

2023 BETO Peer Review Feedstock-Conversion Interface Consortium FCIC Introductory Session

#### April 6, 2023 Denver, CO

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Integrated Biorefineries (IBR) were plagued by materials handling issues that were exacerbated by having a variable feedstock with no consistent quality specifications.





Identify and address the impacts of feedstock variability - chemical, physical, and mechanical – on biomass preprocessing and conversion equipment and system performance, to move the biorefining industry towards improved operational reliability.

### **History of FCIC**

#### FY17-18

- Kickoff Planning Meeting May 2017
- FCIC 1.0 launched in December 2017
- Budgets
  - FY17 \$5M
  - FY18 ~\$11M
- CRADA Call (\$8M) for industry engagement
- 5 Tasks
  - Feedstock Variability & Specification Development
  - Feedstock Physical Performance Modeling
  - Process Integration
  - System-Wide Throughput Analysis
  - Process Controls and Optimization
- Feedstock: Corn stover and pine residues
- Framework: focused on empirical relationships

#### FY19-22

- FCIC 2.0 launched (~\$11M-\$14M per year)
- 9 Tasks
- Feedstock: Corn stover and pine residues
- Framework: first-principles; adopted quality by design approach



#### FY22-24

- FCIC 2.1 launched (~\$11M per year)
- CRADA Call (\$2M) released in March 2023 for industry engagement
- 10 tasks
- Feedstock: Corn stover, pine residues, and MSW
- Framework: first-principles; quality by design approach

### **RD&D Needed to Develop Fundamental Understanding for FCIC**

- 1. Feedstock quality impacts on preprocessing and conversion performance.
- 2. Biomass flow behavior and robust particle mechanics computation models to improve feedstock flowability.
- 3. Abrasion mechanisms for equipment design and wear resistance.
- 4. Key feedstock and operation factors needed to establish feedstock quality specifications and to develop cost-effective mitigation strategies toward improving operational effectiveness for integrated supply-logisticsconversion systems.
- 5. Intelligent control systems and performance criteria to actively manage feedstock quality and achieve high levels of continuous system reliability.



Corn stover fractions: (A) Cob, (B) Husk, (C) stalk, and (D) whole material



Feeder Screw Wear

### FCIC Budget (~\$11M per year)



Establish SMART Metrics and an FCIC Roadmap

Established clear 1-year and 3-year outcomes

No roadmap developed; emphasis placed on examining new feedstocks for SAF production

Manage the Rise of Product Development within BETO

FCIC does not pursue product development, but develops tools and knowledge for industry Design heuristics for problematic unit operations and disseminate distributions of material attributes to industry

More Meaningful and Diverse Industry Engagement

Released FY23 CRADA Call for industry to work with FCICmember labs on problematic unit operations Goal is to disseminate tools and knowledge to industry to deliver performance-guaranteed processes by industry

### **Agenda and Session Logistics**

DAY 4 - THURSDAY APRIL 6, 2023				
Start Time (MT)	End Time (MT)	Title	Organization	Speaker
10:00 AM	10:15 AM	Technology Area Daily Intro	BETO	Mark Elless & Beau Hoffman
10:15 AM	11:00 AM	FCIC Overview & Task X - Project Management	NREL	Ed Wolfrum
11:00 AM	11:30 AM	Task 2 - Feedstock Variability	NREL	Bryon Donohoe
11:45 AM	1:00 PM	Lunch	All	INL
1:00 PM	1:30 PM	Task 3 - Material Handling	INL	Yidong Xia
1:30 PM	2:00 PM	Task 5 - Preprocessing	INL	Jordan Klinger
2:00 PM	2:30 PM	Task 6 - High Temperature Conversion	ORNL	Jim Parks
2:30 PM	2:50 PM	Break	All	
2:50 PM	3:20 PM	Task 7 - Low Temperature Conversion	ANL	Phil Laible
3:20 PM	3:40 PM	Task 1 - Materials of Construction	ORNL	Jun Qu
3:40 PM	4:00 PM	Task 4- Data Integration and Web Portal	PNNL	Jim Collett/Rachel Emerson
4:00 PM	4:30 PM	Task 8 - Crosscutting Analysis	PNNL	Erin Webb
4:30 PM	4:45 PM	Task 9 - Failure Modes & Effects Analysis	INL	Rachel Emerson
4:45 PM	5:30 PM	Closed Door Comment Review Session	Reviewers	

#### **Session Logistics**

- Most presenters will have 20 minutes
  for their presentation; followed by 10
  minutes of Q&A and scoring of the
  presentation. Each presentation will be
  strictly timed and the presenter given a
  5- and 1-minute warning to wrap up.
- Lead Reviewer will be given the opportunity to ask the first question(s) for each presenter; then open for other reviewers.
- All breaks will be strictly honored.
- The closed door comment review session at the end of day is just for the reviewers and BETO. Everyone else must leave the room for this session.

- Mr. Chris Burk, Consultant, Lee Enterprises Consulting
- Ms. Bryna Guriel, Senior Platform Manager, Genomatica
- Ms. Vicky Putsche, President, VLP Consulting Co
- Dr. Julie Tucker, National Program Manager, USDA-FS
- Mr. Philip Weathers (Lead), Principal Consultant, Weathers Associates Consulting
- Dr. Paul Weider, Process Chemist (retired), Shell Oil



# **THANK YOU, REVIEWERS!**



## Thank you

#### http://energy.gov/fcic



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