



The International Biofuels Scene

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Advancing Presidential Objectives

Science & Discovery

- Connecting basic and applied bioscience
- Conducting breakthrough R&D

Economic Prosperity

- Creating jobs and reinvigorating rural economies
- Supporting the emerging U.S. bioenergy industry and market

Climate Change

- Reducing GHG emissions by 60% for cellulosic biofuels and 50% with advanced biofuels
- Validating and demonstrating low-carbon power generation technologies
- Influencing development of criteria and indicators for sustainable biofuel production

Clean, Secure Energy

- Developing & demonstrating advanced biofuels technologies



R&D Priorities

- Achieving biofuel cost targets (modeled)
 - <\$2/gal for cellulosic ethanol;
 - <\$3 for cellulosic drop-ins
- Developing bio-power and bio-products for important supporting roles
- Meeting the EISA Renewable Fuel Standard
- Investing to meet targets (~\$200M/yr)

Moving Markets

- Close collaboration with USDA, EPA, DoD
- Pilot and commercial demonstrations
- Infrastructure for delivery (including fuel dispensers)
- Subsidies & other policy drivers

Research, Development, and Demonstration

Feedstocks

Biochemical and
Thermochemical
Conversion

Biopower
Biofuels
Bioproducts

Integrated
Biorefineries

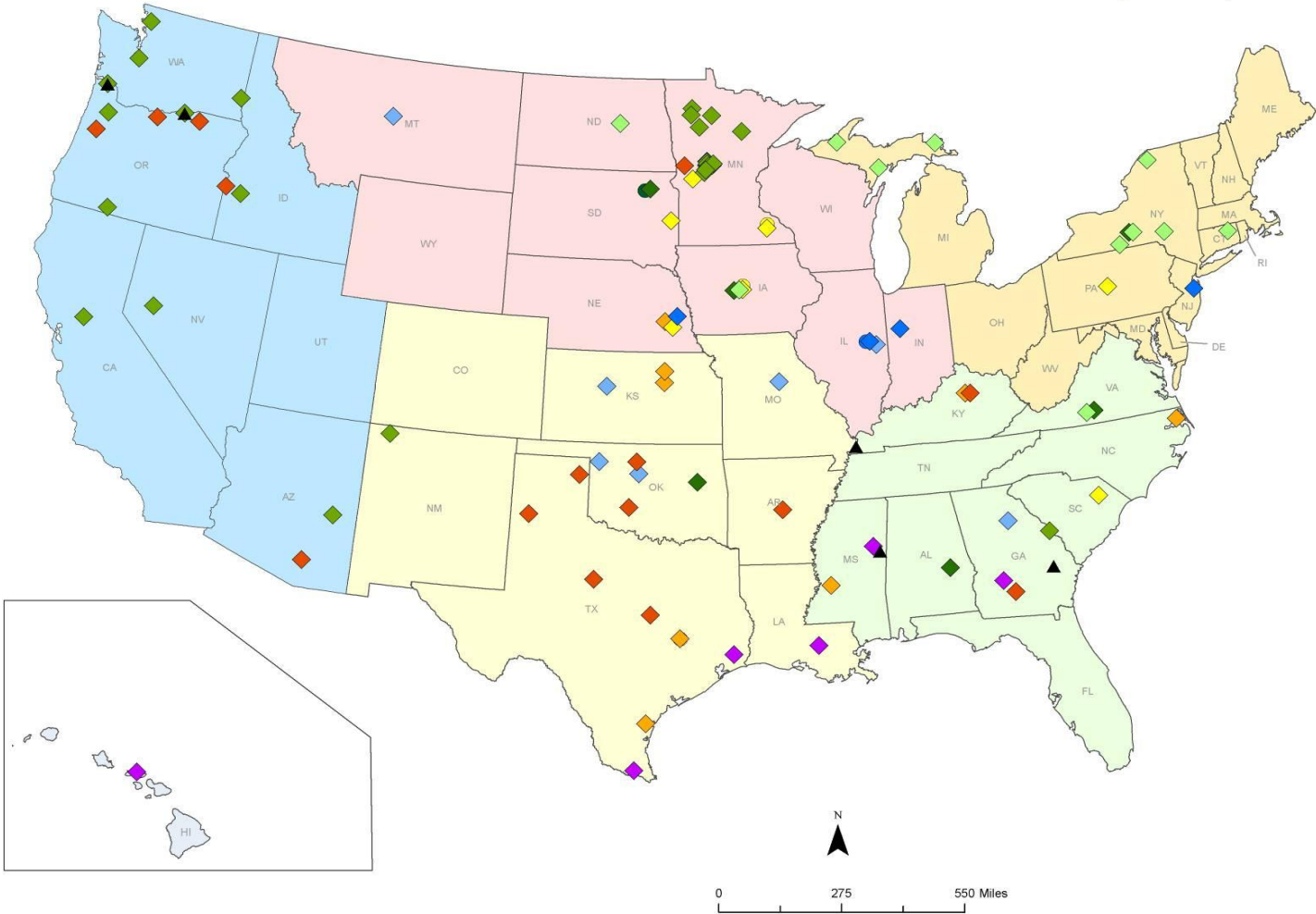
Infrastructure

Crosscutting Activities

Analysis; Sustainability; Partnerships, Communications, and Outreach

Feedstock Supply R&D

Regional Feedstock Bioenergy Crop Trials



Feedstock

- ◆ Corn Stover (7)
- ◆ Sorghum (7)
- ◆ Cereal Crops (20)
- ◆ Energycane (7)
- ◆ Switchgrass (5)
- ◆ Poplar (29)
- ▲ Poplar, Proposed (5)
- ◆ Willow (11)
- ◆ Miscanthus (5)
- ◆ CRP (6)

Sustainability Sites

- Corn Stover (2)
- Sorghum (1)
- Switchgrass (1)
- Miscanthus (1)

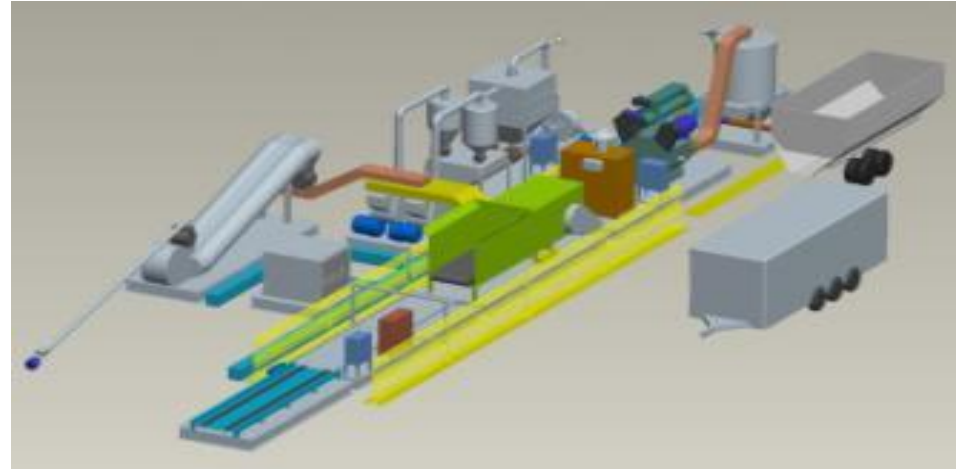
Regions

- Western
- North Central
- South Central
- Northeast
- Southeast

http://www1.eere.energy.gov/biomass/pdfs/field_trials_map2v2.pdf

Five projects selected August 2009 to design and demonstrate systems to handle:

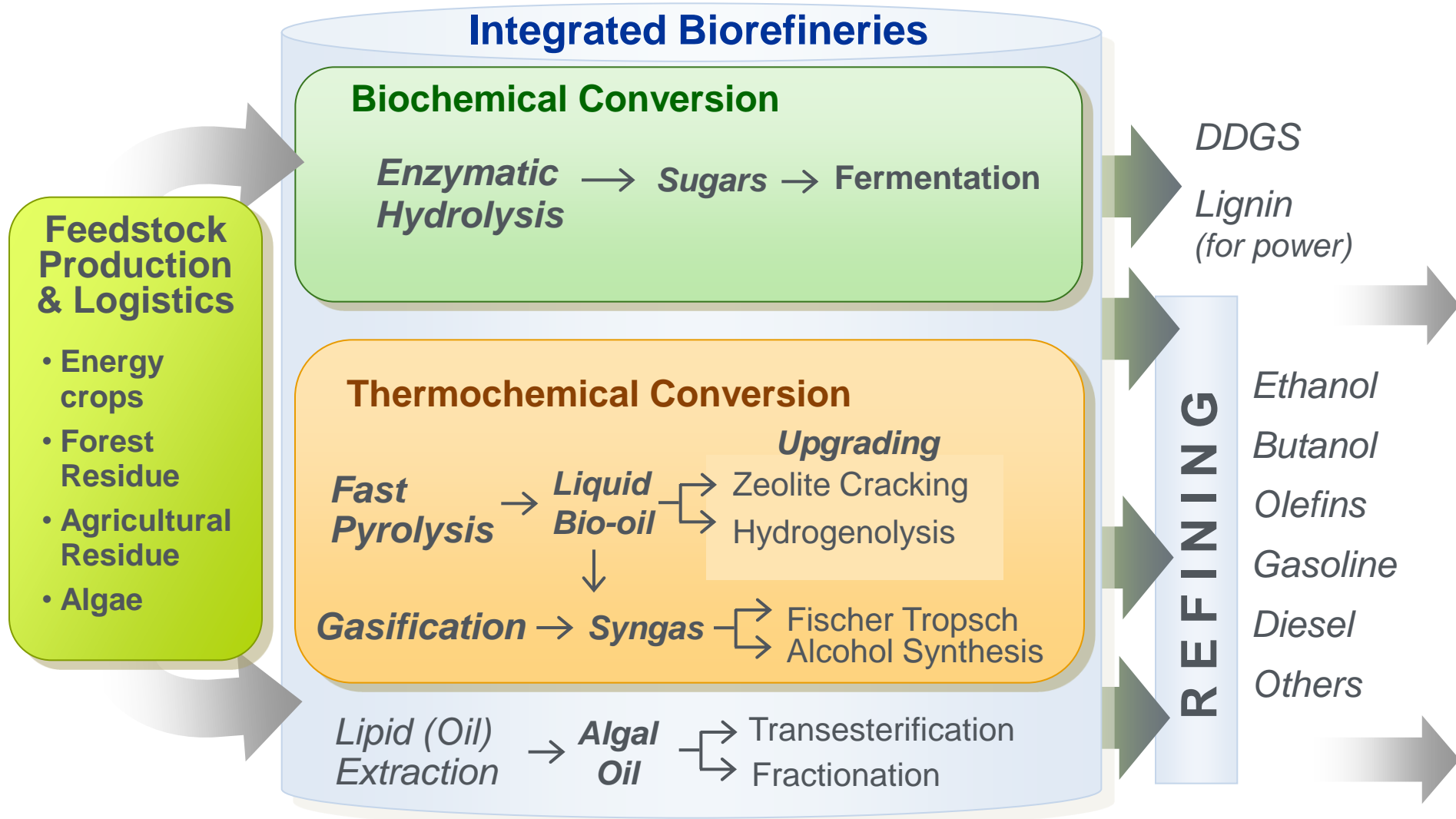
- Harvesting
- Collection
- Preprocessing
- Transport
- Storage



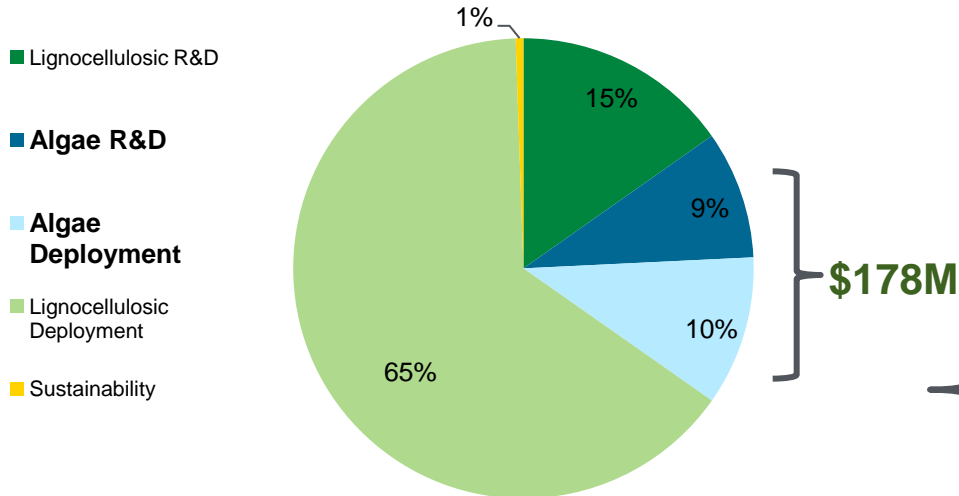
Development of the Deployable Process Demonstration Unit (PDU) will help bridge gap between producers and refineries

- Test supply system concepts, new equipment designs, and deploy new technologies
- Produce engineered feedstocks to meet commodity-scale performance metrics and advanced conversion characteristics

Exploring Routes to Convert Biomass

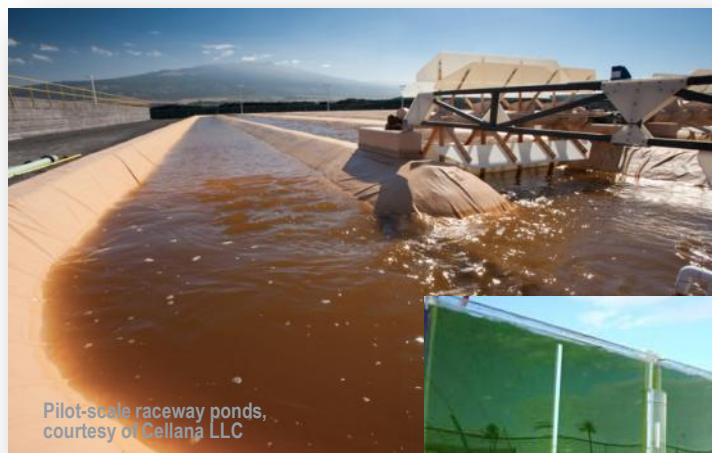


Biomass Program 2010 Budget* \$938M



*2010 appropriations and ARRA funds

- Feedstock production and crop protection: R&D consortia, 3 integrated biorefinery (IBR) projects, Sandia Laboratory project
- Energy efficient harvesting and drying: R&D consortia, 3 IBR projects, INL project
- Extraction, conversion, and product purification: R&D consortia, 3 IBR projects, NREL and PNNL projects
- Siting and sustainability of resources: National Academies of Science study, 3 IBR projects; ANL, PNNL, and ORNL projects



- **29 R&D, pilot, demonstration and commercial scale projects selected to validate IBR technologies**
- **Diverse feedstocks represented**

- Agricultural Residues
- Energy Crops
- Algae/CO₂
- Forest Resources
- Municipal Solid Waste
- Non-edible oils



- **A variety of transportation fuels, biobased products, and biopower will be developed**

- Cellulosic Ethanol
- Butanol
- Methanol
- Renewable Gasoline
- Renewable Diesel
- Jet Fuel
- Biodiesel
- Biobased Chemicals
- Process heat and steam
- Electricity



OBP International Priorities and Goals:

- Accelerate progress toward biofuels research and development (R&D) goals
- Reduce global greenhouse gas emissions and reliance on oil
- Promote industry partnerships and economic development



Scope of International Work:

- **Collaborative activities span our scope of research priorities** - sustainability, analysis, feedstocks, algae, biochemical and thermochemical conversion, and integrated biorefineries
- **Partnerships cover several regions of the world** - Asia, Middle East, South America, North America, and Europe.
 - Asia: China, India, Japan
 - Middle East: Israel
 - South America: Brazil
 - North America: Canada
 - European Union: Finland, Sweden, France
- **Engaged in key multilateral forums** - International Energy Agency (IEA), the Global Bioenergy Partnership (GBEP), International Panel on Climate Change (IPCC), the Asia Pacific Economic Cooperation (APEC), and the Roundtable on Sustainable Biofuels (RSB)

Current U.S. Partners Include:

- NREL, PNNL, INL, ORNL, ANL, SNL