

# Biomass Feedstock

Bottlenecks

Approach

Expertise

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S1007

The Science and Engineering for a Biobased

Industry and Economy

“Multistate Research Committee”

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# “Feedstock”

- Biologically Based – Recent Solar Capture
- Many sources – Much potential
- Typically Voluminous
- Typically Cultivated/ Cultured
- Feedstock Supply/ Engineering
  - Growth
  - Harvest
  - Handle
  - Store
  - Transport
  - Prozesse
  - “Supply and Prep of Plant Material for Conversion”

# Feedstock Integration

- Feedstock Supply Can't Function in a Knowledge Vacuum
  - Optimizing Biological production versus ease of Harvesting?
  - Knowledge of Feedstock value versus Over-investment?
  - What are **feedstock requirements and tolerances** for the conversion?
  - What do **feedstock quality compromises** do to conversion efficiency?
  - Does **large-scale conversion perform like bench-top experiments**?
  - **Standards for At-the-Door Feedstock Characteristics**

# Feedstock Bottlenecks

- Growth
  - Impact of system design on biomass yield and quality
  - Impact of system operation on ecosystem and environment
- Harvest
  - Terrestrial and Aquatic cutting and gathering equipment
  - Ag machinery not robust for many feedstock sources
- Storage
  - Wet versus Dry
  - Supply Management versus Fermentation versus Drying Energy
- Transport
  - Handling Discrete versus Continuous Units
  - Transport Density versus Densification Energy
- Processing
  - Size Reduction Energy versus Conversion Process Efficiency
  - Physical Separation versus Benefits
- Standardization
  - Few standards to ensure consistent feedstock supply to processing plants

# Feedstock Approach

- Growth
  - Optimization of Genetic and Agronomic Factors
  - Harvest frequency on Yield, Quality, Wildlife Habitat, CRP grasslands
- Harvest
  - Take advantage of Biomass Weakest Mode of Failure
  - In-Field processing, Size Reduction, Dry Flowable Product, Densification
- Storage
  - Centralized storage – methods, deterioration, Dry Matter Losses
  - In-field “storage”
- Transport
  - Availability - Use - Moisture - Deterioration Strategies
  - GPS – GIS – Shortest Distance Management
- Processing
  - Size Reduction Optimization
  - Separation Benefits
- Standardization
  - ASAE and other – Uniform terminology, system integration

# Feedstock Expertise

- Growth

- Paul Adler                      Agronomist                      USDA-ARS
- Lewis Liu                      Molecular Biologist                      USDA-ARS
- David Brune                      Engineer                      Clemson University

- Harvest

- Raymond Huhnke                      Engineer                      Oklahoma State University
- Shahab Sokhansanj                      Engineer                      ORNL
- Alvin Womac                      Engineer                      University of Tennessee

- Storage

- Carl Bern                      Engineer                      Iowa State University

- Transport

- Michael Montross                      Engineer                      University of Kentucky

- Processing

- Lonnie Ingram                      Microbiologist                      University of Florida