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

BIOENERGY TECHNOLOGIES OFFICE FY 2015 BUDGET AT-A-GLANCE

The Bioenergy Technologies Office supports targeted research, development, demonstration, and deployment (RDD&D) activities to advance the sustainable, nationwide production of advanced biofuels that will displace a share of petroleum-derived fuels, mitigate climate change, create jobs, and increase United States energy security.

What We Do

The Bioenergy Technologies Office employs an integrated, crosscutting RDD&D strategy to develop commercially viable biomass utilization technologies. The Office makes strategic investments in the following areas:

- ✓ **Feedstock Production and Logistics** advances a sustainable, secure, reliable, and affordable terrestrial biomass feedstock supply for the U.S. bioenergy industry.
- ✓ **Algae R&D** develops cost-effective algal biofuels production and logistics systems. The challenges and opportunities to commercializing algal biofuels production systems are broad and complex, requiring the close integration and collaboration of many scientific and engineering disciplines to bring about innovations.
- ✓ **Conversion Technologies** identifies and develops viable technologies for converting biomass feedstocks into fungible, liquid transportation fuels, bioproducts, and chemical intermediates.
- ✓ **Demonstration and Deployment** validates integrated technologies with the successful construction and operation of cost-shared pilot-, demonstration-, and pioneer-scale biorefineries.
- ✓ **Strategic Analysis** provides context and justification for program decision-making by establishing a basis of quantitative metrics, tracking progress toward goals, and enabling portfolio planning and management.
- ✓ **Cross-Cutting Sustainability** promotes positive economic, social, and environmental effects and reduces potential negative impacts of bioenergy.

Program Goals/Metrics

The Bioenergy Technologies Office goals are designed to reduce the cost of biofuels to be competitive with petroleum-based fuels in the market. Key cost targets include:

- Through RDD&D, make cellulosic biofuels competitive with petroleum-based fuels at a modeled cost of mature technology of $3/gasoline gallon equivalent (gge) ($2011), based on Energy Information Administration projected wholesale prices in 2017.
- Validate a mature technology plant model cost of ethanol production, based on actual integrated biorefinery project plant performance data and compared to the target of $2.15/gallon ethanol ($2007).

FY 2015 Priorities

- **Feedstocks Production and Logistics:** Develop strategies, technologies, and systems that can sustainably provide feedstock to a conversion reactor for a total cost of no more than $80/dry ton by FY 2017, while meeting conversion process specifications and providing sufficient volume to meet demand.
- **Algae:** Pursue research in advanced biology and carbon dioxide utilization to leverage capabilities at the algae testbed facilities and lay a foundation for breakthroughs needed to meet the FY 2022 algae productivity target (5,200 gallons of biofuel intermediate per acre of cultivation per year).
- **Conversion Technologies:** Conduct high-impact conversion technology R&D to demonstrate $3/gge drop

(Dollars in Thousands)	FY 2013 Current	FY 2014 Enacted	FY 2015 Request
Feedstocks (Including Algae)	47,359	46,972	30,500
Conversion Technologies	75,140	101,384	100,500
Demonstration and Deployment	43,630	64,790	105,000
Strategic Analysis and Cross-Cutting Sustainability	14,939	12,146	11,000
Cookstoves	4,122	1,998	0
NREL Site-Wide Facility Support	0	5,000	6,200
Total, Bioenergy Technologies	**185,190**	**232,290**	**253,200**

in hydrocarbon biofuels by 2017 and 2022 using a wide array of feedstock and conversion technologies, with at least 50% greenhouse gas reduction on a lifecycle basis.

- **Demonstration and Deployment:** Advance biofuel commercial deployment through scale-up of integrated biorefinery demonstrations of high-volume potential hydrocarbon pathways, as well as support of military-specification jet fuel in collaboration with the U.S. Department of Defense and the U.S. Department of Agriculture through the Defense Production Act.

Key Accomplishments

- **Feedstock Production and Logistics:** In FY 2013, the Bioenergy Technologies Office's five high-tonnage feedstock logistics projects—which included partnerships with original equipment manufacturers—demonstrated significant reduction of costs (e.g., $13/ton cost reduction relative to conventional systems for baled corn stover) for integrated systems that utilize agricultural residues, forest resources, and/or herbaceous and short-rotation energy crops. Cost reductions claimed in all five projects have been independently validated by Oak Ridge National Laboratory researchers.

- **Conversion Technologies:** In FY 2013 and FY 2014, the Bioenergy Technologies Office met technical research targets for the thermochemical conversion pathway that, when modeled, demonstrate a minimum fuel selling price (MFSP) of $5.6/gge for gasoline and diesel blendstock. These technical achievements represent R&D progress toward achieving the cost target of $3/gge for gasoline and diesel MFSP by 2017 for a thermochemical conversion pathway.

- **Demonstration and Deployment:** In FY 2013, the nation's first pioneer cellulosic ethanol plant supported by BETO began production and commercial sale of product. This plant, developed by INEOS Bio, has an annual cellulosic ethanol production capacity of 8 million gallons per year (mmgy). Two additional, commercial scale biorefineries are expected to complete construction and commissioning in 2014. These facilities will add a production capacity of more than 40 mmgy of domestic cellulosic ethanol.

Photo courtesy of AGCO Corporation

Single-pass baler operating in a corn field as part of AGCO Corporation's high-tonnage feedstock logistics project

Photo courtesy of Pacific Northwest National Laboratory

In 2013, a new hydrotreater was successfully installed at Pacific Northwest National Laboratory. This tool enables researchers to process bio-oil into infrastructure-compatible fuels in support of BETO's work to achieve conversion R&D cost targets and technical goals.

Photo courtesy of INEOS Bio

INEOS Bio's cellulosic ethanol biorefinery in Vero Beach, Florida

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