U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Overview of Feedstock Technologies Program & Day 1 Introduction

Liz Burrows and Alex Jansen

Technology Managers, BETO

April 3, 2023

Agenda

- BETO Team
- Technology Area Strategy
  - Goals
  - Program Structure
  - Stakeholder input
- Implementation & Progress
  - Portfolio
  - Budget & execution
  - Active program
    - Grouped by topic area
  - Day 1 intro
- Reviewers

The Feedstock Technologies "Family"

Nichole Fitzgerald
Program Manager

Mark Elless
Technology Manager

Chenlin Li
Technology Manager

Dana Mitchell
Technology Manager

Alexander Jansen
Technology Manager

Liz Burrows
Technology Manager

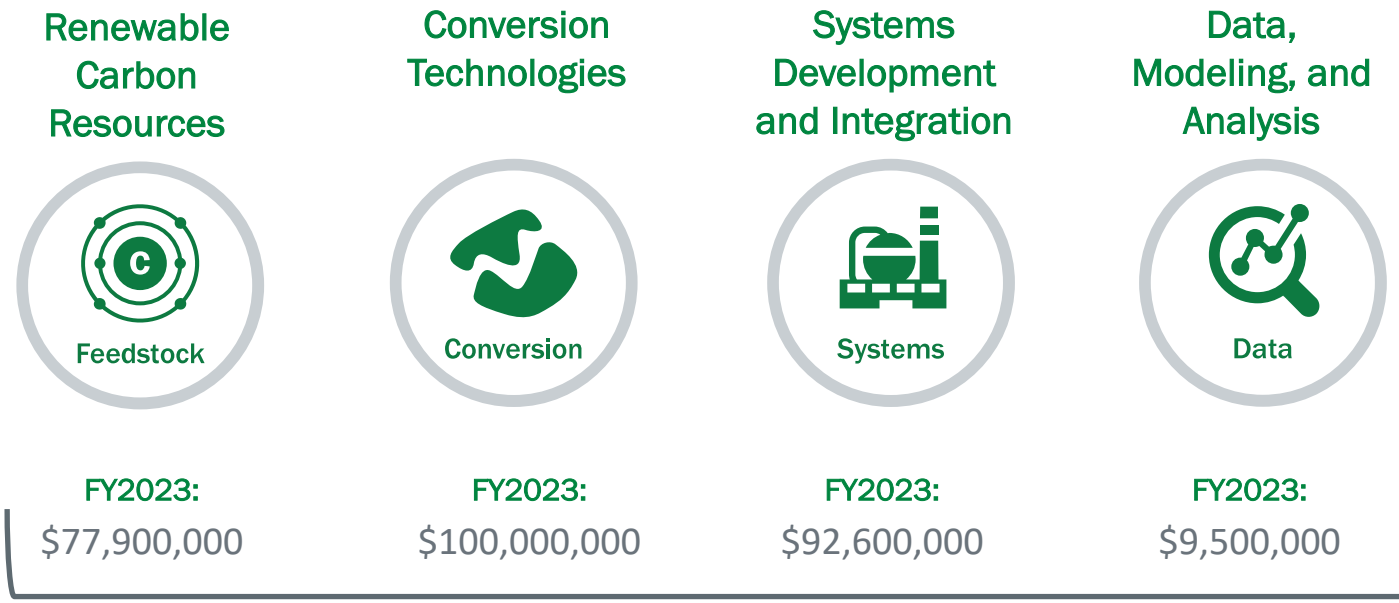
Neil Watson
Business Support

Andrew Zimmerman
Project Monitor

Atilio de Frias
Project Monitor

BETO Program Areas

FY2023 Budget Authority = $280M



New in FY23

- **Feedstock Technologies Program**
- **Advanced Algal Systems Program**

Key Challenges and Barriers

The Feedstock Technologies program's challenges and barriers below highlight areas in which improvements are crucial to reaching program goals.

- Feedstock Availability and Cost
- Production
- Feedstock Genetics and Variety Improvement
- Sustainable Harvesting
- Feedstock Quality
- Biomass Storage Systems
- Biomass Physical State Alteration
- Material Handling and Transportation
- Feedstock Supply System Integration & Infrastructure
- Operational Reliability

RCR Program Goal: in line with FT 2021-23 efforts

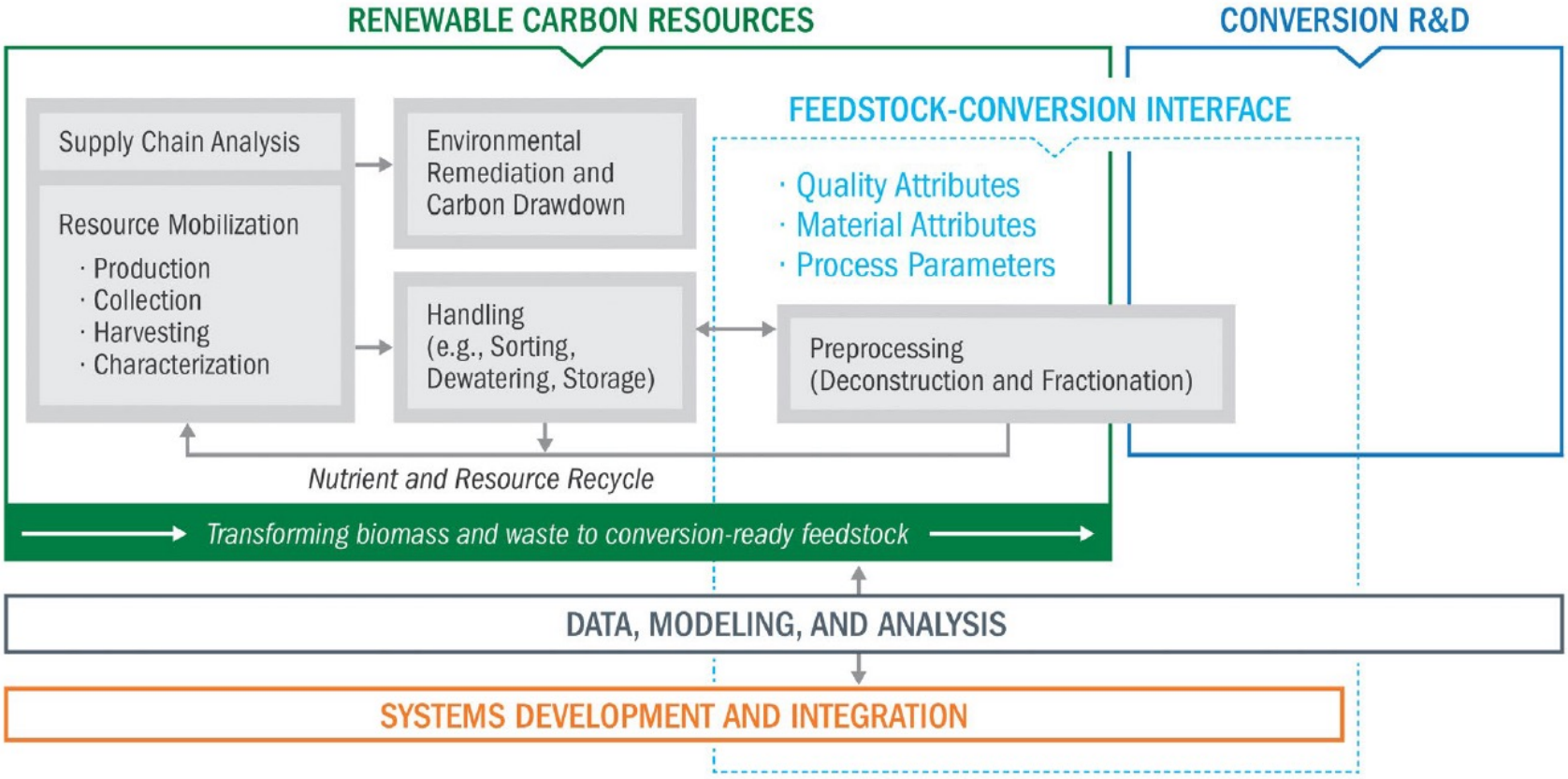
Strategic Goal: Develop technologies to mobilize renewable carbon resources to enable the production of bioenergy and renewable chemicals and materials.

RD&D to:

- Lower the cost
- Improve the quality
- Increase the types and quantities
- Improve the efficiency and reliability of:
  - Production
  - Harvesting or collection
  - Storage
  - Preprocessing
  - Transportation
- Identify the key quality and operational factors for conversion performance while ensuring sustainable practices

Cost-effective, high-quality, sustainable, and energy-dense feedstocks

Program Structure



Industry and stakeholder input in developing strategy

- Workshops
  - 2021: Advancing Synergistic Waste Utilization as Biofuels Feedstocks: Preprocessing, Coproducts, and Sustainability
  - 2022: Bioenergy's Role in Soil Carbon Storage
  - 2023: Regional Feedstock Partnership
- Interagency Collaborations
  - Biomass R&D Board – regular participation
    - Feedstock Production & Management IWG – co-chair
    - Feedstock Logistics IWG – co-chair
- Participation at meetings
  - ASABE – presented and chaired sessions
  - ABLC - presented
  - CAAFI - presented
  - IEA - presented
  - Jacobsen Feedstock Conference – attended
  - Maersk - presented
- Peer Reviewer feedback!

FT Response to 2021 Peer Review Feedback

Apply information technologies to the delivery of feedstocks to biorefineries	Transportation costs of feedstocks to the biorefinery are being modeled in the Billion Ton 2023 report (to be released later this year)	Artificial intelligence and machine learning are used in several projects to produce conversion-ready feedstocks
Expand work on feedstock depots	Just released a funding opportunity for the labs on this topic	Blending R&D continues to be a priority
Continue work on MSW as a feedstock and expand portfolio to include other resources	Finished 3 year FOA campaign for MSW	About to launch an initiative around advancing the Regional Feedstock Partnership

Additional responses to 2021 Peer Review feedback

Engage with the local farming and forest community

- Initiated and ran 3 consecutive SBIR topics focused on community-driven technology development
  - Projects support rural forest and farming communities by creating equipment to make biochar from logging residue and designing small-scale biomass feedstock processing equipment.

Expand focus on forest residue logistics

- Expanded feedstocks in MYPP to include several woody sources including biomass harvested for fire mitigation and material salvaged from natural disasters
- Co-authored chapter on Forest Restoration in Carbon Dioxide Removal report to Congress
- Organized Soil Carbon workshop session titled, “Forest Management Practices to Optimize Soil Carbon Storage”
- Hired Technology Manager from USDA-FS with forest operations expertise

FT session themes at a glance

Monday 4/3/23	Tuesday 4/4/23	Wednesday 4/5/23
Plenary	Sustainable Agriculture	Co-Product Development
		Preprocessing
Lunch!		
Feedstock Supply Chain Analysis	Municipal Solid Waste	Conversion Interface

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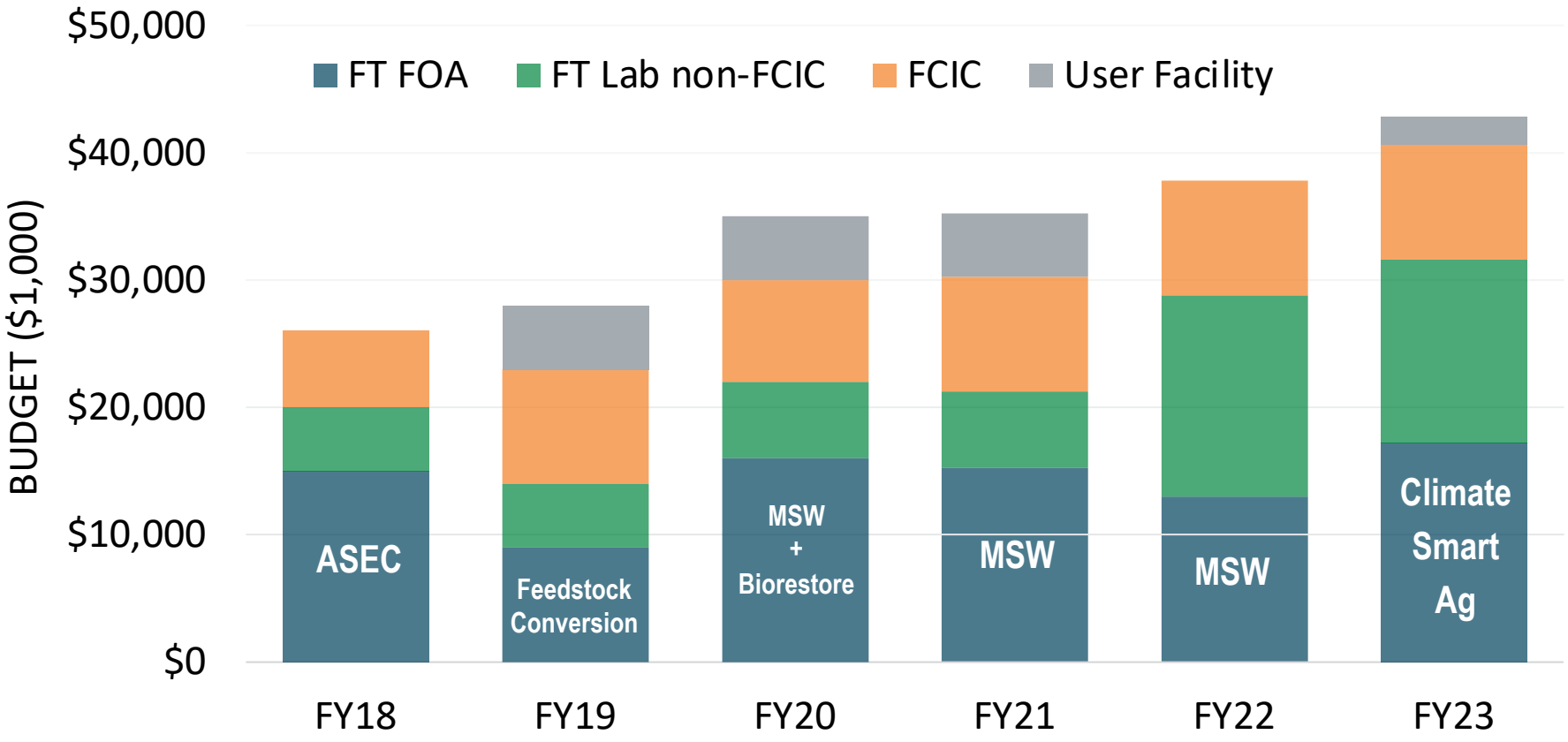
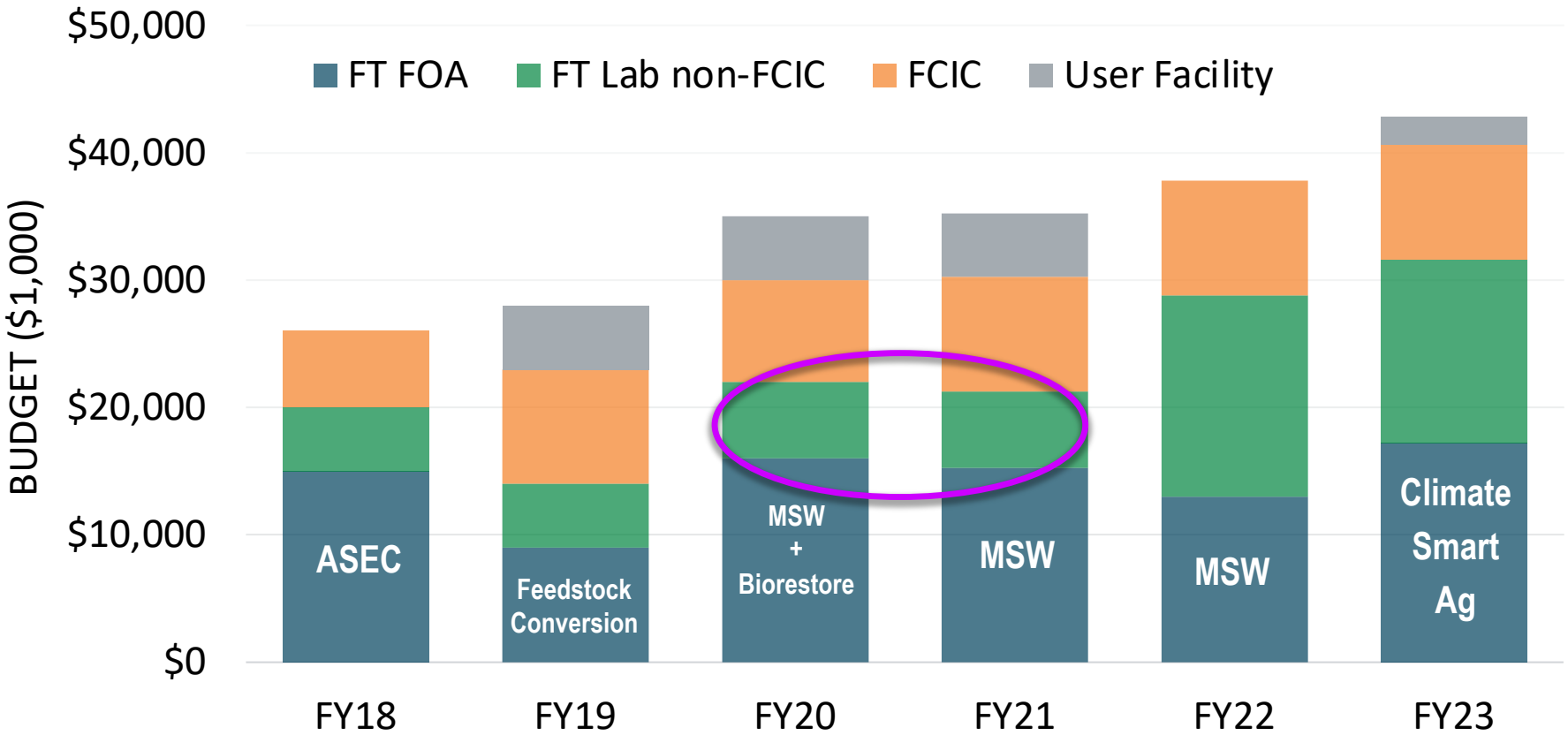
FT RD&D Budget FY 18-23



17 FT Lab projects to be reviewed, span from FY20 – FY22

15 FT FOA projects to be reviewed, span from FY18 – FY21

FT RD&D Day 1 Projects



7 FT Lab projects to be reviewed today spanning from FY20 – FY21

FY20 – 1.1.1.2, 1.1.1.3, 1.2.1.5

FY21 – 1.1.1.6, 1.1.1.8, 1.1.1.9, 1.2.2.2

FT session themes at a glance

Monday 4/3/23

Tuesday4/4/23 Wednesday 4/5/23

DAY 1 – MONDAY APRIL 3, 2023				
Start Time (MT)	**End Time (MT)**	**Title**	**Organization**	**Speaker**
1:00 PM	1:30 PM	Technology Area Introduction	*BETO*	*Liz Burrows & Alex Jansen*
1:30 PM	2:00 PM	Feedstock Supply Chain Analysis	*INL*	*David Thompson*
2:00 PM	2:30 PM	Supply Scenario Analysis	*ORNL*	*Matt Langholtz*
2:30 PM	3:00 PM	Bioenergy Feedstock Library	*INL*	*Rachel Emerson*
3:00 PM	3:20 PM	*Break*	*All*	
3:20 PM	3:50 PM	Resource Mobilization	*INL*	*Pralhad Burli*
3:50 PM	4:20 PM	Triple bottom line sustainability indicators for spatially-explicit, multi-feedstock, multi-technology waste-to-energy supply chains	*PNNL*	*André Coleman*
4:20 PM	4:50 PM	Global impacts of enhancing domestic ecosystem carbon sinks	*NREL & PNNL*	*Patrick Lamers*
4:50 PM	5:20 PM	Benefits and Land Use Effects of US Energy Crop-based Carbon Banking	*ORNL*	*Debo Oladosu*
5:20 PM	6:00 PM	*Closed Door Comment Review Session*	*Reviewers*	

Feedstock Supply Chain Analysis

BETO Work Breakdown Structure

1. Feedstocks
1.1 Sustainable Production
1.1.1 Analysis and Sustainability
- 1.1.1.2 Feedstock Supply Chain Analysis – David Thompson
- 1.1.1.3 Supply Scenario Analysis – Matt Langholtz
- 1.1.1.6 Triple bottom line sustainability indicators for spatially-explicit, multi-feedstock, multi-technology waste-to-energy supply chains – Andre Coleman
- 1.1.1.8 Global Impacts of enhancing domestic ecosystem carbon sinks – Patrick Lamers
- 1.1.1.9 Benefits and Land Use Effects of US Energy Crop-based Carbon Banking – Debo Oladosu

1.1.2 Feedstock Production
1.2 Biomass Engineering and Logistics
1.2.1 Feedstock Logistics Core R&D
- 1.2.1.5 Resource Mobilization – Pralhad Burli

1.2.2 Conversion Interface
- 1.2.2.2 Bioenergy Feedstock Library – Rachel Emerson

1.2.3 Scale-up and Integration
1.3 Algae Feedstocks

Today's Agenda and Session Logistics

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Session Logistics

- Presenters have 20 minutes; followed by 10 minutes of Q&A
- Presenter given a 2-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.

FY23 FT Peer Reviewers

- Dr. Jingxin Wang, West Virginia University (Lead Reviewer)
- 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





Questions?