

- 2007/2008/2009 Recommendations Status
- Travel Reimbursement – Chrissy Fagerholm:  
christina.fagerholm@ee.doe.gov
- Status of 2011 Nomination Process

# Future Meeting Dates (Tab 15)

- 2010 – December
  - Coordinate with Biomass R&D Board Meeting?
  
- 2011
  - Week of February 28 – March 4
  
  - Week of May 23 – May 27
  
  - Week of August 15 – August 19
  
  - Week of November 14 – November 18

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NOVEMBER						
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- DOE issued a Request for Information to solicit feedback on the summary report generated during the December 2009 Biopower Workshop:  
<https://www.fedconnect.net/FedConnect/> (Reference Number: DE-FOA-0000398 or search for “biopower”)
- Comments must be provided by **11:59pm EDT on September 30, 2010**

- Feedstock Sustainability Projects were selected at the end of FY10 to help design, model, and implement sustainable biomass production systems across different regions of the country, looking at a variety of feedstocks and critical factors like soil erosion and water quality.
  - **North Carolina State University**
    - Up to \$2,092,892 in DOE funding; total cost-shared project value is \$4,807,390
    - Project sites in Mississippi, Alabama, and North Carolina
    - Project Objectives:
      - Evaluate impacts on hydrology, water quality, wildlife, plant diversity, soil productivity, carbon budgeting, economics, and safety of biomass feedstock cultivation
      - Investigate biomass production options compatible with forest management with a focus on pine and switchgrass intercropping
  - **Purdue University**
    - Up to \$1,592,385 in DOE funding; total cost-shared project value is \$1,991,177
    - Project Objectives:
      - Conduct a sustainability assessment of multiple species of energy crops including miscanthus, switchgrass, and hybrid poplar, and examine the impacts of removing of crop residues within two watersheds representative of conditions in the Upper Midwest
      - Gauge sustainability in relation to soil erosion, biomass yield, and aquatic biodiversity impacts and develop methods to optimize watershed landscapes to improve water quality and associated ecosystem services
  - **University of Minnesota**
    - Up to \$790,943 in DOE funding; total cost-shared project value is \$999,473
    - Project Objectives:
      - Analyze the Mississippi River watershed using a set of models to help stakeholders make informed decisions about what bioenergy feedstocks to use, where to produce or collect them, and what environmental impacts they will have in terms of climate change or other environmental shifts
      - Estimate the biophysical and economic impacts of different placements of feedstock production operations on the landscape in order to maximize net benefits returned to farmers, biorefineries, and the public

- DOE will invest up to \$12 million over three years for four projects to advance technologies for the thermochemical conversion of biomass into advanced biofuels that are compatible with existing fueling infrastructure.
  - **W. R. Grace & Company (MD) - New Technology for Processing Bio-oils to Produce Gasoline, Diesel and Jet Fuels - up to \$3.3 million**
    - Evaluate a specialized catalytic reactor designed to resist corrosion and extend catalyst life
    - Demonstrate the use of a single catalyst charge and reactor apparatus for more than 1000 operating hours to evaluate and improve the performance and lifetimes of pyrolysis catalysts and reactors
  - **Pacific Northwest National Laboratory (WA) - Catalytic Deoxygenation of Pyrolysis Oils - up to \$3.1 million**
    - Collaborate with Albemarle Corporation and UOP LLC, a Honeywell Company in a three-year project to develop better processes to upgrade pyrolysis oil to hydrocarbon fuels
    - Produce hydrocarbon fuels from bio-oil that are interchangeable with gasoline, diesel or jet fuels produced from petroleum
    - Develop an integrated and stable catalytic deoxygenation process for converting bio-oil to drop-in fuels
    - Investigate catalyst and process parameters that lead to increased process performance over time to enable extended operations in future commercial-scale refineries.
  - **Gas Technology Institute (IL) - Long-Term Processing in the Production of Gasoline and Diesel from Biomass - up to \$2.4 million**
    - Demonstrate long-term processing and catalyst stability in an automated, integrated pilot plant that converts biomass directly to gasoline and diesel fuel
    - Three feedstocks will be tested in the project: wood, corn stover, and lemna, a type of aquatic plant
  - **Battelle Memorial Institute (OH) - Upgrading of Biomass Fast Pyrolysis Oil - up to \$3.2 million**
    - Develop catalysts and an integrated process tailored to upgrade pyrolysis bio-oil
    - Test a novel commercialization model for the technology, by embedding it in small-scale, factory-built systems deployed widely where biomass is available at low cost

- NIFA has posted full application FOA:

<http://nifa.usda.gov/fo/biomassresearchanddevelopmentinitiative.cfm>

- Note: Only open to those who submitted pre-applications and were invited to submit full applications
- Proposals to be submitted by **November 17**
- Awards anticipated to be announced in early 2011

# OBP Overview Slides



**The Biomass Program is working to advance biomass technologies in support of DOE's mission to strengthen America's energy security, environmental quality, and economic vitality through:**

**Crosscutting Activities**  
Analysis, Sustainability, Strategic Partnerships, Stakeholder Communications and Outreach



**Feedstocks**

**Conversion technologies**

**Integrated biorefineries**

**Infrastructure**

**Biopower**

**Advanced biofuels**

Developing lower cost feedstock logistics systems

Improving conversion efficiencies and costs

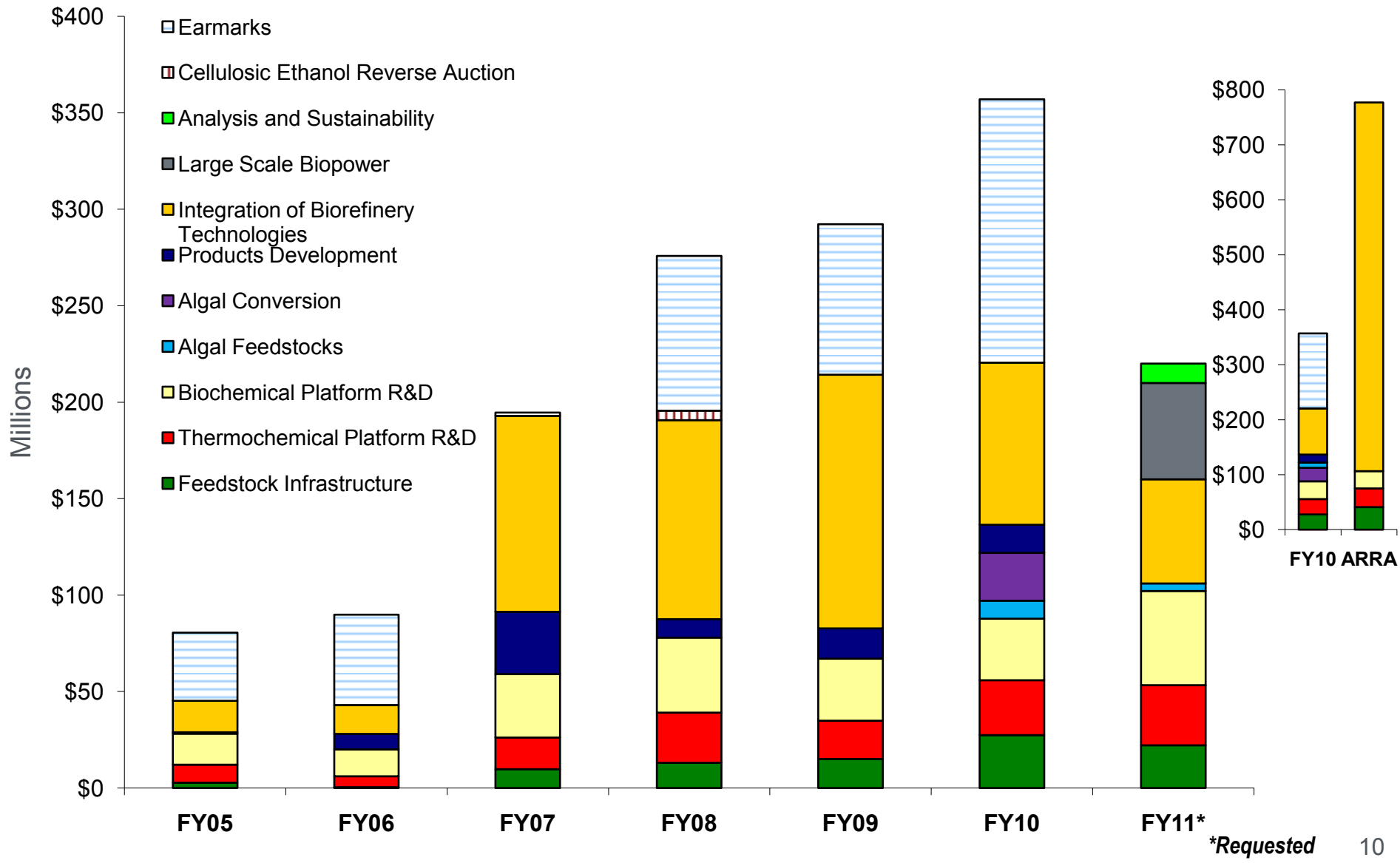
Systematically validating and deploying technology at first-of-a-kind facilities

Evaluating vehicle emissions, performance, and deployment options

Providing a clean, domestic, dispatchable renewable source of power

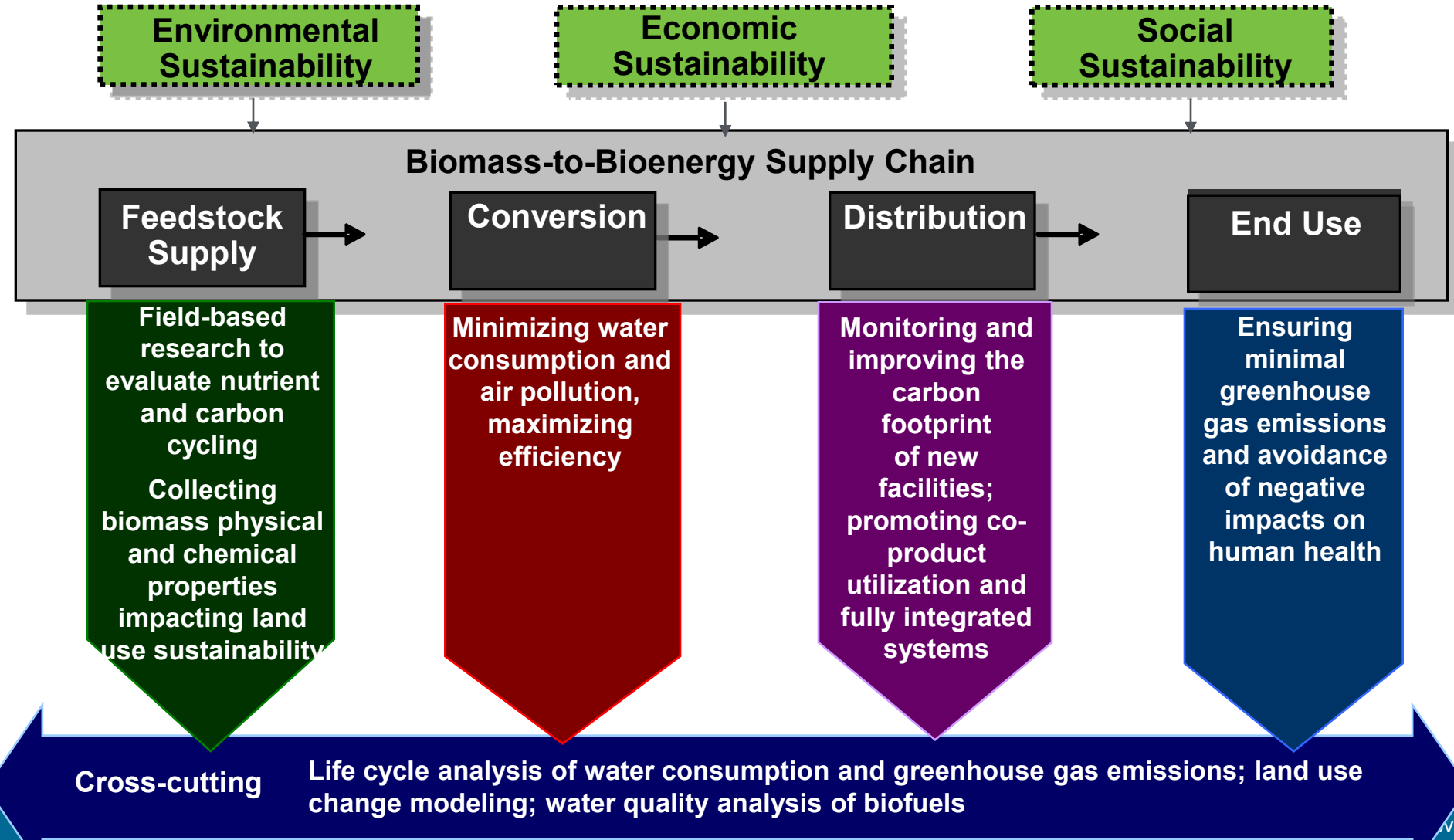
Expanding portfolio beyond cellulosic ethanol to hydrocarbon fuels

# Biomass Program Budget

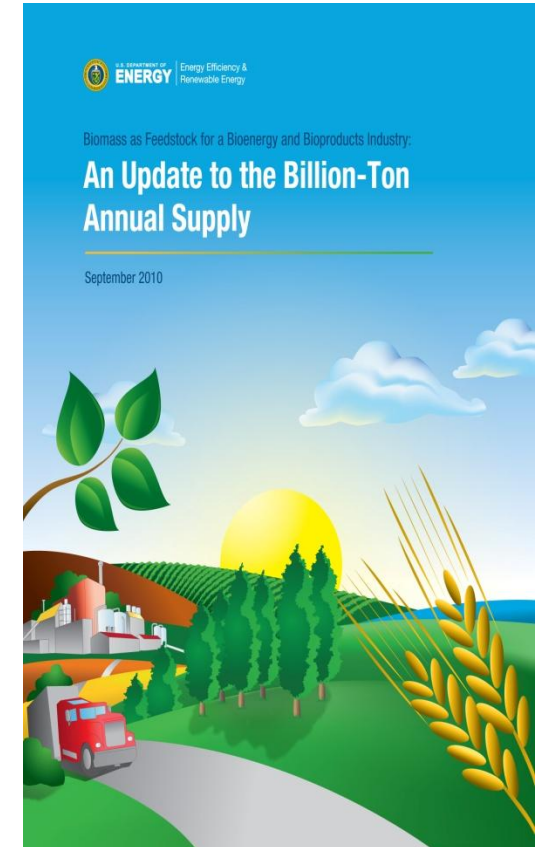


# Our Commitment to Sustainability

Develop and invest in the resources, technologies, and systems needed for biofuels to grow in a way that enhances the health of our environment and protects our planet.



- Update to the 2005 Billion Ton Study
  - County-level inventory and costs for all major feedstocks
  - Used POLYSYS agriculture and new forestry economic models
  - Added sustainability criteria
  - Data and maps to be available in KDF
  - Expected publication in early 2011 (currently undergoing peer and DOE review)
  - Workshops to gain industry perspective were held in December 2009
- Future Work
  - Focus on identifying sustainability and feedstock quality criteria and eventually incorporating into resource assessments
  - Intend for primary dissemination of information to be via KDF



# Feedstock Production R&D

## Regional Biomass Energy Feedstock Partnership Bioenergy Crop Trials

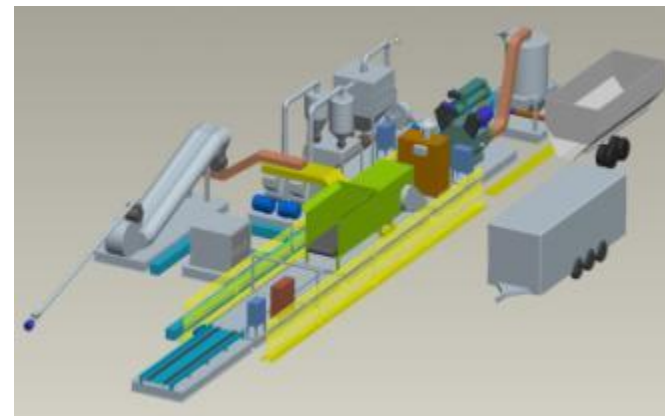


- **Ongoing feedstock logistics projects are developing systems to better handle and deliver high tonnage biomass feedstocks (August 2009 awards)**

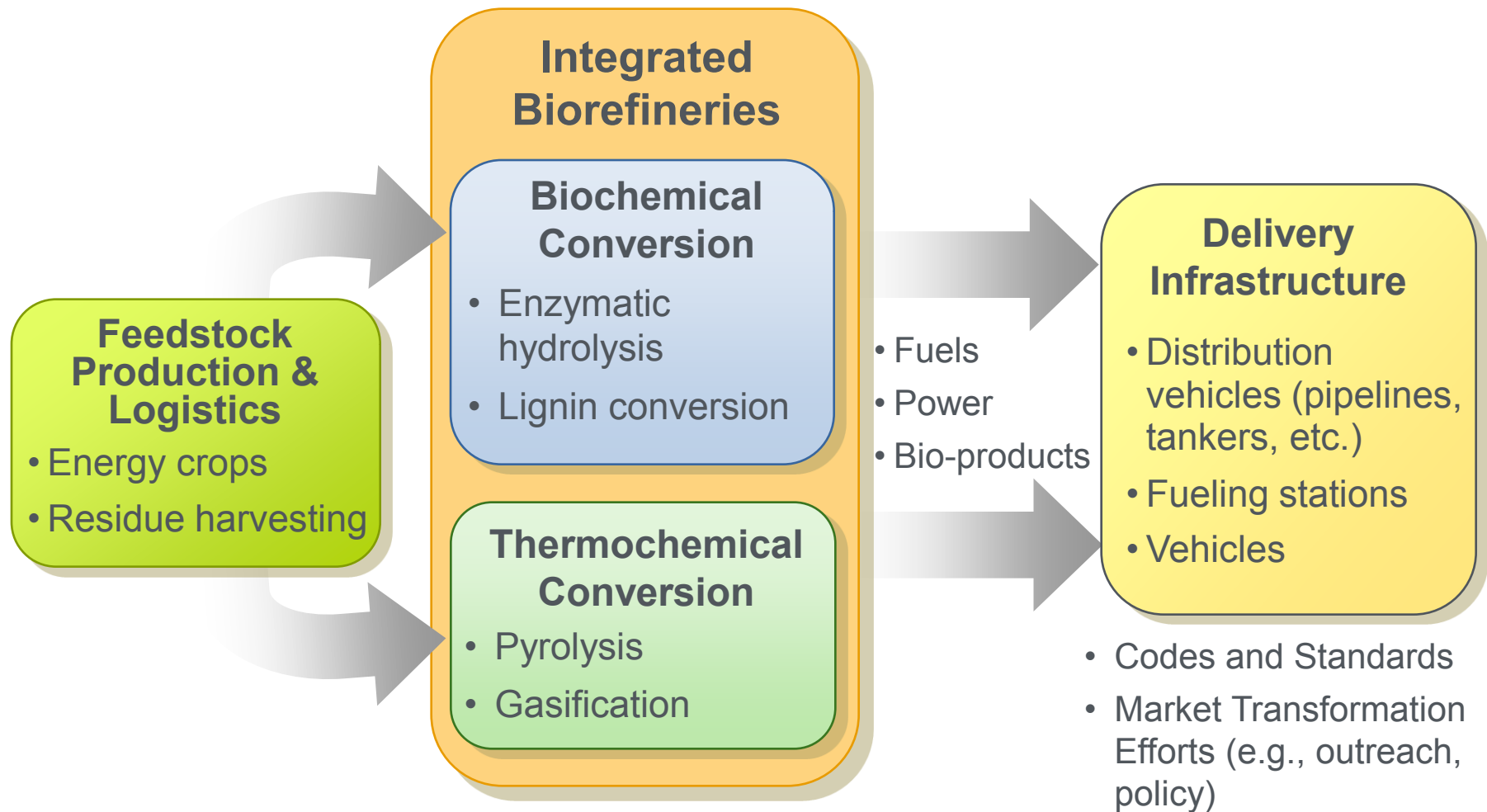
- Agco Corporation of Duluth, GA (up to \$5 million) for agricultural residues
- Auburn University of Auburn, Alabama (up to \$4.9 million) for woody biomass
- FDC Enterprises Inc. of Columbus, Ohio (up to \$4.9 million) for energy crops
- Genera Energy, LLC of Knoxville, Tennessee (up to \$4.9 million) for energy crops
- The SUNY College of Environmental Science and Forestry of Syracuse, New York (up to \$1.3 million) for woody biomass

- **Deployable Process Demonstration Unit (PDU) to bridge gap between producers and refineries**

- The PDU will allow biorefinery partners to test supply system concepts and reduce feedstock supply risks and allow equipment partners to test new designs and deploy new technologies in the context of an integrated supply system.
- Will produce engineered feedstocks that meets commodity-scale performance metrics and advanced conversion characteristics.

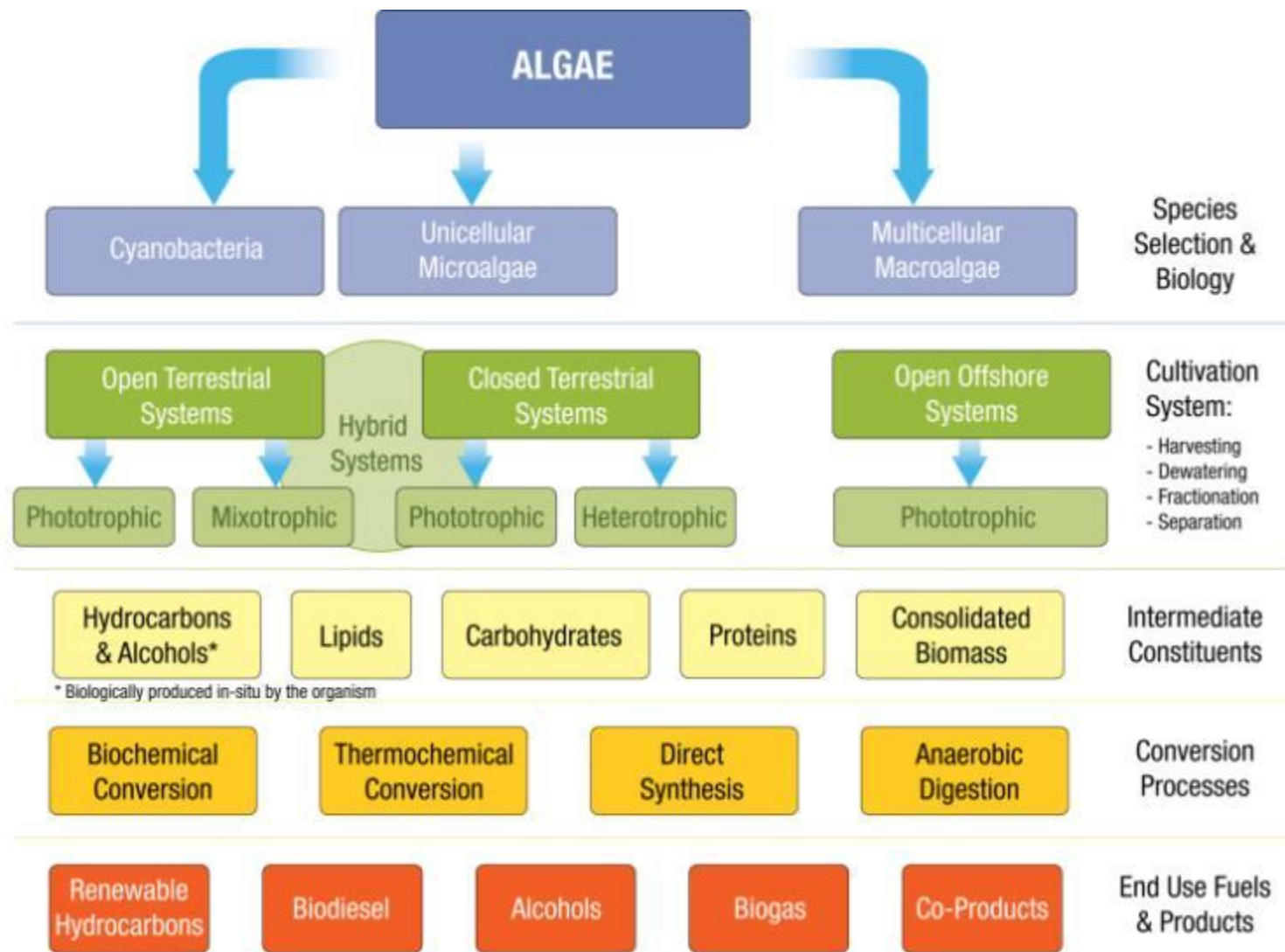


# Exploring Routes to Convert Biomass



**Success relies on simultaneous development of the supply, conversion, and demand infrastructures for cellulosic ethanol.**

# Algal Biofuels: Range of Feedstocks, Systems, Processes, and Products





# Integrated Biorefinery (IBR) Description

IBR Scale	Description	Feedstocks	Fuel/Product
<b>R&amp;D</b> <b>2 projects</b>	Includes R&D and a preliminary engineering design	Poultry Fat, Woody Biomass, Ag Residue, Algal Oil	Renewable Fuels, Renewable Gasoline, Renewable Diesel
<b>Pilot Scale</b> <b>12 projects</b>	Processes a minimum of 1 dry tonne per day biomass and verifies the integrated performance of the given suite of technologies from both a technical and an economic perspective for the first time	Algae, CO <sub>2</sub> , Woody Biomass, Sweet Sorghum, Corn Stover, Switchgrass, Energy Sorghum, Ag and Forestry Residue, Hybrid Poplar	Ethanol, Cellulosic Ethanol, Renewable Diesel, Jet Fuel, Renewable Diesel
<b>Demonstration Scale</b> <b>9 projects</b>	Working with projects to verify technologies from a technical and an economic perspective at a scale sufficient for a commercial facility	Wheat Straw, Corn Stover, Poplar Residues, Woody Biomass, Algae, Mill Residues, MSW, Ag and Forestry Residue	Cellulosic Ethanol, Renewable Sulfur-Free Diesel Fuel, Renewable Hydrocarbon Based Fuel, Renewable Gasoline, Renewable Diesel, Jet Fuel, Succinic Acid
<b>Commercial Scale</b> <b>6 projects</b>	Processes a minimum of 700 dry tonnes per day biomass and refers to a first-of-a-kind or "beta" commercial facility	Lignocellulosic Biomass, Corn Cobs, Woody Biomass, Mill Waste, Sorted MSW	Cellulosic Ethanol, Ethanol, Methanol



# Integrated Biorefinery Projects



- PROJECT SCALE**
- Research and Development
  - Pilot
  - Demonstration
  - Commercial

*Locations approximate*

**For more information visit:**  
[http://www.eere.energy.gov/biomass/integrated\\_biorefineries.html](http://www.eere.energy.gov/biomass/integrated_biorefineries.html)

Launch a new DOE initiative to accelerate, develop and deploy advanced biopower technologies over the next six years. Initiative will establish partnerships with industry and support efforts to:

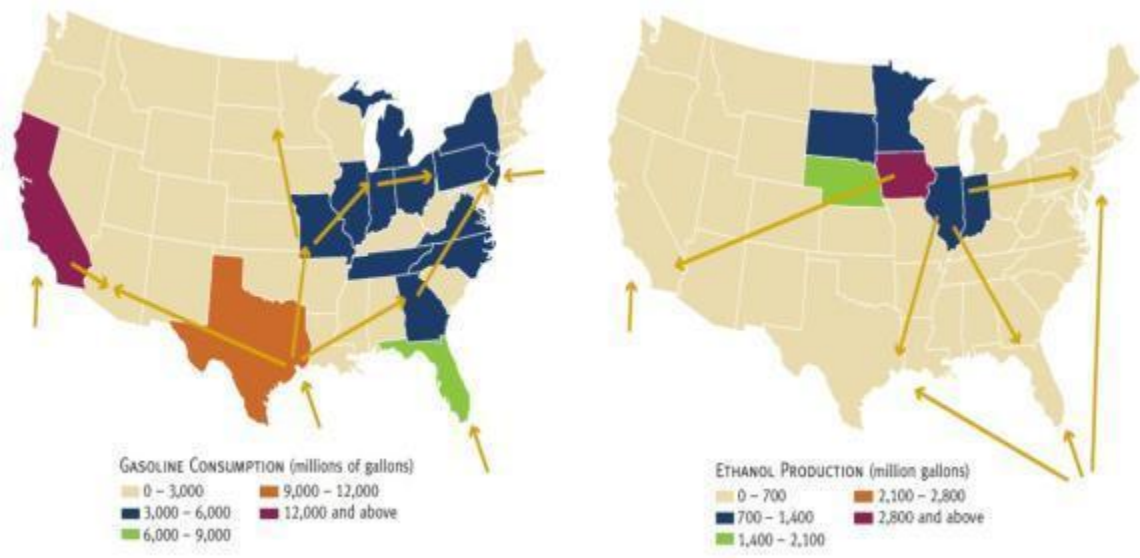
- Conduct R&D on advanced pretreatment and conversion technologies by 2013
  - increase overall efficiency
  - improve environmental performance
  - decrease cost of biopower electricity
- Support pilot scale projects up to 30 MW
- Demonstrate utility scale, biomass repowering and high percentage co-firing (up to 25% biomass) with coal by 2016



Working with DOE Vehicle Technologies, and various offices at DOT, Infrastructure activities include:

- Research on the effects of Intermediate Ethanol Blends (E15 and E20)
- Deploying E85/Blender Pumps at retail stations nationwide
- Testing pipeline compatibility issues and analyzing the feasibility of a new dedicated pipeline
- Research on the testing, certification, and approval for commercial use of new biofuels and biofuels blends

## Distribution Patterns – Gasoline and Ethanol\*



**Whereas petroleum infrastructure is designed largely to transport gasoline from the Gulf Coast toward the interior of the country, ethanol must be transported from the Midwest to major product demand centers along East and West Coast of the United States.**

\*Task Force on Biofuels Infrastructure, National Commission on Energy Policy, April 14, 2009.

# Key Stakeholder Relationships

## DOE Bioenergy Research Centers (BRCs)



Targeting breakthroughs in biofuel technology to make abundant, affordable, low-carbon biofuels a reality by:

- Developing novel enzymes for switchgrass degradation at the Joint BioEnergy Institute (LBNL)
- Reducing the cost of pretreatment requirements through the use of thermophilic microbes and/or enzymes for the conversion of biomass at the Bioenergy Science Center (ORNL)
- Understanding soil microbial community structure for biomass crop growth on marginal lands at the Great Lakes BioEnergy Research Center (Univ. of WI)



- Vehicle Technologies Program :  
<http://www1.eere.energy.gov/vehiclesandfuels/index.html>
- Clean Cities Program: <http://www1.eere.energy.gov/cleancities/>
- Office of Science: <http://www.science.doe.gov/>