U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

BIOENERGY TECHNOLOGIES OFFICE FY 2017 BUDGET AT-A-GLANCE

The Bioenergy Technologies Office (BETO) is accelerating the commercialization of first-of-a-kind technologies that use our Nation's abundant renewable biomass resources for the production of advanced biofuels and biobased products. Non-food sources of biomass, such as algae, agricultural residues and forestry trimmings, and energy crops like switchgrass, are being used in BETO-supported, cutting edge technologies to produce drop-in biofuels, including renewable gasoline, diesel, and jet fuels. BETO is also investigating how to improve the economics of biofuel production by converting biomass into higher-value chemicals and products that historically have always been derived from petroleum.

What We Do

- ✓ **Research and Development** focused on addressing technical barriers, providing engineering solutions, and developing the scientific and engineering underpinnings of a bioenergy industry.
- ✓ **Demonstration** to reduce risk for bioenergy production through validated proof of performance at the pilot stage and to transform the biofuels market by reducing or removing barriers to commericalization.
- ✓ **Analysis and Sustainability** that works across the supply chain with BETO's feedstocks, algae, conversion, and demonstration and market transformation programs to support the development of a sustainable bioeconomy.

Program Goals/Metrics

- Make drop-in hydrocarbon fuels competitive with petroleum-based fuels at a modeled, mature technology price of $3/gge, when compared to 2011 dollars. The other goal is to reduce greenhouse gas emissions 50% or more compared to petroleum-derived fuels, based on Energy Information Administration projected gasoline wholesale prices in 2017.
- Verify a mature technology, plant model price of ethanol by 2017. This is based on actual integrated biorefinery project plant performance data and is compared to the target of $2.17/gallon of ethanol in 2007 dollars.

FY 2017 Priorities

- **Feedstocks Supply and Logistics** will support a funding opportunity announcement (FOA) to develop preprocessing technologies to reduce the cost for processing and transporting feedstocks to the biorefinery, which will be an essential part of creating a national bioeconomy.
- **Advanced Algal Systems** will select up to three additional projects for the Algae Biomass Yield II FOA focused on improving biomass productivity, yield, and other logistical considerations.
- **Conversion Technologie**s will support development of a Syn-Bio effort, which will leverage the tools of synthetic biology to enable the biotechnology industry to achieve substantial improvements in conversion efficiencies and the scale-up of biological processes.
- **Demonstration and Market Transformation** will support Phase II of the 2016 integrated biorefinery FOA to down select for the construction and operation of up to one demonstration-scale and one pilot-scale facilities to produce drop-in hydrocarbon fuels.
- **Strategic Analysis and Sustainability** will identify best practices for reducing air emissions, water use, and wastewater associated with advanced bioenergy pathways as well as publicly deploy Web-based tools that enable users to visualize and improve the sustainability performance of bioenergy systems.

(Dollars in Thousands)	FY 2015 Enacted	FY 2016 Enacted	FY 2017 Requested
Feedstocks	$32,000	$46,500	$0
Feedstock Supply and Logistics	$0	$0	$22,000
Advanced Algal Systems	$0	$0	$30,000
Conversion Technologies	$95,800	$85,500	$140,900
Demonstration and Market Transformation	$79,700	$75,100	$75,000
Strategic Analysis and Cross-Cutting Sustainability	$11,000	$11,000	$11,000
NREL Site-Wide Facility Support	$6,500	$6,900	$0
Total, Bioenergy Technologies	**$225,000**	**$225,000**	**$278,900**

Key Accomplishments

Feedstocks Supply and Logistics

- Idaho National Laboratory successfully completed two State of Technology (SOT) reports on herbaceous and woody energy crops. These SOT reports highlight progress toward meeting the 2017 goal of verifying a supply and logistics system capable of delivering feedstocks to the conversion reactor throat at $80/dry ton.

Advanced Algal Systems

- California Polytechnic State University (CalPoly) established a 9,000 liter system with continuous automated process controls and harvest equipment at a wastewater treatment facility in Delhi, California, for the Algae Biomass Yield FOA project.

Conversion Technologies

- Reduced the modeled conversion cost contribution from $4.09/gge to $3.70/gge via fast pyrolysis for converting biomass to a hydrocarbon fuel blendstock in a mature commercial-scale plant.

- Reduce modeled mature biochemical conversion cost from $9.09/gge to $6.40/gge of combined hydrocarbon fuel and renewable chemical on a pathway to a $3.16/gge conversion cost in 2017 by improving co-product organisms, primary fermentation organisms for fatty acid production, and reducing operating costs.

Demonstration and Market Transformation

- POET-DSM's Project LIBERTY, a biorefinery in Emmetsburg, Iowa, continued commissioning and ramping up production on a trajectory to achieve a capacity of 25 million gallons of cellulosic ethanol per year from corn waste.

Analysis and Sustainability

- Argonne National Laboratory released WATER 3.0 (Water Assessment for Transportation Energy Resources) to enable in-depth analysis of water consumption for multiple biofuels pathways.

- National Renewable Energy Laboratory assessed applicable federal air quality regulations and estimates of seven criteria air pollutant emissions for the fast pyrolysis pathway.

DuPont's cellulosic ethanol biorefinery in Nevada, Iowa. *Photo Courtesy of DuPont*

An aerial shot of POET-DSM's Project LIBERTY cellulosic ethanol plant in Emmetsburg, Iowa. *Photo courtesy of POET-DSM*