

# Feedstock Technologies Program Day 3 Introduction

April 5, 2023

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# FT session themes at a glance

**Monday 4/3/23**

Plenary

**Tuesday 4/4/23**

Sustainable  
Agriculture

**Wednesday 4/5/23**

Co-Product  
Development

Preprocessing

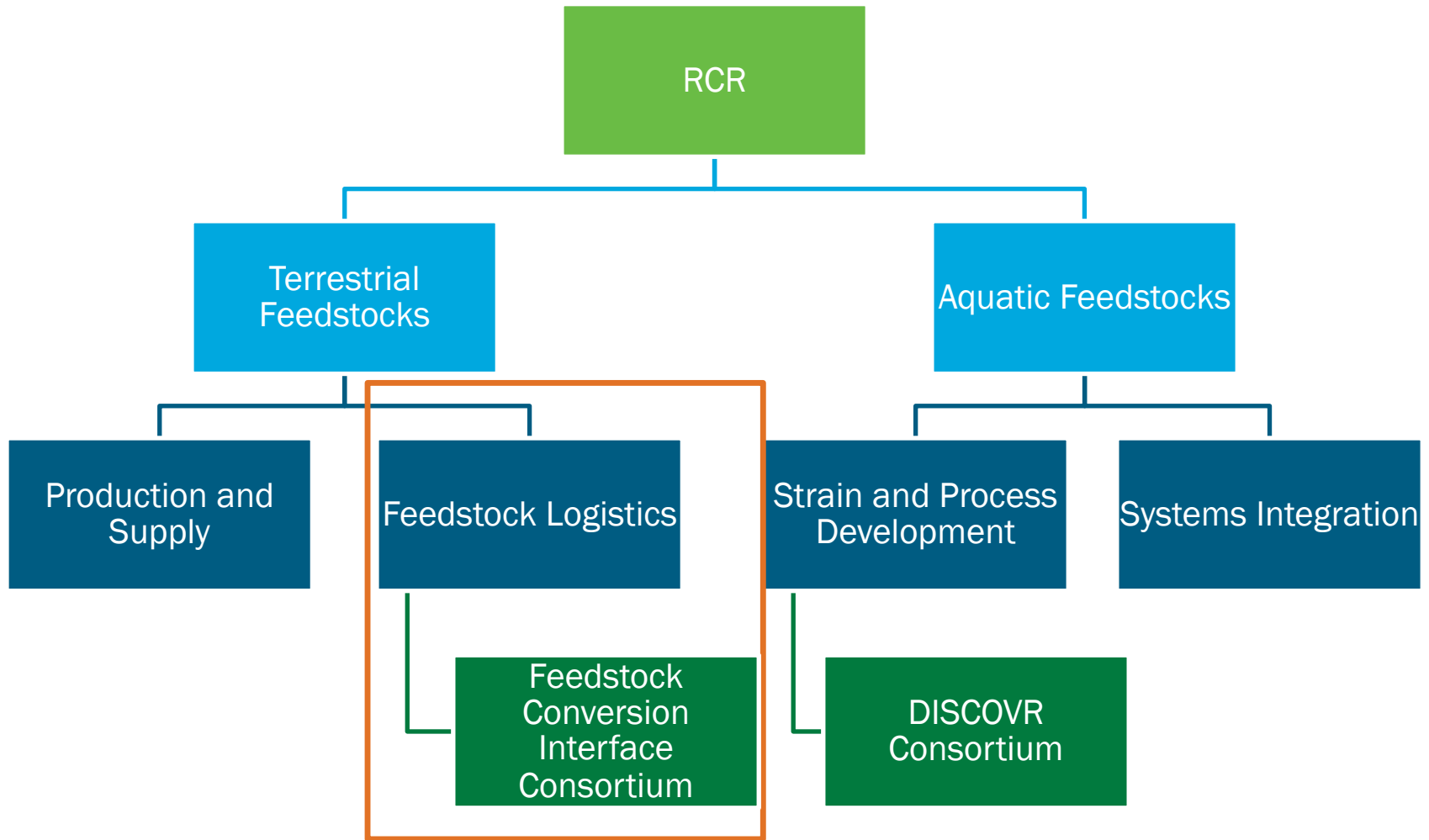
**Lunch!**

Feedstock  
Supply Chain  
Analysis

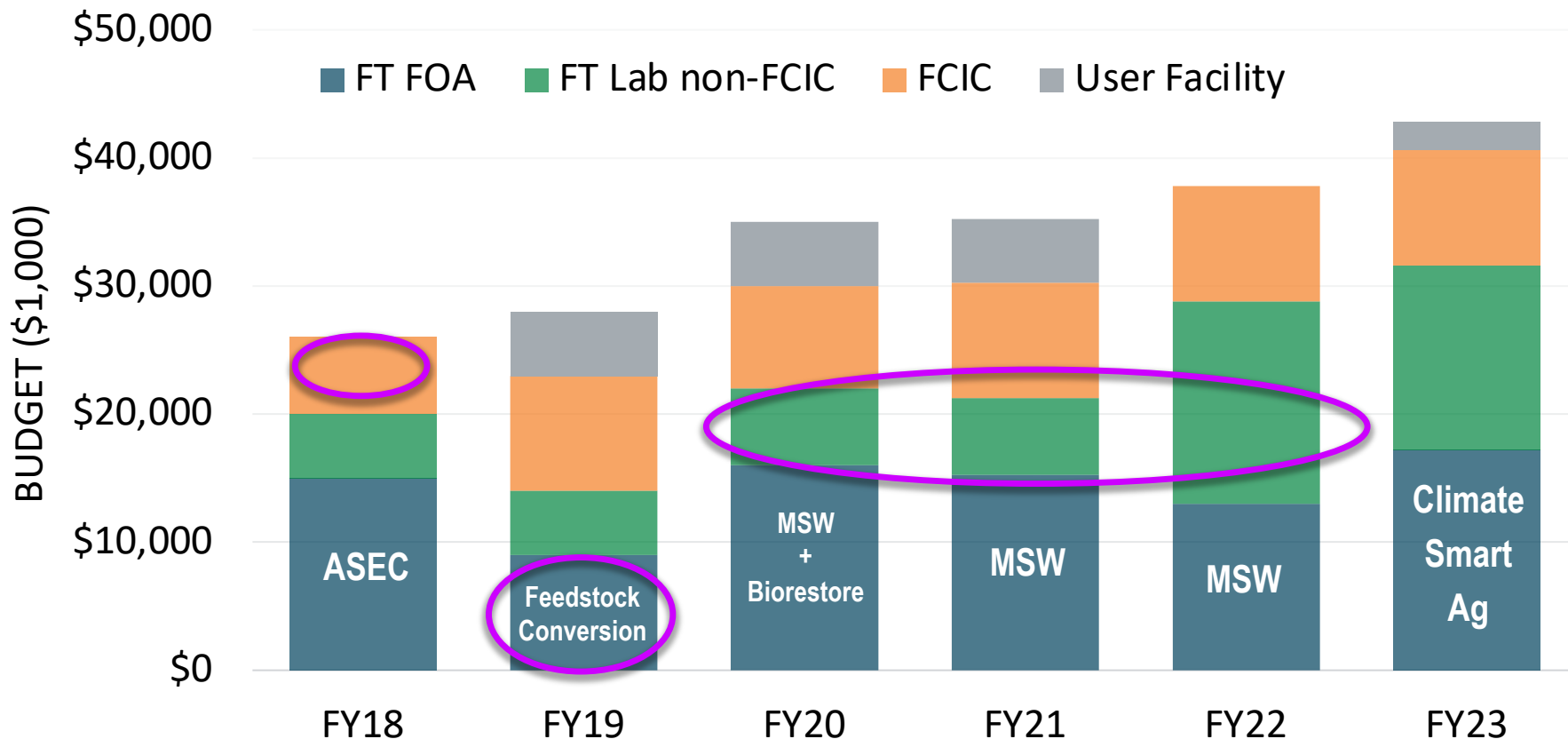
Municipal  
Solid Waste

Conversion  
Interface

# RCR Program Structure and Day 3 R&D Focus



# FT RD&D Day 3 Projects



**5 FT Lab projects spanning from FY20 – FY22**

**7 Feedstock Conversion Interface projects from the FY19 FOA**

**1 FCIC CRADA Call project funded in FY18**

# Integrated Morning Session of FT FOA and Lab Call Projects

- **FY19 FOA AOI 2C: Improving Economics and Development of Coproducts**
  - Metric: Reduce biomass cost by 20% through the development of coproducts from inorganic species/ash, soil, water, and off-specification materials.
- **FY21 Lab Call on Feedstock Preprocessing**
  - Biomass Storage and Process Intensification
  - Biomass Fractionation and Densification
- **FY22 Lab Call R&D Area 2b Specific Areas of Interest**
  - Co-product Development of Non-Recycled MSW and Off-Spec Materials
- **FY22 Congressional Directed R&D on Forest Residue Processing Technologies**
  - Up to \$3M for research at commercially-relevant processing scales into affordable wood chip fractionation technologies and other processing improvements relevant to thermal deoxygenation biorefineries.



# Today's Morning Agenda

Monday 4/3/23

Tuesday 4/4/23

**Wednesday 4/5/23**

## FEEDSTOCK TECHNOLOGIES

**DAY 3** – WEDNESDAY APRIL 5, 2023

Start Time (MT)	End Time (MT)	Title	Organization	Speaker
8:30 AM	8:45 AM	Technology Area Daily Intro	BETO	Chenlin Li & Mark Elless
8:45 AM	9:15 AM	Thermal Conditioning for Development of Co-products for Carbon Cycle Sequestration	INL	Jordan Klinger
9:15 AM	9:45 AM	Value-added biocomposite production using off-spec biomass from mechanical fractionation	ORNL & INL	Erin Webb
9:45 AM	10:15 AM	Polymer products from Lignin through de-aromatization and COOH functionalization	University of South Carolina	Michael Kent
10:15 AM	10:30 AM	Break	All	
10:30 AM	11:00 AM	Value-added process intensification in the supply chain	INL	Bradley Wahlen
11:00 AM	11:30 AM	Biomass Size Reduction, Drying and Densification	INL	Neal Yancey
11:30 AM	12:00 PM	Advancing Forest Biorefineries Towards Commercial Applications through Fractionation of Biomass Wastes	INL & NREL	Luke Williams
12:00 PM	1:00 PM	Lunch	All	

Co-Product Development

Preprocessing

# FT session themes at a glance

**Monday 4/3/23**

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**Wednesday 4/5/23**

**Lunch!**

**Conversion  
Interface**

# Today's Afternoon Agenda

1:00 PM	1:30 PM	Characterization of Mechanical Biomass Particle-Particle and Particle-Wall Interactions	Pennsylvania State University - University Park	Hojae Yi
1:30 PM	2:00 PM	Enhanced Feedstock Characterization and Modeling to Facilitate Optimal Preprocessing and Deconstruction of Corn Stover	Monatana State University	David Hodge
2:00 PM	2:30 PM	SWIFT: Single-pass, Weather Independent Fractionation Technology for Improved Property Control of Corn Stover Feedstock.	University Of Wisconsin	Kevin Shinnars
2:30 PM	3:00 PM	Sulfur Profiling in Pine Residues and Its Impact on Thermochemical Conversion	University of Kentucky	Jian Shi
3:00 PM	3:20 PM	<i>Break</i>	<i>All</i>	
3:20 PM	3:50 PM	Modeling Feedstock Performance and Conversion Operations	Purdue University	Michael Ladisch
3:50 PM	4:20 PM	Machine learning based modeling framework to relate biomass tissue properties with handling and conversion performances	University of Georgia Research Foundation Inc.	Sudhagar Mani
4:20 PM	4:50 PM	Real time, Integrated Dynamic Control Optimization to Improve the Operational Reliability of a Biomass Dryer	INL	Damon Hartley
4:50 PM	5:30 PM	<i>Closed Door Comment Review Session</i>	<i>Reviewers</i>	



# FY19 BETO Multi-Topic FOA: Area of Interest 2

## Area of Interest 2 – Biomass Component Variability and Feedstock Conversion Interface

(a) the physical and chemical characteristics associated with individual tissue components of certain types of biomass such as corn stover and southern pine

(b) how biomass characteristics change during storage, handling, and when undergoing preprocessing and conversion

(c) the utilization of this knowledge to improve feedstock performance during preprocessing and conversion

Federal \$\$ Per Award	Total Federal Funding	Award Duration	Cost Share (%)
\$600K - \$3.5M	\$8.6M	3 years	20%

# FY19 BETO Multi-Topic FOA: Area of Interest 2 Metric

## AOI 2: Relate Biomass Physical and Chemical Characteristics to Feedstock Performance in Handling and Conversion Operations

- Metric: Achieve R-squared value of >80% when relating biomass physical and chemical characteristics to feedstock handling and operations data.



# FY18 FCIC CRADA Call

## Objective

- Focus R&D to understand the root causes of feed handling failures and develop integratable technologies to increase the on-stream operational reliability of biorefineries by providing industry partners with access to the FCIC resources network.

## Justification

- Lignocellulosic biorefineries' development and operation have suffered from failing to account for the complexity and variability of feedstock properties and composition, lack of fundamental understanding of the physics and chemistry of biomass derived feedstock preprocessing and subsequent deconstruction, poor equipment design, and flawed integration.

## Process

- Interested industry or academia were encouraged to submit research proposals, in collaboration with national labs, to address the most pressing industrial feedstock handling, preprocessing, and conversion challenges related to feedstock chemical, physical, and mechanical variability.

## Selections

- Five projects selected – one is still active (**INL's project with Idaho Forest Group**)

Federal \$\$ Per Award	Total Federal Funding	Award Duration	Cost Share (%)
Up to \$2M	\$8.0M	3 years	30%

# Thank you, Reviewers!



**Dr. Jingxin Wang**, West Virginia University



**Dr. Shakira Hobbs**, Assistant Professor, University of California, Irvine



**Dr. Sally Krigstin**, Assistant Professor, University of Toronto



**Dr. Bhima Vijayendran**, Managing Partner, Redwood Innovation Partners, LLC



**Dr. Kevin Kephart**, Deputy Director, Institute of Bioenergy, Climate, and Environment, NIFA, USDA



**Mr. Philip Weathers**, Principal Consultant, Weathers Associates Consulting



**Ms. Bryna Guriel**, Senior Platform Manager, Genomatica



**Ms. Vicky Putsche**, President, VLP Consulting Co



**Dr. Julie Tucker**, National Program Manager, USDA-FS



**Mr. Chris Burk**, Consultant, Lee Enterprises Consulting



**Dr. Paul Weider**, Process Chemist (retired), Shell Oil

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# Questions?