What We Know and What We Need to Know

Integrations of Agricultural and Energy Systems
Westin Atlanta Airport Hotel
12-13 February 2008

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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
  – 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