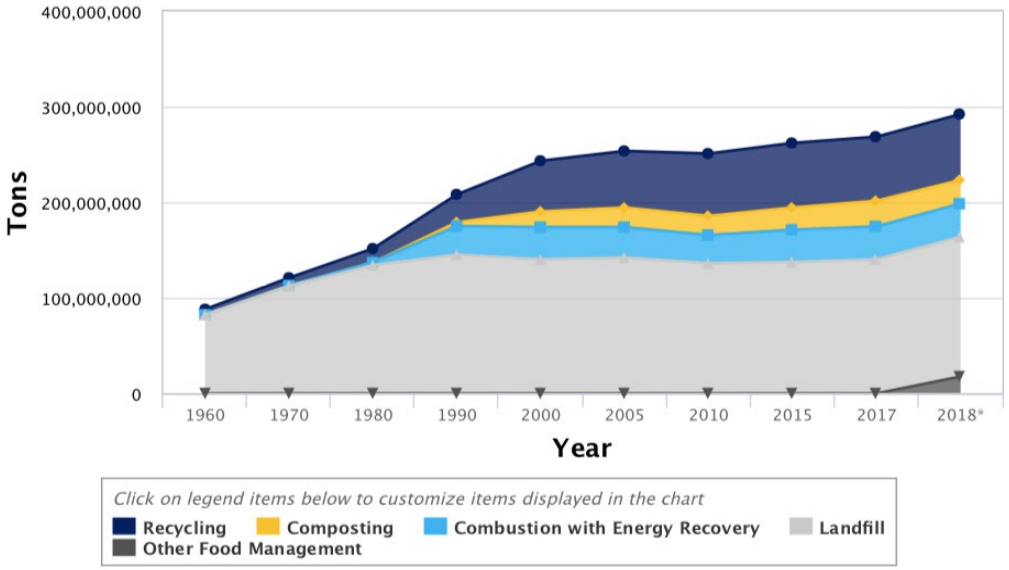


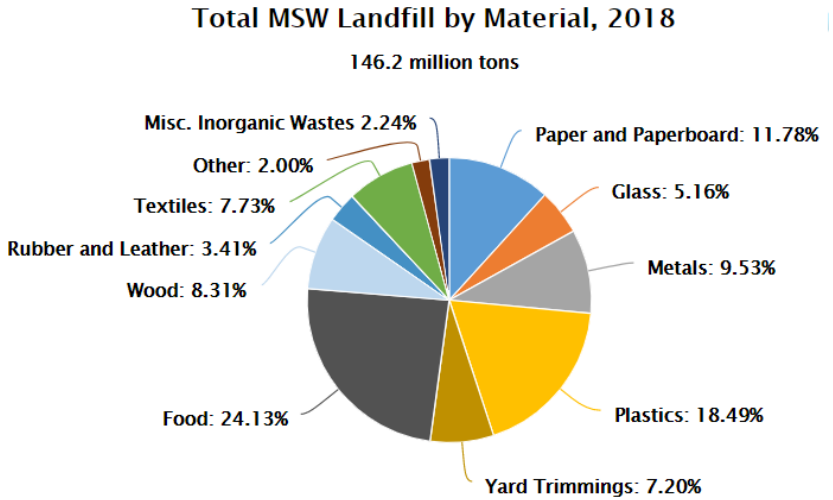



Welcome to the MSW Preprocessing and Sustainability Workshop

All About Non-Recycled MSW Streams

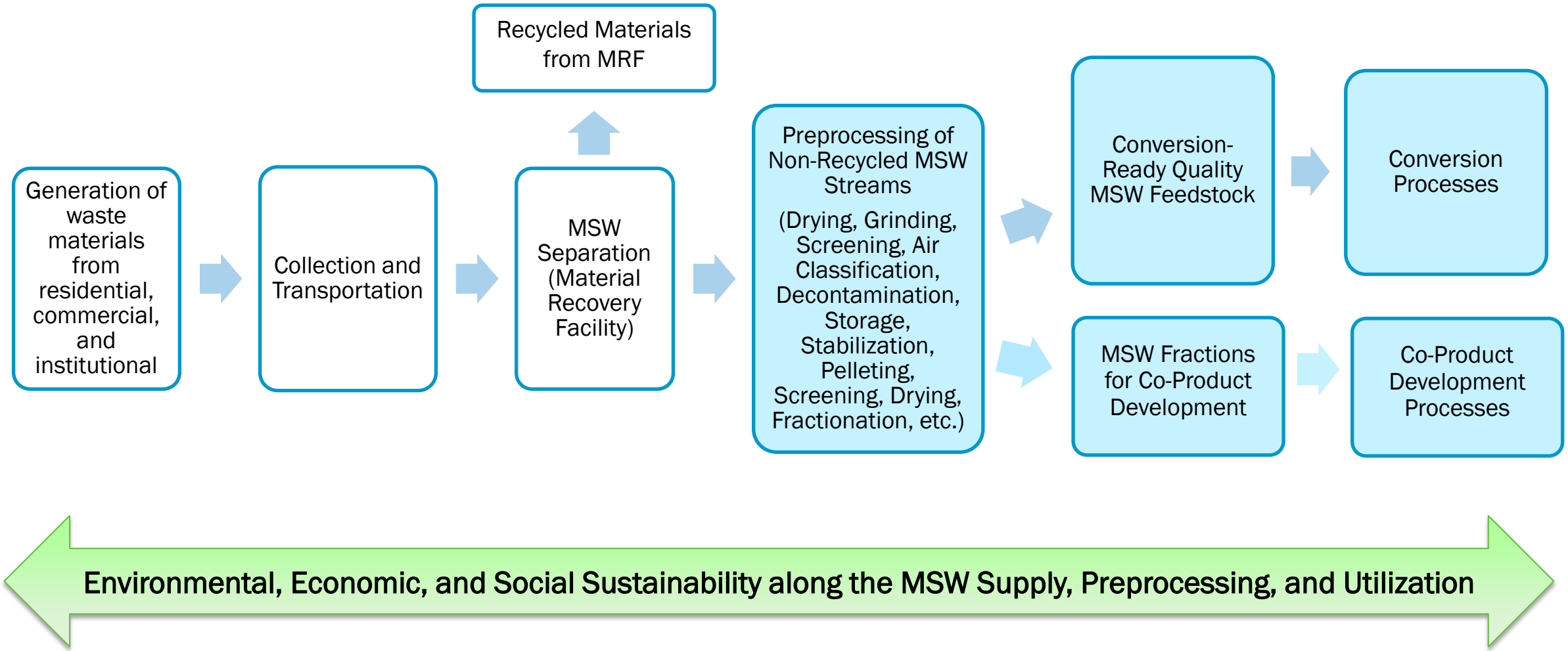
- The relevant feedstock is non-recycled MSW, which would be going to a landfill.
- Focus: the organic portions of MSW that can be converted to biofuels/ bioproducts, including non-recycled paper, plastic, rubber and leather, textiles, wood, food waste, and yard trimming constituents of the MSW stream, and any relevant contaminants that could affect conversion of the feedstock to a fuel or product.





https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials

MSW Supply, Preprocessing, and Utilization



Learnings from FY20 DOE Waste Workshop

- 80 attendees
- MSW stream is currently undervalued
  - Combustion or landfill are two major pathways
- Participants agreed that advancements in the following areas are necessary:
  - Characterization of MSW, across multiple scales and using rapid/real-time analysis techniques
  - Better fractionation technologies to separate MSW stream into distinct components
  - Specifications for feedstocks for various conversion technologies
- Benefits and drawbacks of AI also needs further exploration
- Robust environmental impact modelling of waste utilization is needed
- Non-technical recommendations included
  - Consumer & industry education
  - Regulation (e.g. landfill bans, carbon tax/credits)

Gaps and Opportunities in MSW Utilization

- Variability in MSW Streams and Influential MSW Material Attributes for Conversion:
  - ✓ Biochemical Conversion into sugar/alcohol (upgrading into Jet Fuel).
  - ✓ MSW Gasification
  - ✓ MSW Pyrolysis
  - ✓ Hydrothermal Liquefaction
- MSW Decontamination, Preprocessing, and Formatting Required by Each Conversion Pathway
- Reactor Feeding and Reaction Mechanisms
- MSW Variability and Influential MSW Material Attributes for Co-product Development
- Sustainability Impacts of MSW Streams Utilization
  - ✓ Data gaps? Tools? Models?

MSW Mixed Paper	
Ink	70.03%
Ink + Stickies	6.92%
Ink + Staples	3.75%
Glossy	6.92%
Glossy + Stickies	6.05%
Glossy + Food residue	0.86%
Glossy + Food residue	0.29%
Glossy + Food residue + Stickies	0.29%
Stickies	3.75%
Other	0.86%
Food residue	0.29%
MSW Mixed Plastic	
Dirt	66.11%
Dirt + Labels	32.10%
Dirt + Food residue + Labels	1.12%
Dirt + Food residue	0.67%

80.70% of mixed paper contains ink

14.41% of mixed paper contains glossy coatings

100% of mixed plastic contains dirt

Photos and Data courtesy of Dr. Vicki Thompson, INL

BETO/AMO has joint R&D activities on Plastics Chemical Upcycling and Design within BOTTLE

Our Workshop Goals

- Identifying technical challenges and opportunities associated with developing advanced ***preprocessing technologies***
  - ✓ What knowledge can we learn and transfer from herbaceous and woody biomass for converting MSW into biofuels?
  - ✓ What are existing and new preprocessing technologies to address heterogeneity of MSW streams?
- Defining critical paths toward synergistic use of municipal solid waste streams for both ***conversion-ready feedstocks and valuable co-products***
  - ✓ What potential co-products can be derived from MSW streams to maximize feedstock value?
- Examining the ***economic and environmental viability and sustainability*** impacts of waste stream valorization
  - ✓ What are potential environmental impacts and indicators of utilizing various streams of MSW to produce fuel and products?

Workshop Logistics

Wednesday, April 14

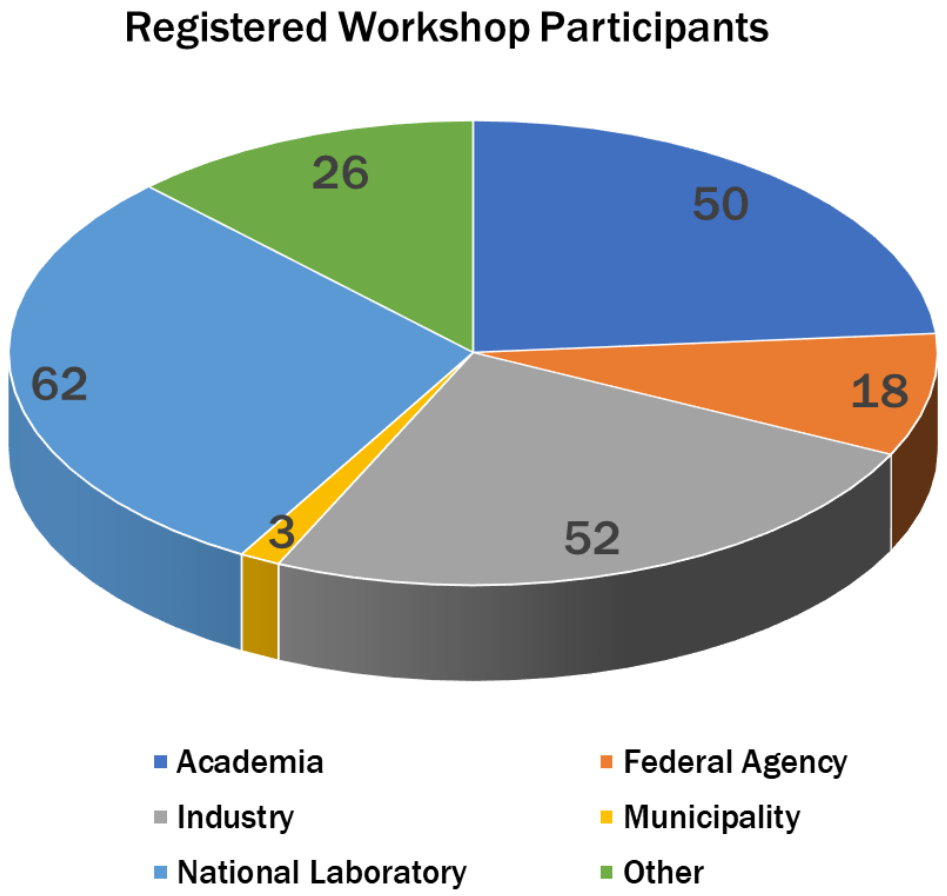
- Morning: Introduction and Keynote Presentations
- Afternoon: Session #1 – Feedstock Preprocessing

Thursday, April 15

- Session #2 – Co-Product Development
- Session #3 – Sustainability and Tradeoff Analysis

Each Session will Include:

- Presentations from invited panelists
- Moderated Panel Q&A
- Facilitated group discussion with opportunity for direct input via a web-based collaboration **software X-LEAP**
- Discussion summary provided by Rapporteur



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Introduction Session: BETO Mission and Vision

Dr. Valerie Sarisky-Reed, Acting Director, DOE-BETO

"Bioenergy Technologies Office Overview"

Introduction Session: BETO Feedstock Technologies R&D

Dr. Nichole Fitzgerald, Program Manager, DOE-BETO

“BETO Feedstock Technologies R&D Program Overview”

Keynote Presentation

JD Lindeberg, President, Resource Recycling Systems

“State of Recycling – Q1 2021”

Workshop Structure and Software Overview

Lauren Illing – Lead Facilitator, BCS LLC.

Web-based Collaboration Software X-Leap for Panel and Group Discussion

LUNCH BREAK

11:15 AM– 12:00 PM ET

Lunch Break Networking – Please feel free to answer these questions in the chat!

1) What was the most interesting thing that you have learned in your work recently?

2) If you could ask your peers anything, what would it be?

3) What do you miss most about in-person workshops?

BREAK

1:30 – 1:45 PM ET

Group Discussions @ X-LEAP Software

1:45 – 3:15 PM ET

BREAK

3:15 – 3:30 PM ET