Algae Biomass Summit

State of US Funding and Regulation of Algae
## Agriculture Act of 2014
### Title IX Appropriations, Fiscal Years 2014-18

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Mandatory Funding (Million)</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biobased Markets Program</td>
<td>$3</td>
<td>Annually</td>
</tr>
<tr>
<td>Biorefinery Assistance Program*</td>
<td>$200</td>
<td>Until expended</td>
</tr>
<tr>
<td>Repowering Assistance Program</td>
<td>$12</td>
<td>Until expended</td>
</tr>
<tr>
<td>Bioenergy Program for Advanced Biofuels</td>
<td>$15</td>
<td>Annually</td>
</tr>
<tr>
<td>Rural Energy for America Program</td>
<td>$50</td>
<td>Annually</td>
</tr>
<tr>
<td>Biomass Research and Development Initiative</td>
<td>$3</td>
<td>Annually</td>
</tr>
<tr>
<td>Biomass Crop Assistance Program</td>
<td>$20</td>
<td>Annually</td>
</tr>
</tbody>
</table>
### Section 9003 Biorefinery Assistance Program
#### Summary of 32 applications received, 2009 to 2012

<table>
<thead>
<tr>
<th>Number</th>
<th>Technology</th>
<th>Feedstock</th>
<th>Advanced Biofuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Anaerobic digestion</td>
<td>Animal manure, Municipal solid and food wastes</td>
<td>Renewable Natural Gas/Electricity (2008 FB definition)</td>
</tr>
<tr>
<td>5</td>
<td>Thermo-chemical (F-T and similar processes)</td>
<td>Woody Biomass, Municipal solid waste</td>
<td>Green diesel, Green gasoline, Aviation Fuel, F-T waxes</td>
</tr>
<tr>
<td>6</td>
<td>Biochemical (Enzymatic and steam hydrolysis)</td>
<td>Woody Biomass, Energy grasses, Crop residues</td>
<td>Cellulosic ethanol</td>
</tr>
<tr>
<td>3</td>
<td>Thermo-chemical/Bio-chemical hybrids</td>
<td>Woody Biomass, Municipal solid waste</td>
<td>Cellulosic ethanol</td>
</tr>
<tr>
<td>3</td>
<td>Lipid Hydro-cracking (UOP process)</td>
<td>Algae oil, non-food oilseeds (Camelina, high stearic canola), yellow grease, waste food oil</td>
<td>Hydro-treated Jet (HRJ), Hydro-treated Diesel(HRD), Naphtha</td>
</tr>
<tr>
<td>5</td>
<td>Traditional (methyl ester) biodiesel</td>
<td>Soy oil, yellow grease, waste food oils, reclaimed corn oil (ethanol distillers syrup)</td>
<td>Biodiesel</td>
</tr>
<tr>
<td>7</td>
<td>Others</td>
<td>Various</td>
<td>Anhydrous ammonia</td>
</tr>
</tbody>
</table>
Section 9003 - Biorefinery Assistance Program

Investments in “First of its kind” commercial production

• **Loan Note Guarantees issued:**
  - Sapphire Energy, Inc., New Mexico, $54.5 million
  - INEOS New Planet BioEnergy, Florida, $75 million
  - Fremont Community Digester, Michigan, $12.8 million

• **Conditional Commitments awarded:**
  - Zeachem, Oregon, $232.5 million
  - Fiberight, Iowa, $25 million
  - Fulcrum Sierra Biofuels, Nevada, $105 million
  - Chemtex, North Carolina, $99 million
FY 2014 Biorefinery Assistance Applications
NOFA closed January 30, 2014.

- 8 applications received;
- $510 million in loan guarantee authority requested;
- 5 States – Texas, Louisiana, Georgia, North Carolina, Florida;
- 5 Technologies:
  - 2 Green gasoline, diesel, and advanced aviation from woody biomass;
  - Cellulosic ethanol from algae;
  - 2 Anaerobic digesters using swine manure as principle feedstock;
  - Solid fuel pellets from woody biomass; and
  - 2 Biodiesel from waste greases and oils.
Section 9003 – Biorefinery Assistance Program

2014 Farm Bill Changes

• Name – “Section 9003 – Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program”

• Purpose -- Assist in the development of new and emerging technologies for the development of:
  – Advanced Biofuels
  – Renewable Chemicals
  – Biobased product manufacturing
Section 9003 – Biorefinery Assistance Program
2014 Farm Bill Changes

Renewable Chemical –

A monomer, polymer, plastic, formulated product, or chemical substance produced from renewable biomass.

- Renewable chemical implementation is not specified in the FB.
- Presently under agency review.
BioBased Product Manufacturing --

Development, construction, and retrofitting of technologically new commercial-scale processing and manufacturing equipment and required facilities that will be used to convert renewable chemicals and other biobased outputs of biorefineries into end-user products on a commercial scale.
Figure 1 - Framework for Execution: USDA Project Management for Integrated Biorefinery Projects

Project Initiation
- Pre-conceptual Design
- Conceptual Design

Definition
- Preliminary Design
- Application Process-Review

Execution
- Final Design
- Construction

Transition to Closeout
- Start-up, Shakedown, Commissioning and Operations
<table>
<thead>
<tr>
<th>Preliminary Design</th>
<th>Application Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Feasibility Study</td>
<td>• Eligibility Review</td>
</tr>
<tr>
<td>• Technical Report</td>
<td>• Financial Review</td>
</tr>
<tr>
<td>• Business Plan</td>
<td>• Technical Review</td>
</tr>
<tr>
<td>• Environmental Report (NEPA)</td>
<td>• Independent Review</td>
</tr>
<tr>
<td>• Standard Forms</td>
<td>• Executive Committee Review</td>
</tr>
<tr>
<td></td>
<td>• OMB Review</td>
</tr>
<tr>
<td></td>
<td>• Project Selection</td>
</tr>
<tr>
<td></td>
<td>• Conditional Commitment Letter</td>
</tr>
</tbody>
</table>
Best Project Management Practices with Independent Engineer

- Start-up
- Shakedown
- Commissioning
- Operations
Biomass Research Development Initiative

Biorefinery, Renewable Chemicals, Biobased Products Program

Rural Energy America Program

R&D
FIRST OF ITS KIND
COMMERCIAL REPLICATION
Scope

Biological
Bio Chemical
Thermo Chemical
Hybrids
Planning

- Pre planning
- Follow regulations & procedures
- Strict adherence to funding notice
- Observe guidelines
Technical Report

- Qualifications of Project Team
  - Agreements & Permits
  - Resource Assessment
    - Design
    - Engineering
    - Schedule
    - Procurement
    - Installation
  - Operations & Maintenance
    - Decommissioning
Risk Management

- Credit evaluation
- Subsidy model
Risk Mitigation

• Scale, Construction, and Monitoring
• Research & Development (bench)
• Pilot (semi works)
• Integrated Demonstration (scaled)
Regulatory

• Follow the regulations & procedures
• Exceptions not recommended
• Modifications are time consuming and costly
Programmatic

- Field Offices (State)
- Regional (4)
- Headquarters (DC)
NEPA

- Start early
- Cat X, Class 1, Class 2, EA
- Choose advisors well
- Utilize State and Headquarter Staff
Financial

- Business Plan
- Equity requirement
- Conditional commitment
Project Management

• Experience and depth
• Technical
• Financial
Project Team: Multidiscipline

- Science
- Technology
- Engineering
- Finance
- Management
Project Execution:
Teamwork - USG, NREL, Lender, IE, Business

- Weekly teleconference
- Quarterly meeting
- Annual review, comprehensive program review, and site inspection

- Pre-construction, construction, testing, commissioning, performance