



# **What We Know and What We Need to Know**

**Integrations of Agricultural and Energy Systems  
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# Workshop Highlights – What We Know

- **Transition to a Bioeconomy – “Integration of Agricultural and Energy Systems”**
- **Addressed costs of biofuel and policy initiatives**
- **Considered farm-level issues and tradeoffs**
  - **By-product utilization in livestock rations**
  - **Feasibility of small-scale biodiesel production**
  - **Potential for supplying biomass feedstock**
- **Considered narrow margins and improving plant efficiency**
  - **Corn fractionation and expanded by-product use**
  - **By-products as fuels in ethanol plant**
  - **Alternative plant processes and feedstock choices**

# Workshop Highlights – What We Know

- **Integrated industry implications**
  - Biofuel expansion implications
  - Livestock industry adjustments
  - Possibilities for the bioeconomy
  - Trade-offs in processes and feedstock choices
  
- **Biomass feedstock opportunities and challenges**
  - Important contribution in evolving area
  - Evolution of biofuels system
  - Production and integration of biomass from producer to biorefinery

# Future Workshop Opportunities

## – What We Need to Know

- **How might the biomass fuel industry evolve?**
  - Discussed in workshop presentations
  - Integration with agricultural system
  - Industry structure
  - Centralized versus distributed production system
  - Corn-based ethanol
  - Government's role
- **What are the implications for the agricultural system and rural America?**
  - Have seen big changes in short time with corn ethanol
  - If we meet the 20B gallon biomass mandate, even bigger changes by 2022
  - How might that change the rural landscape, amenities, water quality and quantity, soil erosion, and employment
  - What will it really contribute to GHG emissions reductions?

# Future Workshop Opportunities

## – What We Need to Know

- **Impacts of EISA of 2007**
  - Know where corn-based ethanol will go
  - Know where we want to go with biomass, residue, and waste biofuels, but how we get there is uncertain
  - Life-cycle analyses (EPA) for new facilities and feedstock create some big uncertainties
  - How new RFS and mandates are implemented (use of waivers) is critical
  - Role of tax credits and tariffs become less important

# Future Workshop Opportunities

## – What We Need to Know

- **Operate in global economy and environment**
  - What does biofuel expansion mean in global context
  - Searchinger, et al, Fargione, et al, etc.
  - NRC's ALTF Panel: Biofuels and Clean Coal
  - Biomass fuels, feedstock supplies, costs, and carbon emissions

# Future Workshop Opportunities

## – What We Need to Know

- **Larger economic question: What are the costs (inefficiencies) of the way we choose to fix the energy and GHG emissions problem?**
  - Sustain cheap energy legacy and all that implies
  - Gov't picks the winners with little knowledge of contribution to problem
  - Response if LCA results not popular
  - Ultimately, must change consumer behavior through markets if we want efficient solution and real progress
    - Carbon taxes
    - Cap carbon and trade carbon credits
  - Markets can also determine how the agricultural and energy systems are integrated

# Challenge and Opportunity

- **Work has come a significant way in this workshop identifying what we know about integrating agricultural and energy systems**
- **We need to know significantly more, especially in the biomass arena, before we have a sense of the future integrated agricultural and energy systems**
- **Thank You!**

# Environmental and Amenity Impacts of Growing Bioeconomy

- **Environmental impacts**
  - Water quality
  - Air and landscape quality
- **Water quantity and quality impacts**
  - Water use per gallon of biofuel
  - Local water supplies (aquifers)
- **Local and regional amenities**
  - Recreation amenities attract businesses/residents
  - Contribute to local economic development
  - Converting CRP to energy crops reduces amenities