Delivering Advanced Biofuels & Bioproducts to the Marketplace

A Progress Report from the Department of Energy Bioenergy Research Centers

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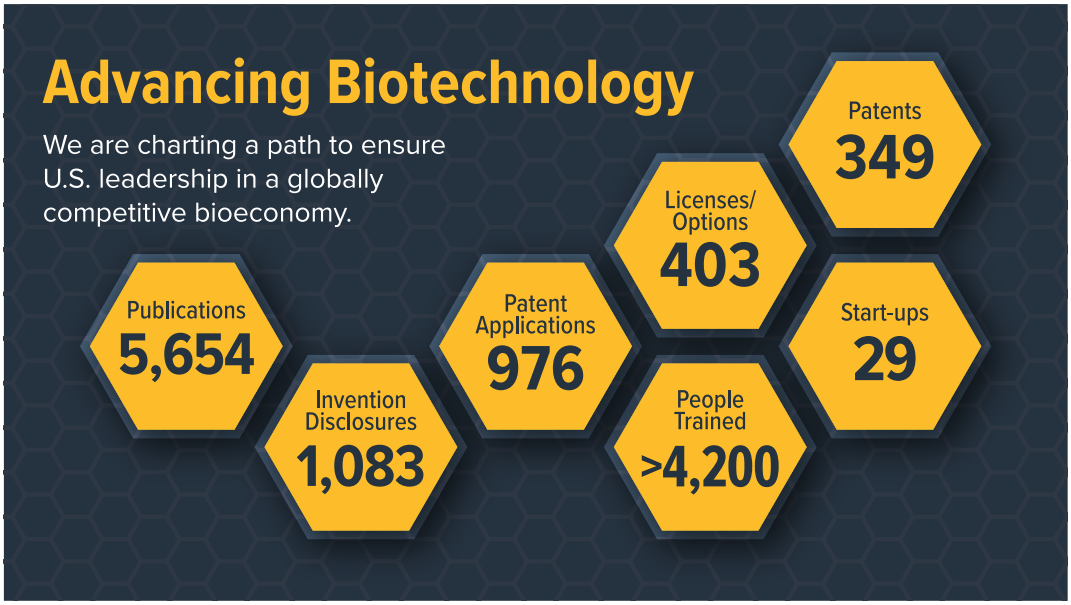
U.S. DEPARTMENT *of* ENERGY

The Bioenergy Research Center Charge

The U.S. Department of Energy's Bioenergy Research Centers (BRCs) are driving major advancements in biotechnology underpinning the production of fuels and chemicals from dedicated bioenergy crops such as switchgrass, poplar, and energy sorghum. This research can enhance energy security; create domestic supply chains for a range of fuels, chemicals, and materials; generate jobs in rural areas, and ensure U.S. leadership in a globally competitive bioeconomy.



Each BRC is led by a DOE National Laboratory or a top university, and consists of a multidisciplinary partnership involving experts from science and engineering, as well as from private companies and non-profit organizations. Working with collaborators across the nation, each BRC takes a unique approach to improving and scaling up the production of advanced fuels, chemicals, and materials, and each is focused on non-food energy crops with promise for its particular region.

First created by the Department of Energy in 2007, the BRCs expanded from three centers to four in 2017. In this next phase of the BRCs, research has expanded from an initial focus on ethanol to advanced biofuels, such as isobutanol, and to biobased chemicals and materials derived from a variety of natural resources.

Together the BRCs are addressing the challenges of converting biomass to biofuels and bioproducts on a scale far greater than any effort to date. The goal is an economic enterprise that invigorates rural communities, expands domestic energy production, and strengthens national resilience and security.

"The BRCs are powerhouses of technological innovation that have pushed the boundaries of what's possible. Their pioneering inventions have led to hundreds of licensing agreements and industry collaborations. We are proud to support and collaborate with them to drive forward transformative innovations for the bioeconomy."

- Erik Iverson, CEO of the Wisconsin Alumni Research Foundation

Bioenergy Research Centers at a Glance

Center for Advanced Bioenergy and Bioproducts Innovation | cabbi.bio

The Center for Advanced Bioenergy and Bioproducts Innovation (CABBI), led by University of Illinois Urbana-Champaign, is developing efficient ways to grow bioenergy crops, transform biomass into valuable chemicals, and market the resulting biofuels and bioproducts. CABBI integrates recent advances in genomics, synthetic biology, and computational biology in a transformative research model designed to accelerate research and development while retaining the flexibility to incorporate newly-developed technologies. The center is developing the predictive capability to determine which feedstock combinations, regions and land types, market conditions, and bioproducts have the potential to support the bioeconomy.
Technology Contact: Vijay Singh - vsingh@illinois.edu

Center for Bioenergy Innovation (CBI) | cbi.ornl.gov

The Center for Bioenergy Innovation (CBI), led by Oak Ridge National Laboratory, seeks to accelerate domestication of bioenergy-relevant, non-model plants and microbes to enable high-impact innovations within the fuels, chemicals, and materials domains. In this endeavor, CBI is pursuing a host of new technologies to alleviate critical cost barriers facing the emerging bioeconomy. The center is creating robust, high-yielding non-food feedstock plants using genetic technology and bioengineering; developing biocatalytic methods for high-yield production of advanced biofuels that can be blended with existing transportation fuels; and studying ways to produce valuable byproducts from lignin left over after biomass processing.
Technology Contact: Melissa Cregger - creggerma@ornl.gov

Great Lakes Bioenergy Research Center (GLBRC) | glbrc.org

The Great Lakes Bioenergy Research Center (GLBRC) is a cross-disciplinary research center led by the University of Wisconsin–Madison. With Michigan State University and other partners, GLBRC is developing resilient biofuels and bioproducts from dedicated energy crops grown on marginal lands. GLBRC has three integrated areas of research – bioenergy cropping systems, biomass conversion, and field-to-product optimization – that together will help build a resilient bioeconomy. GLBRC's groundbreaking research in plant and microbial systems is paving the way for new innovations in producing essential chemicals, fuels, and materials that our society needs from non-food crops.
Technology Contact: Jennifer Gottwald - jennifer@warf.org

Joint BioEnergy Institute (JBEI) | jbei.org

The Joint BioEnergy Institute (JBEI), led by Lawrence Berkeley National Laboratory, is working to convert bioenergy crops into economically viable, carbon-neutral biofuels and renewable chemicals currently derived from petroleum, and other bioproducts that cannot be efficiently produced. JBEI's mission is to establish the scientific knowledge and new technologies to convert bioenergy crops and carbon-rich waste streams, such as agricultural waste and forest debris, into economically viable, carbon-neutral biofuels and renewable chemicals and bioproducts.
Technology Contact: Robin Johnston - rjohnston@lbl.gov

Enabling Commercialization, Creating Opportunity

The BRCs are enabling a new generation of biorefineries and developing a portfolio of new biobased products, methods, and tools for use in the biofuels industry. Using a broad range of genome-driven research methods, BRC technologies represent a variety of approaches to different bottlenecks in the current bioeconomy pipeline. Some technologies focus on improved ways of breaking down biomass for conversion into fuel, some on engineering plants with the characteristics most advantageous for biofuels, and still others on creating bioproducts that can help make advanced biofuels economically viable. In total, the BRCs have successfully launched 29 start-up companies, disclosed over 1,000 new inventions, and optioned or licensed out hundreds of technologies, and trained more than 4,000 postdoctoral researchers, graduate, and undergraduate students.

"These inventions will be the new startups, the new fuels that will be in our tanks, the renewable materials in our lives, and the manufacturing jobs in America."
- Jay Keasling, Joint BioEnergy Institute (JBEI) Chief Executive Officer