“What specific action items would you recommend to speed commercialization of thermochemical processing in Midwest?”

**Recommendations:**

**Feedstock Development/Logistics**

- Vertical integration that identify the specifics of the processes that need improvement.
- Focus on high value products that will allow the supply chain to develop/be understood.
- Education & Communication between Producers and Industry so risks are understood & options can be developed to address risks.
- Create consortium, multi-industry, develop shared vision, R & D, etc. To be widely engaging of supply chain, stakeholders, geographically diverse.

**Logistics**

- Solve the feedstock supply chain for first plants;
  - Densification?
  - Stabilization?
- Improve communication among stakeholders to build supply chains.

**Conversion**

- More R & D, demo plants with funding partnerships including government & industry.
- Long-term pre-commercial technology demonstrations of successful conversion.

**Public & Policy Support**

- Long term stable government policy.
- Develop policy, business climate & financial structures for construction of initial plants;
  - Incentives?
  - State, Region vs. National
- Develop regional strategy for thermochemical biofuels.
- Replace legislative uncertainty with national commitment.
- Long-term, stable renewable fuels policy (State & Federal).
Reactions to Recommendations; already working on:

**Feedstock Development**

- **Bryan Mellage – C-Minus**
  - Bring value to by-product of thermochemical processing – biochar.
  - We will buy & sell biochar as carbon sequestration.

- **USDA-ARS**
  - Working to develop perennial grasses that yield 10 T/A.

- **Iowa State University – Agronomy**
  - Develop sustainable biomass supply management systems

- **Tom Binder – ADM**
  - Developing pilot plant to take multiple feedstocks to value added products as well as fuels
    - Hopefully successful without subsidies
  - We have worked with Monsanto, Deere, and consumer product companies to address value chain.

- **USDA-ARS**
  - Developing new improved varieties of feedstocks.
  - Developing sustainable production systems.
  - Developing tools to predict impact on ecosystem services.

- **Iowa Corn Growers Association**
  - We are supporting maintaining the RFS.
  - We are funding research on thermochemical conversion to high value products.
  - We are participating in research & meetings on feedstock harvest storage & transport.

- **Jeff Volenec – Purdue – Cenusa**
  - We are conducting research & education programs that will inform the production capabilities and environmental sustainability metrics of a wide range of biomass production systems. This information is needed for LCA, economic analysis, regulatory analysis, etc.

- **USDA-ARS**
  - Feedstock Development
  - Feedstock production & logistics
  - Fuelshed-scale site selection for feedstock production

- **Iowa State University Extension**
  - Education potential producers & industry leaders on biomass production.

- **UOP/Envergent**
  - Advise on/work with feedstock requirements/constraints with the growers here in the Midwest.
Feedstock/Logistics

- Chevron
  - Working with universities to better understand supply/logistics
- USDA-ARS (multi-locations & scientists)
  - Feedstock Development
  - Feedstock Quality
  - Feedstock Quality Assessment
  - Feedstock Storage
  - Feedstock Conversion
  - Producer Technology Transfer
  - Sustainability

Logistics

- BP
  - Working with government and private industry to bring demo plants and other R & D on-line.
- USDA-ARS (multi-locations)
  - Provide feedstocks for testing – multi-types
  - CRADA’s & other technology assistance

Logistics/Conversion

- West Central
  - Develop a commercial scale model for collecting and storing biomass. (Prospective)
- UOP/Honeywell
  - Improve communications among stakeholders & build supply chains
  - We are in the petroleum business but not operators. We are also in the renewables business. We have had to bring biorenewable feedstock suppliers together with fuels producers in the past to get projects to go.
- Iowa State University
  - Research on Feedstock Logistics
  - Research on Thermochemical Conversion
  - Research on Sustainability

Conversion

- Iowa State University – Agronomy
  - Develop value added biochar technology
- Iowa State University
  - R & D on thermochemical conversion
- Renmatix
Adopting our technology to process several of the feedstock discussed in the workshop.

- **UOP/Honeywell**
  - Building 1 tpd pilot plant to convert lignocellulosic biomass to gasoline & distillate fuels at Tesoro petroleum refinery in Hawaii.

- **Andrew Held – Virent**
  - Reduce technology risk and demonstrate cost performance such that strategic partners will invest & build production facilities.

- **Chevron**
  - Might build a demo unit to illustrate how different entities need to work together.

- **Ag Ventures Alliance**
  - We invested $250K in Auello.

- **Tom Binder – ADM**
  - We are looking into conversions of hemicellulosic & lignin into multiple value added products & are able to interest large chemical companies.

- **Iowa Energy Center**
  - R & D/Pre-commercial & conversion technology development/demonstrations

### Workforce Development/Public & Policy Support

- **West Central/REG**
  - Have a dedicated staff working educating and advocating for stable public policy particularly as it related to RFS2.

- **Iowa State University**
  - ISU has several centers working on bioenergy related policy.

### Public & Policy Support/Other

- **UOP/Envergent Technologies**
  - Involvement in DOE projects to demonstrate the viability & economics of our process to further influence the adoption of policies which support its implementation.

- **Farm Bureau**
  - Already has policy that supports the continued development of renewable energy.

### Other

- **USDA-NIFA**
  - Funding Cenusa
  - Provide post-award management support to facilitate a broadening consortium developing a shared vision among stakeholders across the entire supply chain and communities impacted by the development of regional systems.
- Provide supplemental funding
- Provide new funding for knowledge gaps identified

**Brad Petersburg – RDA & RDP**
- Using new markets tax credits to help finance the commercialization of one or more biorefineries in low-income communities.

**Cenusa**
- All areas with collaboration from USDA & industry partners.

**KiOR**
- **Impact** - Starting up commercial unit, results will affect the way stakeholders react in the future.
- **Positioning** – Clear and focused strategy & development of IP platform.

### Reactions to Recommendations; positioned to address:

#### Feedstock Development

- **Iowa State University Extension**
  - Demonstrating to potential producers convincing risk management strategies to biomass production.

- **Brad Petersburg – RDA & AgVA**
  - Form producer groups to supply biomass & invest in biorefineries

- **Iowa Corn Growers Association**
  - Collaborate with companies that have thermochemical technology on research, demonstration, and supply chain.
  - Educate corn growers about future opportunities for markets for corn stover.

- **Jeff Volenec – Purdue – Cenusa**
  - Initiate new research as needed – identified by stakeholders, to inform critical questions.
  - Participate in leadership/consortium of stakeholders discussions to move things forward.

- **Bryan Mellage – SEN Energy**
  - Organize producers in Southeast Nebraska to get ready to bring a thermochemical plant to our area.

- **USDA-ARS**
  - May be able to reduce need for N fertilizer on perennial grasses.

- **Unknown**
  - Energy Grains – USDA grant to organize farmers to plant relationships that bring all into one.

#### Feedstock/Logistics

- **USDA-ARS**
  - Feedstock densification and logistics.

- **Unknown**
Identify refiners that need that type of organization.

**Logistics**

- **Phillips 66**
  - We want to become closer to growers, distributors, marketers, and public policy groups to better understand the supply chain for biomass to drop-in fuels.

- **Unknown**
  - POET’s Project Liberty is demonstrating collection and stockpiling & logistics of corn stover.

- **Ag Ventures Alliance**
  - We could organize our farmers and have them sign long term supply contracts for corn stover at some determined price.

- **Renmatix**
  - Feedback to help with feedstock supply chain development

**Conversion**

- **Iowa Energy Center**
  - R & D, Pre-commercial conversion technology development, and demonstration

- **Phillips 66**
  - We are developing thermochemical technologies that produce drop-in fuels from biomass. These two technologies are currently in the pilot plant phase.

**Workforce Development/Public & Policy Support**

- **Iowa State University**
  - Strategy for thermochemical biofuels

**Public & Policy Support**

- **Iowa Economic Development Authority**
  - Working with private sector companies who are commercializing thermochemical processing technologies.
  - Future: develop financial incentives as new investment risk reduction tools specific to thermochemical technologies.

**Public & Policy Support/Other**

- Unknown
  - POET and many partners created Growth Energy, which is lobbying and public policy arm for industry renewable fuels.
Senator Tom Harkin (Alex Lynch)
- Continuing to hold the line on RFS2 and ensure the success of the biofuels industry.

BP
- Could: lobby regulators for certainty regarding RFS2 regulations and goals.

Other

Farm Bureau
- May be able to assist with commercialization

Howard Roe – Tall Corn
- POET is building a plant to handle corn stover in Emmetsburg, long range plans are to build similar facilities at each plant (27).

Unknown
- Continue to work with Congress & Administration to create more stability in the industry.

David Karson
- Today: Student Guest
- Future: Hopefully work on policy and financing in biofuel industry