Growing the renewable chemicals and advanced biofuels cluster in MN
Renewable Chemical Value


Slide courtesy of BioAmber
Greenhouse Gas Reductions from Biofuels

According to existing federal policy (EPA’s RFS2)

Compared to gasoline:

**Corn Ethanol**
- 20% GHG Reduction

**Advanced Biofuel**
- 50% GHG Reduction
e.g. bio-butanol

**Cellulosic Biofuel**
- 60% GHG Reduction
e.g. ethanol from corn stover or wood

Source: EPA RFS2 Threshold Levels; graph and slide by GPI
Minnesota’s Biobased Chemicals Cluster

Slide courtesy of BioIndustrial Partnership
Large forestry biomass resource and large (but declining) forest products industry

Large agricultural biomass resource, and successful track record in creating an ethanol industry through effective state policy

BIOECONOMY
COALITION OF MINNESOTA
Minnesota – World Leading Cluster of Biobased Chemical Company Headquarters
Company Highlight:

- Headquarters: Golden Valley, MN
- Base bio-derived compound: Levulinic ketals
- Used to replace petroleum in the manufacture of:
  - Plasticizers (PVC), polyols for polyurethane materials or use in polyester thermosets or thermoplastics and cleaning solvents
POET Dsm Advanced biofuels
Project liberty model

Cellulosic Biomass → Cellulose Plant → Ethanol → Waste
Power Generation

Corn → Grain Ethanol Plant → Ethanol → DDGS
PROJECT LIBERTY STACK YARD
## Iowa Bioeconomy

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Projected Capacity million gallons per year (mgpy)</th>
<th>Feedstock Source</th>
<th>Biofuel Type</th>
<th>Public Funding and Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>POET Project Liberty</td>
<td>20</td>
<td>Corn stover</td>
<td>Cellulosic ethanol</td>
<td>$14,000,000 Iowa Power Fund</td>
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<tr>
<td>Quad County Corn Processors</td>
<td>2</td>
<td>Corn kernel fiber</td>
<td>Cellulosic ethanol</td>
<td>$150,000 IA Dept of Economic Development</td>
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<td>Dupont</td>
<td>~25</td>
<td>Corn stover</td>
<td>Cellulosic ethanol</td>
<td>$9,000,000 Iowa Power Fund</td>
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<tr>
<td>Fiberight</td>
<td>6</td>
<td>Municipal solid waste</td>
<td>Cellulosic ethanol</td>
<td>$2,900,000 Iowa Power Fund</td>
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<tr>
<td>BioProcess Algae</td>
<td>unknown</td>
<td>Waste CO2 from ethanol production</td>
<td>Biodiesel</td>
<td>$4,100,000 Grants from State of IA</td>
</tr>
</tbody>
</table>

**Figure 6.3, Next Generation Biofuel Projects – Iowa**
Mission of the Bioeconomy Coalition of Minnesota

Articulate and implement a Minnesota state policy and regulatory agenda to expand biobased chemical, advanced biofuel, and biomass thermal energy industries, along the entire value chain from R&D through commercial production and use.
Coalition Organizers
Coalition Partners

- Segetis
- RELUCED
- BioAmber
- butrolix
- gevo
- SynGas Technology, LLC
- VerdeNero
- Fredrikson & Byron, P.A.
- firstgreen PARTNERS
- IA TP
- Institute for Agriculture and Trade Policy
- amec
- Dovetail Partners Inc.
- NatureWorks
- Minnesota Farmers Union
- Associated Contract Loggers & Truckers
2013 Legislative Achievements

• Biobased Chemical Funding:
  – Language added to NextGen Energy Board Statute allowing investment in biobased chemicals
  – ~$2.5 million over 2 years
  – Planned RFP for Fall 2013

• Next Gen Biofuels:
  – Modifying MN “ethanol” mandate to be biofuel-neutral, allowing butanol and other biofuels to enter market.
  – Establishes 30% by 2025 biofuel goal
  – Taskforce to recommend incentives to commercialize advanced and cellulosic biofuels in MN
2014 Goals

• Finalize financing and break ground for at least 2 new facilities producing advanced biofuels, biobased chemicals, or cellulosic sugars.

• Create a new state program to attract commercial-scale production of biobased chemicals, advanced biofuels, cellulosic sugars, and biomass thermal energy in Minnesota, either through a producer payment or tax credit, loan guarantee, grant, bonding, or other means.

• Secure bonding funding for district heating projects

• Secure bonding funding for the Biosystems Engineering building on University of Minnesota

• Increase procurement of biobased products by the state of Minnesota