Feedstock Economics and Engineering Analysis

Report to the North Central Feedstock Workshop

Sioux Fall, SD

August 15-17, 2006

Approach

- Brainstorming of issues to be addressed
- Classifying issues into three major categories: cost, logistics, and processing
- Breakout into three category teams
- Individual writing assignments:
  - Description of issue
  - Charge to DOE
- Consensus building within category teams
- Integrating ideas

Economics and Engineering

- Refine estimates for this region*
  - Charge: Develop regional estimates of biomass availability, short and long run, encompassing both ag and forestry sectors
  - Charge: Determine accurate crop yields and residue ratios

*To be performed by various feedstock groups

Economics and Engineering

- Consider cost of feedstock resources
  - Charge: Assess the costs of producing, harvesting, storing, and transporting biomass feedstocks.
- What is the value of removed nutrients?
  - Charge: Estimate sustainable removal rates for biomass evaluated at county level
- How does policy affect availability?
  - Charge: Analysis of policy change impacts on biomass availability, cost and cropping systems

Economics and Engineering

- Generate supply curves
  - Charge: Develop market models of biomass feedstocks, including detailed supply curves specific to feedstock type and region
- Economic impact of biomass industries
  - Charge: Conduct economic impact analysis of biomass production and processing development at state and regional levels

Economics and Engineering

- System analysis of feedstock supply
  - Charge: Develop models to evaluate various logistical and management scenarios
  - Charge: Determine the affect of feedstock type and properties on logistics
  - Charge: Determine how we effectively manage quality loss in storage
- Capture economies of scale
  - Charge: Determine effect of plant size on cost of delivery at plant-gate

Economics and Engineering

- Integrated approaches to production systems and processing facilities
  - Charge: Recognize that evaluations based on integrated approaches may yield synergistic benefits that translate to reduced cost and improved biofuels and biobased products
- Integration of energy crop production with traditional agriculture
  - Charge: Support research and education on intercrop systems of energy and traditional crops

Economics and Engineering

- Balancing soil environmental issues with economic aspects of feedstock production
  - Charge: Develop model that is specific to soil type, feedstock, rotation, and environmental sensitivity to identify portion of biomass production that can be responsibly removed from the land
- Gaps in logistical information
  - Charge: Develop Internet inventory on regional biomass feedstock activities and expertise

Economics and Engineering

- Feedstock specifications appropriate to conversion requirements
  - Charge: Assembly of data for economic models must account for feedstock variability and processes to be employed.
  - Charge: Develop methods for harvest, storage, and preprocessing to achieve defined feedstock specifications

Economics and Engineering

- Potential impact of disruptive technologies
  - Charge: Recognize potential impact of new technologies that approach theoretical yields of biomass and biofuels
- Decoupling economies of scale
  - Charge: Explore opportunities to reduce capital cost of conversion facilities relative to biomass transportation costs

Economics and Engineering

- Reduce cost of production through co-product credits
  - Charge: Examine additional co-products beyond DDGS and power: adhesives, chemicals, lubricants, polymers, proteins.
- Role of energy efficiency
  - Charge: Reassess potential for petroleum displacement by including impact of energy efficiency in feedstock production, fuel production, and fuel economy in transportation sector.

Economics and Engineering

- The product and process will dictate the feedstock
  - Charge: Develop a diversified biorefinery program in biochemical and thermochemical platforms integrated with feedstock supply
- Will communities accept biorefineries in their communities and energy cropping systems on their farms?
  - Charge: The DOE should promote more extensive risk evaluation and public education efforts when biorefinery placement begins.