



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