



National Institute of Food and Agriculture
www.nifa.usda.gov

Biomass Research and Development Initiative (BRDI)

Briefing for Biomass R&D TAC

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Overview

- **NIFA Bioenergy Portfolio**
- **Agriculture Food and Research Initiative**
- **BRDI**
- **Measuring sustainability**
- **Concurrent BRDI Activities**



NIFA Bioenergy/Products Portfolio

- Joint DOE/USDA Plant Feedstock Genomics Program \$2M
- Agriculture and Food Research Initiative (AFRI)
 - Sustainable Bioenergy Challenge \$46M
- Joint USDA/DOE Biomass Research and Development Initiative (BRDI) \$40M
- Critical Agricultural Materials \$1M
- Small Business Innovation Research Program \$4M
- Sun Grant, other and non-competitive ~ \$15M
- >\$100M NIFA annual investment in FY 2012



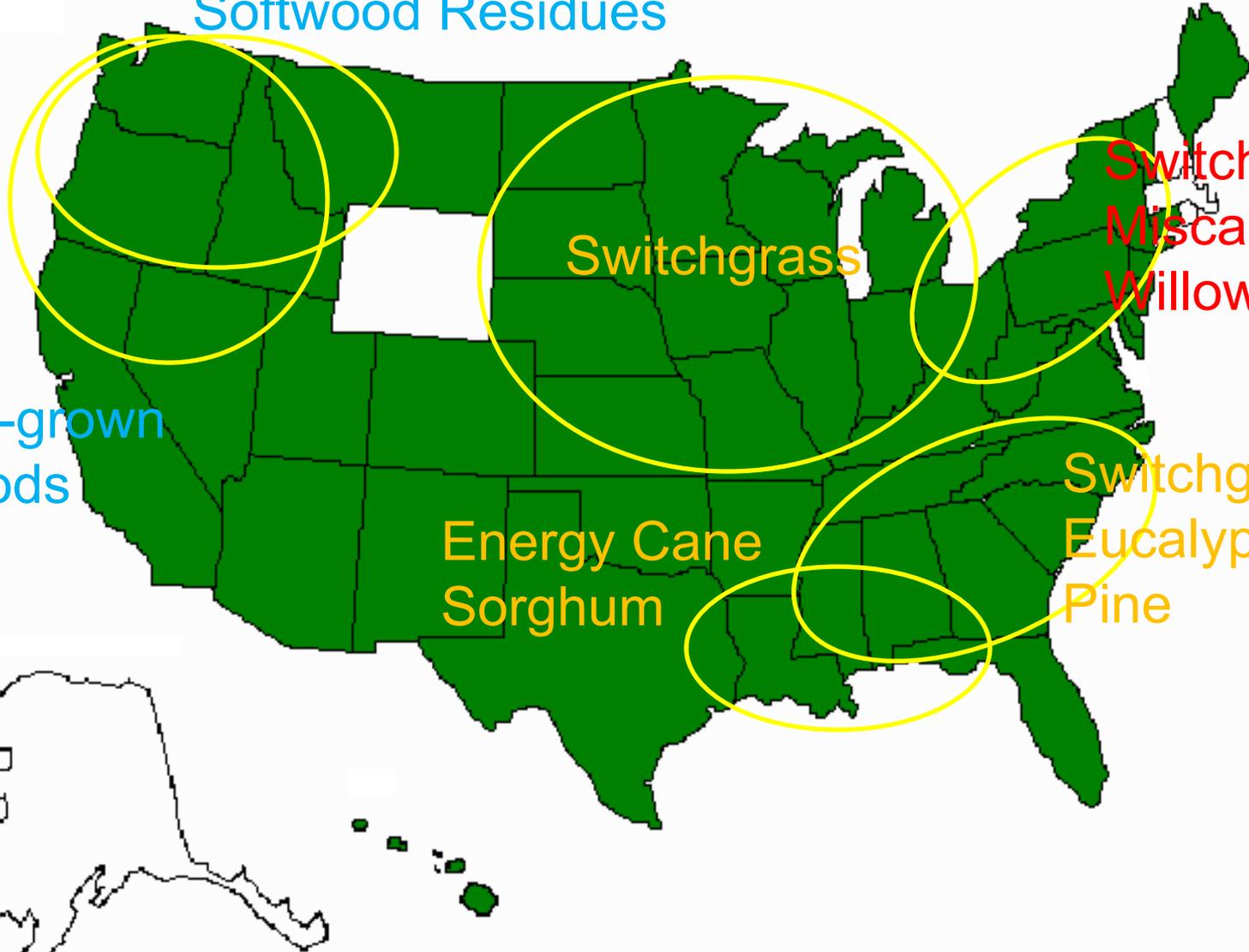
Agriculture and Food Research Initiative

Sustainable Bioenergy Challenge

- **Regional Approaches to Sustainable Bioenergy – Coordinated Agriculture Projects (CAPs)**
 - Large awards to stimulate biofuels production in a multi-state region
 - Perennial grasses, sorghum, woody biomass, energy cane, oil seed crops
- **Standard research grants**
 - Co-products, crop protection, impacts on pollinators and wildlife, carbon sequestration, land-use changes, socioeconomic impacts, impacts of policy, water quality/quantity, scalable conversion technologies, feedstock logistics
- **Stimulating a New Era of Students and Faculty**
- **National Loblolly Pine Genome Sequencing**



Softwood Residues



Switchgrass
Miscanthus
Willow

Switchgrass

Switchgrass
Eucalyptus
Pine

Energy Cane
Sorghum

Purpose-grown
Hardwoods



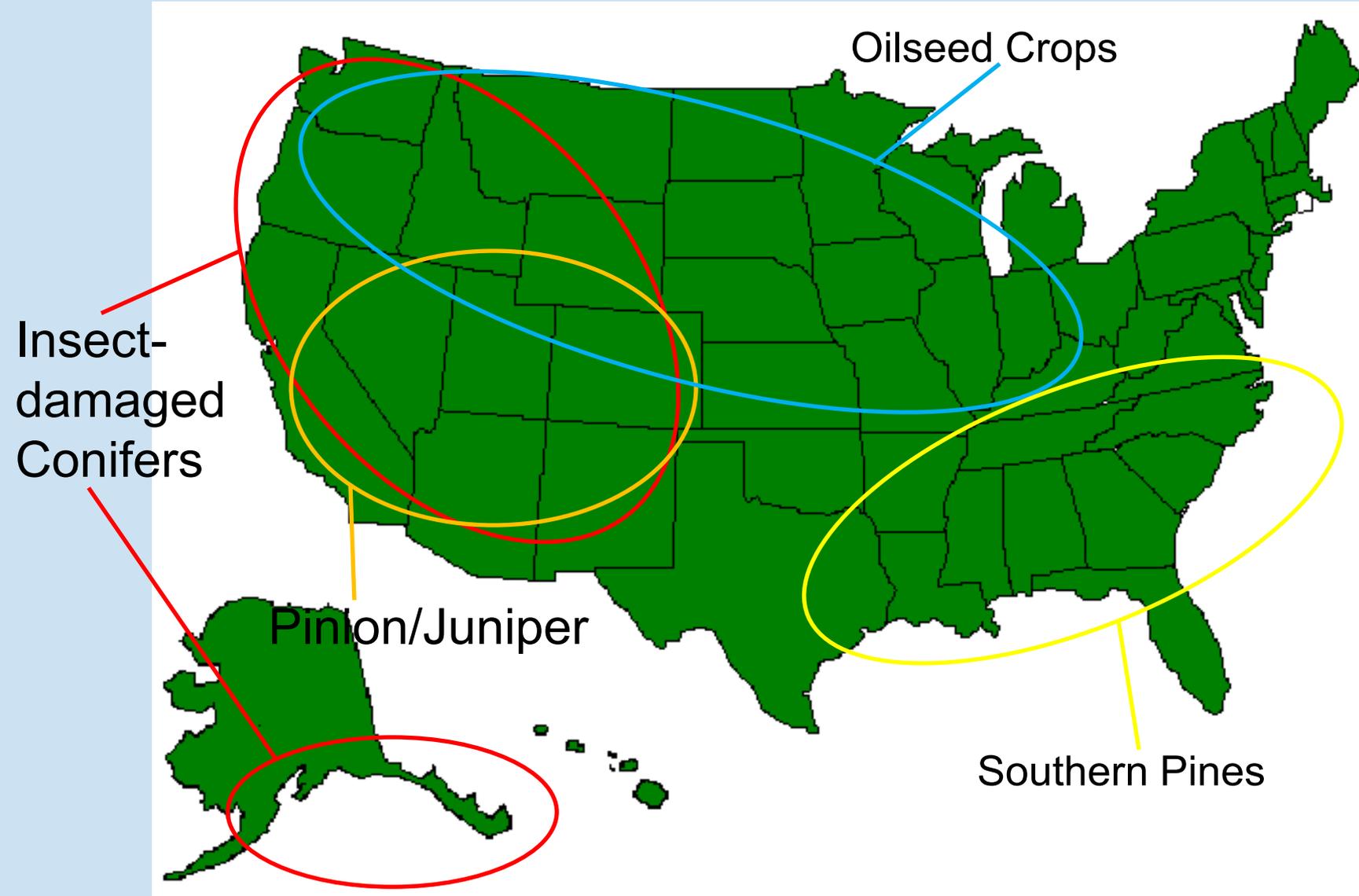
Agriculture and Food Research Initiative FY 2013

– Sustainable Bioenergy Challenge

- Sustainable production of regionally appropriate feedstocks (CAP) \$10M (1 award, \$2M/year)
 - Southern pines, oilseed crops, pinion/juniper forest materials in the West, insect-killed trees in the West
- Standard research grants \$3M (3 awards, \$1M)
 - Impacts of regional bioenergy systems on water availability and quality

– Foundational program

- Engineering, Products, Processes
\$500,000/project





Biomass Research and Development Initiative FY2009-2012

- \$118M support 25 projects
- Focus on advanced biofuels/biobased industrial products/chemicals
- Interest in small scale processing/rural manufacturing
- Funding range \$3M - \$7M
- Required integration of:
 - feedstock development/production, feedstock logistics,
 - feedstock conversion, product development
 - system analysis, e.g. life cycle analysis, impacts on food/feed supply



Biomass Research and Development Initiative FY 2012

- **USDA contribution - FY 2012 \$40 M authorized, \$25M available**
- **DOE contribution - FY 2012 \$10M**
- **DOE Office of Biomass and Golden Field Office administer pre-application process**
- **USDA-NIFA administers the invited full application process**
- **FY 2012 solicitation announced March 2012**
- **178 Pre-applications reviewed**
- **42 Invited full applications reviewed**
- **4 awards made in September**



Biomass Research and Development Initiative FY 2012

- **Ceramatec, Inc., Salt Lake City, UT, \$6.6M**
 - Convert new sorghum hybrids, switchgrass, forest residues to renewable diesel, base oils
 - Fractionation pretreatment, fermentation to free fatty acids, electrochemical conversion of FFAs to hydrocarbons
- **Kansas State University, Manhattan, KS, \$5.1M**
 - Camelina as rotation crop with wheat
 - Oil and meal chemically converted to adhesives, coatings



Biomass Research and Development Initiative FY 2012

- **USDA-Agricultural Research Service, Wyndmoor, PA, \$6.7M**
 - Animal manure, perennial grasses, forest residues converted to refinery fuel blendstocks
 - Develop on-farm distributed pyrolysis technology
 - Integrated dual fluidized bed, combustion-reduction pyrolysis unit
- **Ohio State University, Wooster, OH, \$6.5M**
 - animal manure, ag residues, woody biomass, miscanthus converted to gasoline
 - Anaerobic digestion integrated with partial oxidation and FT technologies



Biomass Research and Development Initiative

Evolution of program objectives:

- FY 2009 required life cycle analysis
- FY 2010 required integration of feedstock production, conversion, analysis
- Funding range \$3M-\$7M
- FY 2011, 2012 continue with integrated, comprehensive approach
- Increasing number of awards that add value to current ag production or industrial processes
- Projects with multiple value-added products have greater likelihood of success



Biomass Research and Development Initiative

Projects that add value to existing ag systems:

- **Oklahoma State**– optimize perennial grasses for bioenergy and livestock production
- **Domtar** – expand pulp and paper mill to produce sugars from mill waste and chemicals from lignin
- **Quad County Corn Processors Cooperative** – expand corn dry mill to diversify products from whole stillage
- **University of Wisconsin** – utilize dairy manure in a closed loop system for producing feed and energy
- **Cooper Tire** – new market for guayule, a source of natural rubber and new crop for the semi-arid SW
- **ARS** – cropping systems to optimize yields for oilseed crops – feedstocks for hydrocarbon fuels



Measuring Sustainability

- What data should be collected?
- Global Bioenergy Partnership (GBEP)
<http://www.globalbioenergy.org/>
- Criteria and indicators from international perspective that take into account developing countries
- BRDI will be a test case for the GBEP framework
 - University of Hawaii/ZeaChem/Oregon State University/Washington State University
 - ARS/academia/UOP



Measuring Sustainability

- **2 projects developing cutting edge evaluation methods and metrics**
 - “Exergetic LCA” quantifies the life-cycle exergy of a bioenergy system
 - Exergy is a thermodynamic indicator of the quality of the energy conversions through the life-cycle of the fuel or product.
- **Innovative economic accounting metrics that incorporate resource and environmental factors**



Biomass Research and Development Initiative Concurrent Activities

- **23 projects active under current Farm Bill**
 - www.nifa.usda.gov; search Biomass Research and Development Initiative; grants page has link to abstracts
- **Analysis of program performance**
 - 28 site visits completed (projects are pre-2009)
 - Progress report to Congress being finalized and will move through Departmental clearance
- **NAL Digital Commons data portal is open – Project Directors will submit primary data**
- **BRDI and the new Farm Bill – what's next?**