

Bioenergy Technologies Office – Federal Partnerships

June 25, 2015

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Inter- and Intra-agency Collaboration

The Office partners with other offices within the U.S. Department of Energy, as well as with other agencies in the federal government, to overcome challenges in effectively deploying biofuels, biopower, and bioproducts.

Federal Collaboration

- Biomass Research & Development Board
- Offices and programs within the following:
 - Department of Agriculture
 - Department of Defense
 - Department of the Interior
 - Department of Transportation
 - Environmental Protection Agency
 - National Aeronautics and Space Administration
 - National Science Foundation
 - Office of Science and Technology Policy

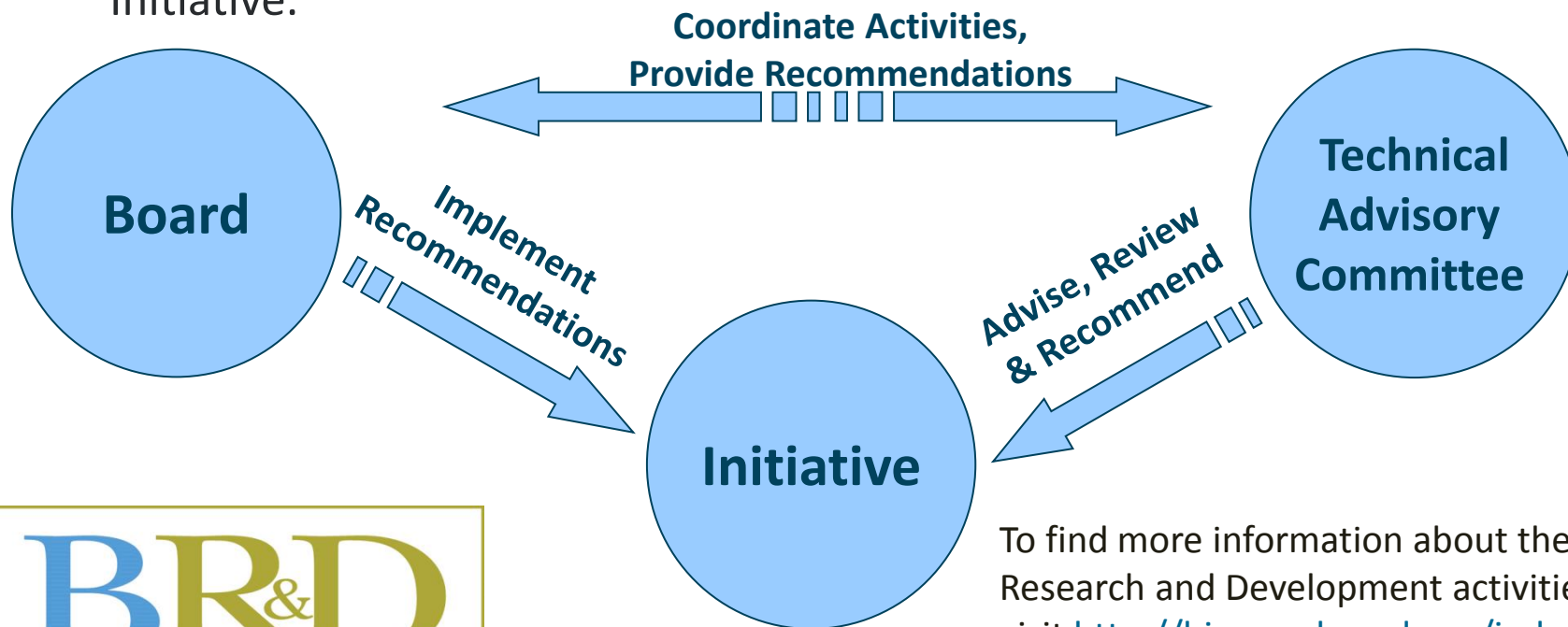
DOE Internal Collaboration

- Energy Efficiency and Renewable Energy
 - Vehicle Technologies Office
 - Fuel Cell Technologies Office
 - Advanced Manufacturing Office
- Energy Policy and Systems Analysis
- Loan Programs
- International
- Fossil Energy
- Office of Science
- ARPA-E
- EIA

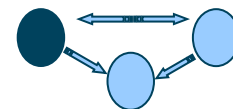


Biomass Research and Development Act

- The Biomass Research and Development Act was established in 2000, and has been amended several times, including the last Farm Bill, the Agricultural Act of 2014.
- The Act established the Interagency Biomass R&D Board, the Biomass R&D Technical Advisory Committee, and authorized funds for the Biomass R&D Initiative.



To find more information about the Biomass Research and Development activities, please visit <http://biomassboard.gov/index.html>



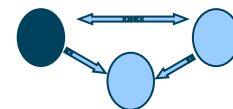
Interagency Biomass R&D Board

- The Board is a panel consisting of Senate confirmed co-chairs from USDA and DOE and senior-level representatives from executive branch agencies:
 - Department of Agriculture: Co-Chair Cathie Woteki, REE
 - Department of Energy: Co-Chair Dave Danielson, EERE
 - Environmental Protection Agency
 - Department of Interior
 - National Science Foundation
 - Office of Science and Technology Policy
 - Department of Transportation
 - Department of Defense

Membership

Co-Chair **Co-Chair**

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



Biomass R&D Board Work

- The Biomass Board was created by statute to coordinate strategic planning for biomass activities across all federal agencies.
- The Board convenes Interagency Working Groups to coordinate broad tasks across the entire supply chain.
- Public deliverables include case studies, supply chain reports, and inventories of government-wide Biomass R&D activities.



A BILLION DRY TONS OF BIOMASS

HAS THE POTENTIAL TO PRODUCE

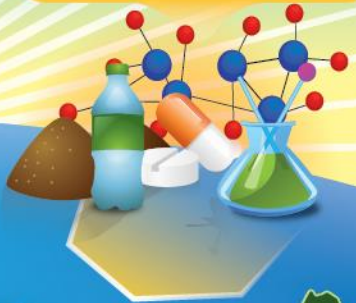
1.5 MILLION JOBS
and keep about
\$200 BILLION
dollars in the U.S.
every year.

92 BILLION
kWh of electricity
to power
8 MILLION
households.

60 BILLION
gallons of biofuels
displacing almost
30%
of all transportation
fuels.

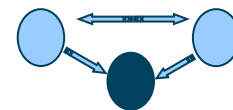
50 BILLION POUNDS
of biobased
chemicals and bio-
products, replacing
a significant portion
of the chemical
market.

reductions of
CO₂ emissions by
500
MILLION TONS
a year.



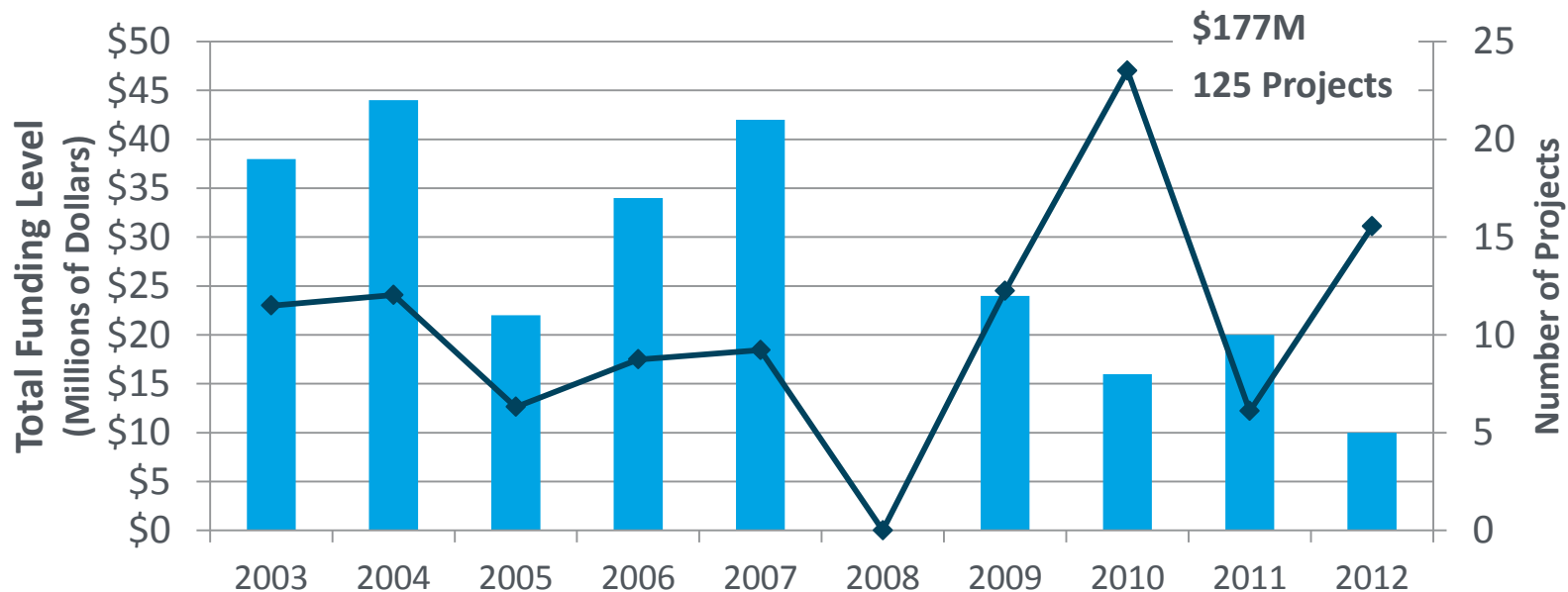
Projection based
on the 2011 Billion
Ton Study Report

Biomass R&D Initiative



- The Biomass R&D Initiative (BRDI) provides funding for research and development projects in the following areas:
 - Feedstocks Development
 - Biofuels and Biobased Products Development
 - Biofuels Development Analysis
- The BRDI solicitation is jointly run by staff at DOE and USDA.

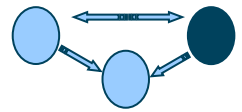
BRDI Award History 2003-2012



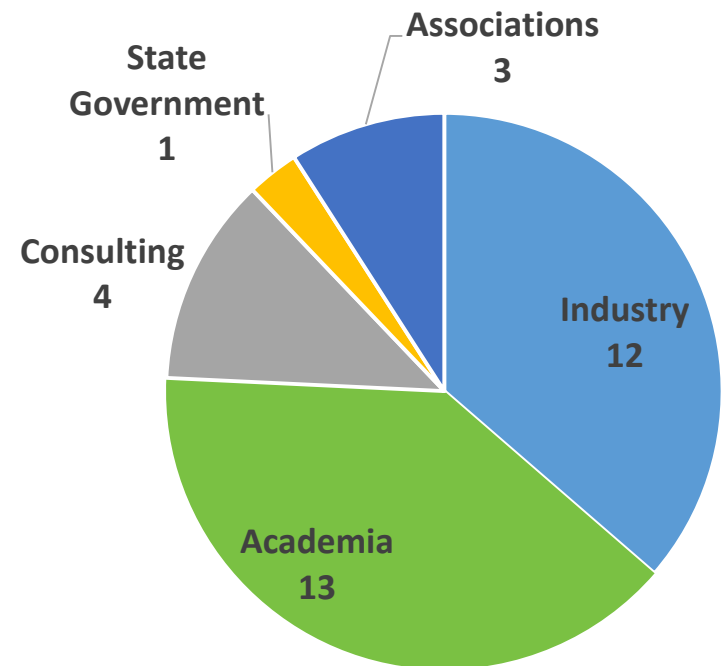
* No awards were issued in 2008

■ Number of projects
◆ Funding

Technical Advisory Committee



- The TAC is required to advise the Secretaries of Agriculture and Energy on the Biomass R&D Initiative, and makes additional recommendations from subcommittees.
- Members are jointly appointed by the Secretaries of Energy and Agriculture.
- The TAC is comprised of approximately 30 external stakeholders with diverse expertise
- The TAC is charged annually with:
 - Collaborating to provide recommendations for report outs
 - Identifying potential industry barriers and solutions in their respective fields/subcommittees



Collaborations with Department of Agriculture

USDA is a major partner with the DOE and the Bioenergy Technologies Office in particular, focusing on several biomass efforts related to feedstocks production, management, and supply.



Selected DOE collaboration activities with USDA include

- USDA/DOE Biomass Feedstocks Coordination Meetings
 - Regular discussions on common feedstocks deployment issues, such as invasive species.
- Woody Biomass Utilization Group
 - Coordination between agencies on issues related to woody biomass feedstocks.
- Farm to Fly 2.0
 - BETO provides technical expertise on initiative out of USDA and DOT for renewable jet fuel.
- Defense Production Act
 - DOE partners with USDA and DOD on initiative for advanced drop-in fuels for the military.

Collaborations with Department of Defense

DOE is supportive of DOD's mission to secure sustainable and reliable sources of energy:

- The DOD uses ~5 billion gallons a year – approximately 80% of the federal government's total fuel usage.
- In 2009, Secretary of the Navy Ray Mabus announced an energy goal of deploying the “Great Green Fleet” by 2016.



The Bioenergy Technologies Office works with DOD on several tasks, including the Defense Production Act






- MOU signed by Secretaries Mabus, Vilsack, and Chu to support commercial-scale biorefineries to produce drop-in jet fuels and diesel.
- DOE involvement is essential in both the DPA and internal demonstration and market transformation activities.

Defense Production Act (DPA) Initiative

In September 2014, 3 projects were selected under the DPA Initiative to build commercial biorefineries to produce

- Drop-in fuels for military applications
 - Domestic fuels from non-food biomass feedstocks
 - Cost-competitive biofuels (w/o subsidies)
- Production anticipated to begin in 2017.
 - Fuels are approved for use as jet fuel by ASTM at up to 50/50 blends.



Company	Location	Feedstock	Capacity	Groundbreaking	Off-Take Agreements
 EMERALD BIOFUELS	Gulf Coast	Fats and Greases	82 MM g/y	TBA	TBD
 Fulcrum BIOENERGY	McCarran, NV	MSW	10 MM g/y	Spring/Summer of 2015	 CATHAY PACIFIC
 RED ROCK BIOFUELS	Lakeview, OR	Woody Biomass	12 MM g/y	TBA	 SOUTHWEST AIRLINES

Interagency initiative to produce more than 100 MM g/y of advanced biofuels

Collaborations with the Department of Transportation

Within DOT, the Office of the Assistant Secretary for Research and Technology (OST-R) focuses on developing and regulating infrastructure, and promoting transportation safety.

The Federal Aviation Administration (FAA), funds alternative aviation fuel research, development, environmental analysis, and testing for approval.



BETO is collaborating with the DOT by

- Assessing infrastructure needs and capacity constraints with RITA
- Partnering with FAA to help develop alternative jet fuels
 - OSTP led effort to develop alternative jet fuel roadmap



Collaborations with the Environmental Protection Agency

The EPA supports the bioenergy industry through various analysis and testing activities and is responsible for implementation of the RFS.

The Office of Transportation and Air Quality (OTAQ) regulates air pollution from motor vehicles, engines, and the fuels used to operate them.

The Office of Research and Development (ORD) is the scientific research arm of EPA.

BETO coordinates on tasks with the EPA, including

- DOE-EPA Coordination Group
 - Monthly meetings to share information on topics such as EPA's RFS pathway analyses and BETO's R&D efforts and sustainability activities
 - Efforts focus on improved data sharing



Selected Collaborations within EERE

Sustainable Transportation

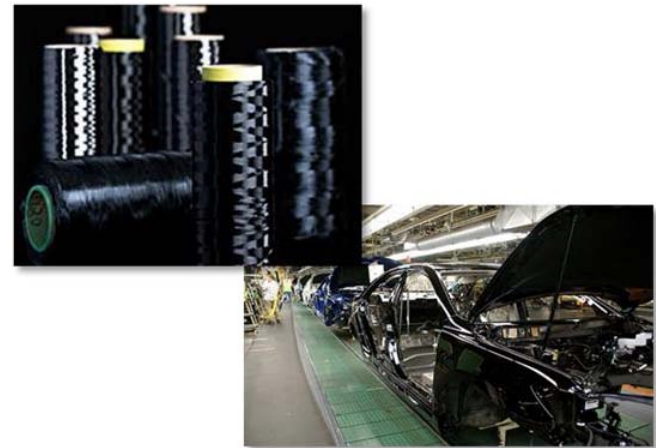
- Bioenergy Technologies Office
- Fuel Cell Technologies Office (FCTO)
- Vehicle Technologies Office (VTO)

VTO partners with BETO to support

- Fuel characterization and combustion testing for biofuels and biofuel blends
- Infrastructure and materials analysis to facilitate biofuel deployment
- Co-optimization of fuels and vehicles.

EERE recently launched the Clean Energy Manufacturing Initiative (CEMI)

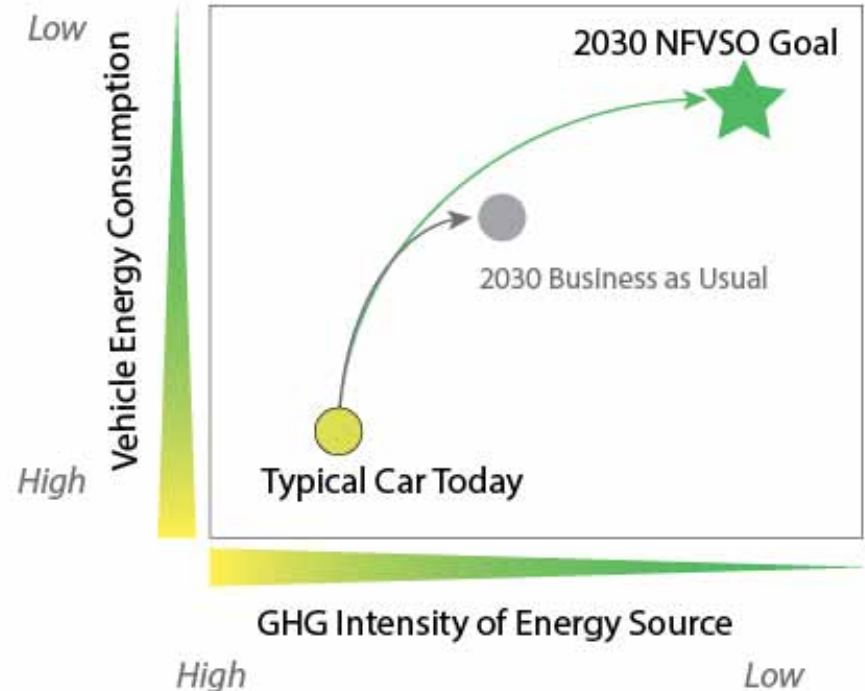
- BETO partnered previously with the Advanced Manufacturing Office and VTO to host a workshop on renewable, low-cost carbon fiber for lightweight vehicles.



Optima: Co-Optimization of Fuels and Engines

Objectives:

- Through co-optimization of fuels and engines, reduce per-vehicle petroleum consumption 30% vs. 2030 business-as-usual
- Develop new fuels and vehicles with higher performance that can be produced affordably, sustainably, and at scale



Collaboration with Fossil Energy

BETO has partnered with Fossil Energy to host a workshop on Bioenergy with Carbon Capture and Sequestration

The objective of this workshop is to obtain input from stakeholders on low-carbon and carbon-negative power systems and the use of biomass in power generation to achieve lower greenhouse gas emissions in a sustainable manner.

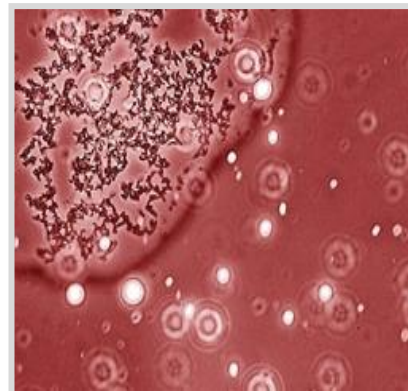
A workshop report and presentations from the event will be posted on the BETO website in the next few months.



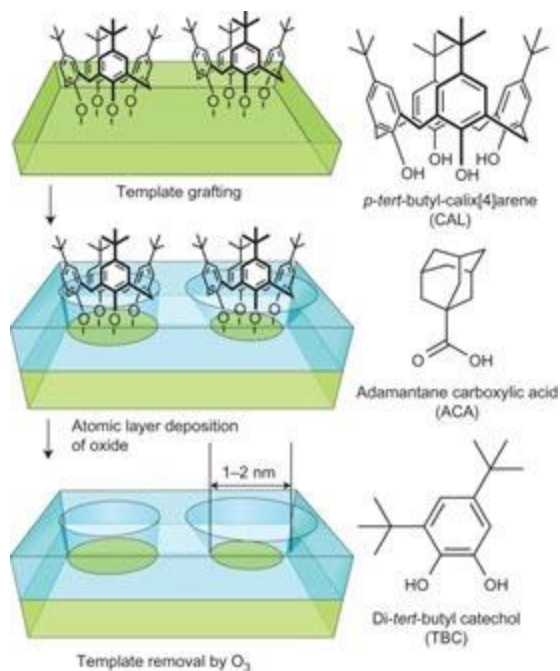
Collaboration with the Office of Science

Biological and Environmental Research Program (BER) Basic Energy Sciences Program (BES)

- Overlapping R&D areas of interest:
 - Energy crops (BER)
 - Systems biology (BER)
 - Climate change and sustainability (BER)
 - Photosynthesis (BES)
 - Catalysis (BES)



Microbe secreting hydrocarbons (Credit: Eric Steen, JBEI)



Nanosieves to improve catalyst specificity (Credit: Brandon O'Neil, Argonne EFRC)

- Biomass R&D Act
 - Biomass R&D Board and Working Groups
 - Biomass R&D Technical Advisory Committee
- Bridging Gaps Through Partnerships
 - Bioenergy Research Centers (BER)
 - Energy Frontiers Research Centers (BES)
 - Advanced Biofuels Process Demonstration Facility (BETO)

Collaboration with ARPA-E



*Chromatin Plant-Based
Sesquiterpene Biofuels*

Advanced Research Projects Agency-Energy (ARPA-E)

- Regularly coordinate by sharing information on relevant projects, especially those from the ARPA-E PETRO* REMOTE Program**, the Electrofuels Programs and other biomass-based fuels initiatives.



*PETRO: Plants Engineered to Replace Oil

**REMOTE: Reducing Emissions using Methanotrophic Organisms for Transportation Energy

Conclusions

- The Bioenergy Technologies Office works directly within the Department of Energy and with other cabinet agencies on a number of high-level initiatives.
- By coordinating efforts across agencies, our Office can tap into others' expertise, leverage existing initiatives in the federal government, and stay informed on the latest innovations in the field.
- BETO works diligently to ensure steady collaboration across the entire supply chain—bringing together experts in the field to solve the major challenges facing the industry today.



Feedstock Supply



Biomass Conversion



Bioenergy Distribution



Bioenergy End Use

DOE, USDA, NSF

DOE, USDA, NSF

DOE, DOD,
DOT, EPA

DOE, EPA, USDA
DOD, DOT



Thank You

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