



U.S. Department of Energy
Energy Efficiency and Renewable Energy

biomass program

DOE/ARS Collaboration in Bioenergy Research

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Office of the Biomass Program

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- Advanced Energy Initiative
 - Reduce dependence on foreign sources of oil by addressing how we power our automobiles and homes
 - Make cellulosic ethanol cost competitive by 2012
 - Includes vehicle efficiency and solar components (i.e. Solar America Initiative)
- 20 in 10
 - Increase supply of renewable and alternative fuels
 - Set Alternative Fuels Standard (AFS) at 35 billion gallons per year by 2017
 - 5X the current Renewable Fuels Standard for 2012
 - **15%** of projected annual gasoline use in 2017
 - Increase vehicle efficiency
 - Reform and modernize CAFÉ
 - **5%** of projected annual gasoline use in 2017



- Office of Science Bioenergy center selection
 - DOE BioEnergy Science Center led by DOE's Oak Ridge National Laboratory in Oak Ridge, Tennessee
 - DOE Great Lakes Bioenergy Research Center led by the University of Wisconsin in Madison, Wisconsin, in close collaboration with Michigan State University in East Lansing, Michigan
 - DOE Joint BioEnergy Institute led by DOE's Lawrence Berkeley National Laboratory
- 932 Selection
 - Six commercial Integrated Biorefineries selected
 - \$53 million in FY 2007 budget request
- 10% validation projects: One-tenth to one-fifth of the projected scale of a first-commercial facility
 - Integrated biorefinery demonstrations using cellulosic feedstocks and producing a combination of fuels, chemicals, and substitutes for petroleum-based feedstocks and products
- E85 optimization



- Biomass R&D Board, co-chaired by DOE and USDA has been meeting monthly since May.
 - Includes Senior Management Membership (12) from 10 agencies: USDA (2), DOE (2), DOT, EPA, NSF, DOI, DOC, Treasury, OFEE, OSTP
- Focus of meeting discussions has been on breaking down the implementation barriers to the President's 20 in 10. Informal interagency teams have been established in these areas:
 - Feedstocks – USDA lead
 - Infrastructure – DOT lead
 - Distribution (via intermediate blends) – DOE and EPA co-lead
 - Policy – Treasury lead
- The Board has committed to developing a draft action plan by the end of the year that will focus on near term interagency collaboration.
- Biomass R&D Technical Advisory Committee released an update to their vision last year and will release the update to the roadmap in October.
 - www.brdisolutions.com/default.aspx

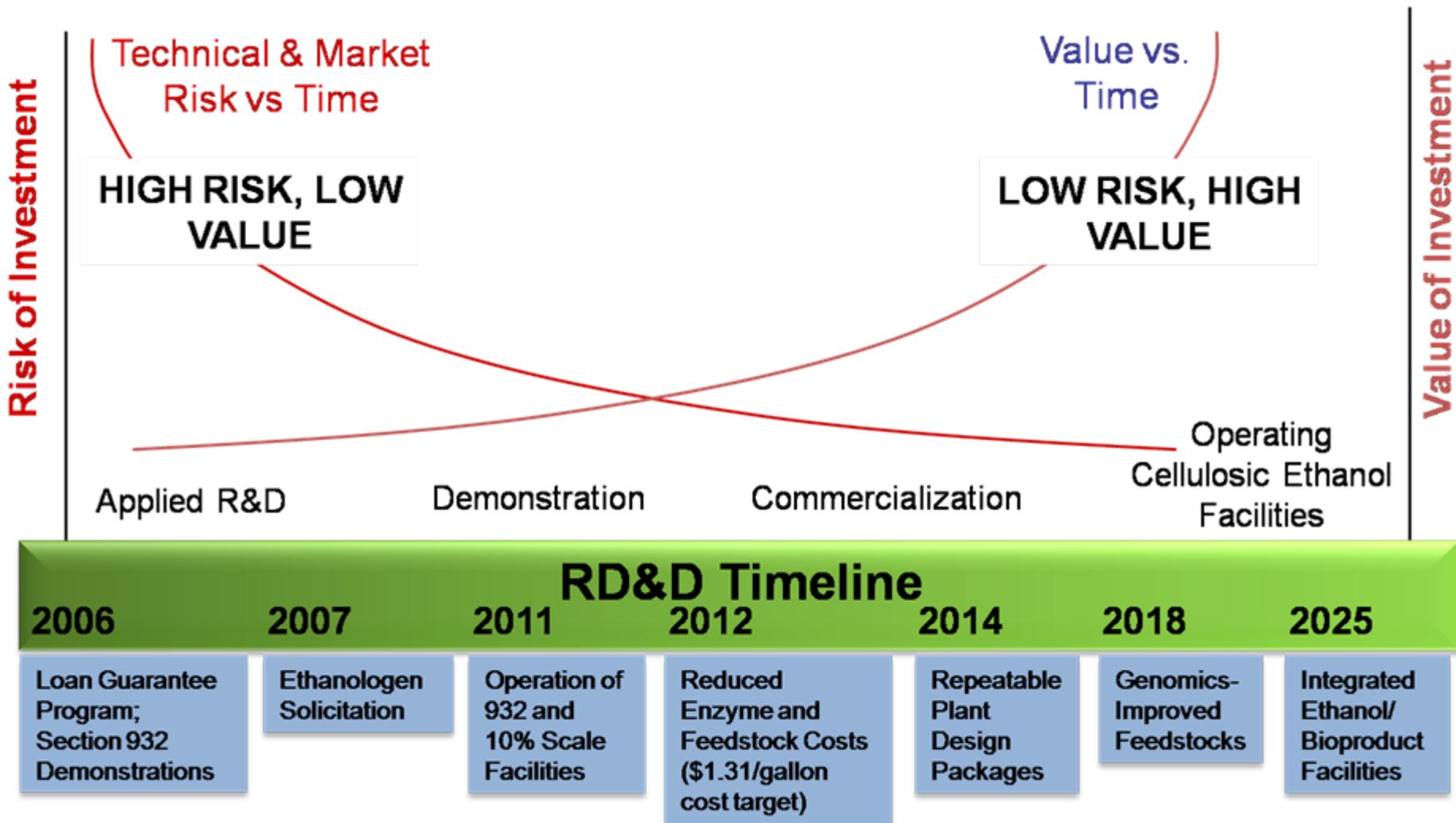


Biennial peer review includes a review of all DOE-funded projects, crosscutting activities, and overall program strategy

- Platform reviews conducted
 - Feedstocks, Conversion, Biorefineries, Infrastructure, Other
- Program Review November 15-16 in Baltimore, MD
 - Details/registration at: <http://obpreview07.govtools.us>
 - Peer review report publicly available Spring 2008

The Biomass Multi-Year Program Plan is being updated to reflect the President's "20 in 10" strategy; available in October

The Biomass Program is continuing strategic planning to develop plans for biofuels other than cellulosic ethanol that can contribute to the President's goals and evaluate bioproducts and biopower.





Biomass Program

Develop cost competitive biomass technologies to enable the production of biofuels nationwide and reduce dependence on oil through the creation of a new domestic bioindustry supporting the President's goal to reduce gasoline use 20 percent by 2017.

Feedstocks

In partnership with USDA and other key stakeholders, develop sustainable technologies to provide a secure, reliable and affordable cellulosic and sustainable biomass supply for the U.S. bioindustry.

\$10 m

Conversion

Develop technologies for converting feedstocks into cost-competitive commodity liquid fuels, like ethanol, as well as bioproducts and biopower.

Biochem: \$67 m
Thermochem: \$17 m

Integrated Biorefineries

Through public-private partnerships, demonstrate and validate technologies that can be integrated into processes and achieve commercially accepted cost and performance proforma targets.

\$99 m

Infrastructure

Enable the deployment of ethanol through a nationwide strategy for a higher ethanol blend (minimum E15) and regional E85.

\$5 m

2007 funding levels

Cross-cutting Form alliances with USDA, other federal and state agencies, and stakeholder organizations to improve understanding of biofuel technologies; conduct outreach to foster market transformation; and understand and address issues of environment, health and safety. Provide underlying research to enable codes and standards development for the safe use of renewable fuels in all applications.



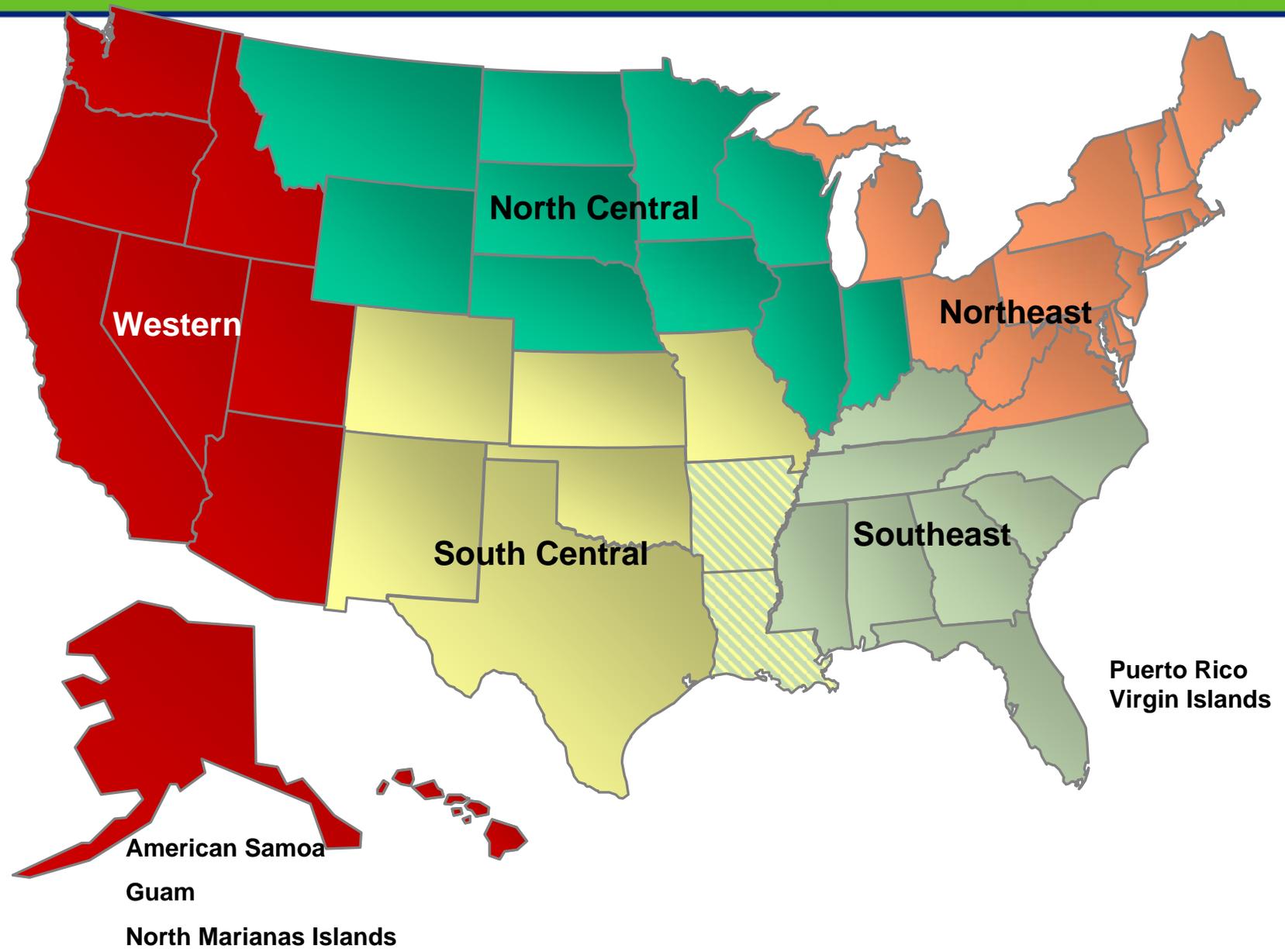
- Regional feedstock partnership program
 - Sustainable corn stover removal
 - Energy crop plantings
- Monthly seminars/discussions between DOE labs, ARS labs, and universities about thermochemical conversion
- ARS sponsorship and co-chair of Symposium on Biotechnology for Fuels and Chemicals
- Participation in program and platform reviews
 - OBP program review
 - November 13-15, Washington, DC



- Developed in response to the Advanced Energy & 20 in 10 Initiatives
- Will facilitate the development of sustainable biomass resources on a regional basis in order to fulfill the potential contribution toward meeting the 1.3 Billion Ton Biomass Goal by conducting resource assessments by feedstock types and regions
- Includes participants from Sun Grant Initiative universities, National Biomass State & Regional Partnership organizations, DOE, DOE National Labs, USDA, other academia, industry, environmental organizations, farm groups, etc.



Regional Feedstock Partnerships





DOE-OBP	USDA-ARS
Integrated biorefinery approach	Feedstock development and production
Large-scale deployment	Small-scale (farm level)
Centralized processing (and logistics)	Distributed energy production
Sustainable biomass and biofuels production	Sustainable biomass production
Transportation	Bio-energy and co-products



- DOE OBP already heavily partnered with ARS
- Partnership vital for achieving goals and milestones related to federal bioenergy initiatives
- Strategic planning and program review benefit greatly from ARS involvement



- Office of the Biomass Program Website:
<http://www1.eere.energy.gov/biomass/>
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- EXTRA



- **BlueFire Ethanol, Inc. of Irvine, California, up to \$40 million**
 - The proposed plant will be in Southern California. The plant will be sited on an existing landfill and produce about 19 million gallons of ethanol a year. As feedstock, the plant would use 700 tons per day of sorted green waste and wood waste from landfills.
 - BlueFire Ethanol, Inc. investors/participants include: Waste Management, Inc.; JGC Corporation; MECS Inc.; NAES; and PetroDiamond.
- **Broin Companies of Sioux Falls, South Dakota, up to \$80 million**
 - The plant is in Emmetsburg (Palo Alto County), Iowa, and after expansion, it will produce 125 million gallons of ethanol per year, of which roughly 25percent will be cellulosic ethanol. For feedstock in the production of cellulosic ethanol, the plant expects to use 842 tons per day of corn fiber, cobs, and stalks.
 - Broin Companies participants include: E. I. du Pont de Nemours and Company; Novozymes North America, Inc.; and DOE's National Renewable Energy Laboratory.



- **logen Biorefinery Partners, LLC, of Arlington, Virginia, up to \$80 million**
 - The proposed plant will be built in Shelley, Idaho, near Idaho Falls, and will produce 18 million gallons of ethanol annually. The plant will use 700 tons per day of agricultural residues including wheat straw, barley straw, corn stover, switchgrass, and rice straw as feedstocks.
 - logen Biorefinery Partners, LLC investors/partners include: logen Energy Corporation; logen Corporation; Goldman Sachs; and The Royal Dutch/Shell Group.
- **Range Fuels (formerly Kergy Inc.) of Broomfield, Colorado, up to \$76 million**
 - The proposed plant will be constructed in Soperton (Treutlen County), Georgia. The plant will produce about 40 million gallons of ethanol per year and 9 million gallons per year of methanol. As feedstock, the plant will use 1,200 tons per day of wood residues and wood based energy crops.
 - Range Fuels investors/participants include: Merrick and Company; PRAJ Industries Ltd.; Western Research Institute; Georgia Forestry Commission; Yeomans Wood and Timber; Truetlen County Development Authority; BioConversion Technology; Khosla Ventures; CH2MHill; Gillis Ag and Timber.



- **Abengoa Bioenergy Biomass of Kansas, LLC of Chesterfield, Missouri, up to \$76 million**
 - The proposed plant will be located in the state of Kansas. The plant will produce 11.4 million gallons of ethanol annually and enough energy to power the facility, with any excess energy being used to power the adjacent corn dry grind mill. The plant will use 700 tons per day of corn stover, wheat straw, milo stubble, switchgrass, and other feedstocks.
 - Abengoa Bioenergy Biomass investors/participants include: Abengoa Bioenergy R&D, Inc.; Abengoa Engineering and Construction, LLC; Antares Corp.; and Taylor Engineering.
- **ALICO, Inc. of LaBelle, Florida, up to \$33 million**
 - The proposed plant will be in LaBelle (Hendry County), Florida. The plant will produce 13.9 million gallons of ethanol a year and 6,255 kilowatts of electric power, as well as 8.8 tons of hydrogen and 50 tons of ammonia per day. For feedstock, the plant will use 770 tons per day of yard, wood, and vegetative wastes and eventually energycane.
 - ALICO, Inc. investors/participants include: Bioengineering Resources, Inc. of Fayetteville, Arkansas; Washington Group International of Boise, Idaho; GeoSyntec Consultants of Boca Raton, Florida; BG Katz Companies/JAKS, LLC of Parkland, Florida; and Emmaus Foundation, Inc.