

INSTITUTE OF BIOENERGY, CLIMATE, AND ENVIRONMENT

OVERVIEW

THE INSTITUTE OF BIOENERGY, CLIMATE, AND ENVIRONMENT (IBCE) administers programs to address national science priorities that advance energy independence and help agricultural/forest/range production systems adapt to climate variables. IBCE-administered programs include more than one scientific discipline and focus on specific goals.

The National Institute of Food and Agriculture (NIFA) supports integrated grant programs that influence the development of sustainable bioenergy systems and products. IBCE's core programs address basic natural resources—including air, water, and soil—to advance sustainable forest, range, and agricultural production.

IBCE comprises three divisions: the Division of Bioenergy, the Division of Climate Change, and the Division of Environmental Systems. The divisions promote the transdisciplinary, seamless integration of research, Extension, and education efforts across NIFA programs.

\$15B

Value of crop losses in 2011 due to drought and weather extremes

36

Number of states projected to have water shortages within 5 years

DIVISIONS

DIVISION OF BIOENERGY

This division supports the development of regional systems that produce sustainable bioenergy and biobased products. The goal of these systems is to deliver liquid transportation biofuels to help meet the nation's goal of 36 billion gallons of biofuels per year by 2022. The division administers grants that support sustainable biomass production, genomic improvements of bioenergy feedstocks, the logistics of handling feedstocks, biomass conversion, product development, and programs that facilitate and clarify land-use changes that result from feedstock production. Other programs seek to identify the environmental and socio-economic impacts of biofuels in rural communities.

DIVISION OF CLIMATE CHANGE

This division supports activities that help agricultural and natural resource systems adapt to climate variables such as droughts, floods, and temperature extremes. The division focuses on challenges that are fundamental to sustainable agricultural production and the management of healthy forests and rangelands. Long-term outcomes include developing new varieties of plants and animals that can adapt to climate variability; increasing carbon sequestration; identifying new strategies that account for climate variables; advancing the sustainable use of natural resources; and improving conservation activities in the use of energy, nitrogen fertilizer, and water.

DIVISION OF ENVIRONMENTAL SYSTEMS

This division advances knowledge in the areas of natural resources, the environment, and conservation. The division supports scientific work that involves air, water, soil, and wildlife resources in order to advance the sustainability of agricultural, forest, and range production systems. Increasing water shortages, loss of topsoil, reduced biological diversity, and loss of habitat are among the issues that significantly impact the sustainability of agriculture and slow or reverse the expansion of agricultural goods and services. Program priorities include improving air and water quality; developing sustainable ecosystem services; wildlife damage management; maintaining soil health and soil restoration; and improving the manage-

ment and sustainable use of forests, wildlife, and rangelands. Grant programs develop innovative ways to achieve sustainable use of natural resources and develop educational and Extension programs that implement best management practices to enhance environmental, social, and economic benefits.

USDA's Small Business Innovation Research (SBIR) program is housed within the Division of Environmental Systems. SBIR makes competitively awarded grants to qualified small businesses to support high quality, advanced concepts research related to important scientific problems and opportunities in agriculture.

INSTITUTE OF BIOENERGY, CLIMATE, AND ENVIRONMENT (CONT'D)

MAJOR PROGRAMS AND INITIATIVES

CLIMATE VARIABILITY AND CHANGE

During fiscal years (FY) 2010-11 the Global Climate Change portfolio took the first major step in addressing NIFA's societal challenge on climate change by funding grants that will help agricultural and forest production systems adapt to climate change, reduce greenhouse gas emissions, and increase carbon sequestration. Most of these grants were large, integrated, transdisciplinary projects that focused on

- developing advanced food, feed, and fiber production systems and new plant cultivars and animal breeds that can adapt to changing climates through conventional breeding or other appropriate approaches, and
- developing best management practices and sustainable methods to reduce greenhouse gas emissions and increase carbon sequestration from agriculture and forest systems while still contributing to the carbon-based market.

NIFA awarded four Coordinated Agricultural Projects (CAP) to address major scientific and societal issues in production agriculture and forestry. One CAP focused on the Pacific Northwest wheat system, another on Midwest corn, a third on wheat and barley germplasm, and a fourth that focused on managing Southern forests for greenhouse gas mitigation. Together, these projects total more than a \$130 million investment in climate adaptation and mitigation initiatives. A set of 14 standard grants totaling \$55 million over a 5-year period will address more specific issues on climate adaptation and mitigation through stand-alone research, education, Extension, or integrated projects.

Through partnerships with the National Science Foundation, the U.S. Department of Energy (DOE), the National Aeronautics and Space Administration, and U.S. Forest Service, the program also supports large investments to develop models that identify agricultural greenhouse gas generation, develop improved models of earth climatic systems that effect agriculture, and identify the affects of climate change on water sustainability.

In 2012, a Request for Applications was published to fund new climate-related projects for major crops such as legumes, livestock, and rangeland and forest systems. The division will also conduct a comprehensive review of its work to identify

major gaps in the science that should be addressed through competitive or formula funded programs.

SUSTAINABLE BIOENERGY

The Sustainable Bioenergy portfolio focuses on the societal challenge to secure America's energy future through the production of sustainable bioenergy, biofuels, and biobased products. Advances in a suite of agricultural sciences are needed in order to meet the Energy Independence and Security Act of 2007's production goal of 36 billion gallons of biofuels per year. Portfolio programs support advances in crop development, production, coordinated logistics, near-term commercialization in conversion technologies and products, modeling the improvement or changes in environmental services, and evaluating policy options that affect social prosperity for rural communities.

During FY2010-11 large Agriculture Food Research Initiative (AFRI) CAPs (the largest grants in NIFA history) were awarded to bring together all aspects of sustainable feedstock production and logistics in cost effective regional applications. The five funded CAPs deploy regionally-appropriate feedstocks, including loblolly pine, poplar, energy cane, switch grass, and sorghum. Two AFRI education grants partnered 1862 land-grant universities with minority-serving institutions to help prepare the workforce needed for this industry. The portfolio also supports sequencing the genome of the loblolly pine tree, an important biofuel feedstock.

NIFA's feedstock genomics program, which is run in partnership with DOE, supports feedstock genomics work in species other than the CAPs listed above. AFRI also supports research in sustainable bioenergy, biodiversity (pollinators and wildlife), soil carbon status, pests and disease, policy options, land use (food fuel competition), and rural community impacts. The Biomass Research and Development program, in partnership with DOE and USDA Rural Development, supports efforts to deploy and commercialize sustainable biofuels and biobased products production technologies. Additional programs include the Biodiesel Education program, the Critical Agricultural Materials program, and the bioenergy and byproducts-focused portions of the SBIR program.

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