U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY

Bioenergy Consortia: The Spirit of National Laboratory Collaboration

The U.S. Department of Energy's (DOE's) National Laboratories collaborate on cutting-edge research and development (R&D) projects through the use of multi-lab consortia. DOE's Office of Energy Efficiency's Bioenergy Technologies Office (BETO) funds seven bioenergy industry consortia across the United States.

Each bioenergy consortium is devoted to advancing technologies needed to drive the expansion of competitive, cost-effective, and scalable fuels and products made from renewable biomass.

This overview includes descriptions of each bioenergy consortia and their affiliated labs.

Bioenergy consortia leverage the unique R&D skills and collaborative spirit of each DOE National Laboratory. *Photos by Dennis Schroeder, NREL clockwise starting from top left: 55262, 26534, 51109, 55167, 52679, and 29650.*

Agile BioFoundry Consortium

The Agile BioFoundry Consortium platform unites the unique abilities of nine DOE National Laboratories to explore targeted R&D outcomes, such as improvements in the Design-Build-Test-Learn biological engineering cycle efficiency through the use of synthetic biology, new microbial host organisms, and market transformation through the transfer of intellectual property and biomanufacturing technologies.

Affiliated Labs:
ANL | INL | LBNL | LLNL | LANL | NREL | ORNL | PNNL | SNL

Learn more at agilebiofoundry.org.

Bioprocessing Separations Consortium

The Bioprocessing Separations Consortium platform unites the unique abilities of six DOE National Laboratories to explore targeted R&D outcomes, such as developing cost-effective, high-performing separations technologies that are coordinated with challenges relevant to industry.

Affiliated Labs:
ANL | LBNL | LANL | NREL | ORNL | PNNL

Learn more at bioesep.org.

Up to 10 DOE National Laboratories participate and collaborate on R&D projects at different consortia:

- Argonne National Laboratory (ANL)
- Idaho National Laboratory (INL)
- Lawrence Berkeley National Laboratory (LBNL)
- Lawrence Livermore National Laboratory (LLNL)
- Los Alamos National Laboratory (LANL)
- National Energy Technology Laboratory (NETL)
- National Renewable Energy Laboratory (NREL)
- Oak Ridge National Laboratory (ORNL)
- Pacific Northwest National Laboratory (PNNL)
- Sandia National Laboratories (SNL)

An NREL researcher works on a project for the Co-Optima initiative. *Photo by Dennis Schroeder, NREL 49095.*

Chemical Catalysis for Bioenergy Consortium

The Chemical Catalysis for Bioenergy Consortium (ChemCatBio) unites the unique abilities of seven DOE National Laboratories to address challenges related to the catalytic upgrading of intermediates from both high- and low-temperature processes.

ChemCatBio R&D projects accelerate the development of new biofuel catalysts and make improvements to existing catalytic systems.

Affiliated Labs:
ANL | LANL | NETL | NREL | ORNL | PNNL | SNL

Learn more at chemcatbio.org.

Consortium for Computational Physics and Chemistry

The Consortium for Computational Physics and Chemistry (CCPC) platform unites the unique abilities of five DOE National Laboratories to explore state-of-the-art computational modeling of fundamental physical and chemical processes.

New fundamental insight and models developed by the CCPC will accelerate R&D and aid in the design of advanced catalysts, enzyme systems, and reactors.

Affiliated Labs:
ANL | NETL | NREL | ORNL | PNNL

Learn more at cpcbiomass.org.

Co-Optimization of Fuels & Engines Consortium

The Co-Optimization of Fuels & Engines (Co-Optima) initiative, jointly funded by BETO and the Vehicle Technologies Office, works to advance the underlying science needed to develop fuel and engine technologies that will work in tandem to achieve significant efficiency and emissions benefits.

Co-Optima focuses on identifying and developing new high-performance biofuel blendstocks that can increase energy affordability and diversify fuel options, while reducing life cycle emissions from the transportation sector and improving the value proposition for bio-based fuels.

Affiliated Labs:
ANL | INL | LBNL | LLNL | LANL | NREL | ORNL | PNNL | SNL

Learn more at energy.gov/fuel-engine-co-optimization.

In an ongoing partnership with LanzaTech, PNNL is working to convert waste gases, such as carbon monoxide from steel mills, into jet fuel. *Photo by Andrea Starr, PNNL.*

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DISCOVR Consortium

The DISCOVR (Development of Integrated Screening, Cultivar Optimization, and Verification Research) consortium enhances algae productivity through screening of promising algae strains and implementation of effective cultivation strategies to accelerate the development of algal biofuels and bioproducts.

Affiliated Labs:
LANL | NREL | PNNL | SNL

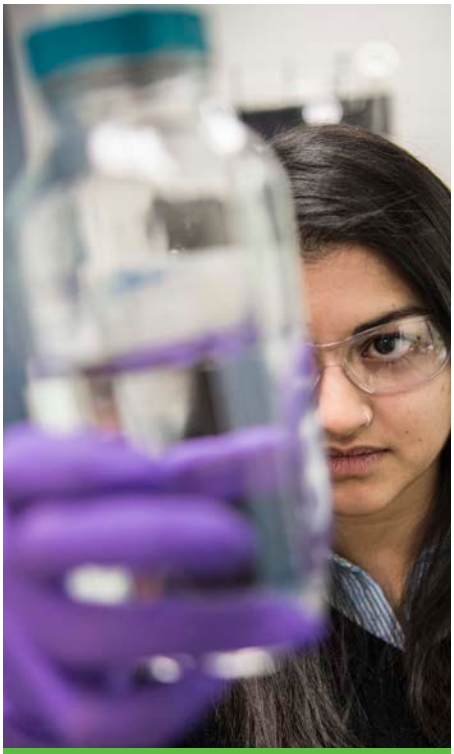
Learn more at discovr.labworks.org.

Feedstock-Conversion Interface Consortium

Researchers in the Feedstock-Conversion Interface Consortium (FCIC) quantify, understand, and manage biomass variability from the field to downstream conversion. The consortium seeks to understand how feedstock composition, structure, and behavior impacts overall biorefinery performance.

Affiliated Labs:
ANL | INL | LBNL | LANL | NETL | NREL | ORNL | PNNL | SNL

Learn more at fcic.inl.gov.



A researcher examines a drop-in hydrocarbon diesel bio blendstock in a biomass research lab.
Photo by Dennis Schroeder, NREL 55265.

Examples of ongoing bioenergy consortia R&D at DOE National Laboratories:

- **Argonne National Laboratory** performs X-ray absorption spectroscopy characterization using the lab's Advanced Photon Source to identify changes in the overall coordination environment and oxidation states in a catalyst under working conditions.
- **Idaho National Laboratory** develops tools to quantify and understand ranges and sources of feedstock variability from molecular to bulk scale. Researchers quantify the extent of variability as a function of biomass storage, harvesting, and as a result of environmental factors (e.g., drought).
- **Lawrence Berkeley National Laboratory** develops machine learning algorithms and integrates automated infrastructure to create more effective Design-Build-Test-Learn cycles, leading to more effective R&D.
- **National Renewable Energy Laboratory** accelerates development of electrochemical CO_2 conversion technologies by developing scalable methodologies to prepare tailored nanoparticle catalysts to enable production of fuels and chemicals through electrocatalytic conversion of CO_2.
- **Oak Ridge National Laboratory** worked on a multiscale simulation that incorporated biomass particle properties, reaction kinetics, and fluid dynamics to predict net bio-oil yields at the reactor scale, generating results in line with experimental observations.
- **Los Alamos National Laboratory** designs and validates cells that work as biosensors to target and produce molecules of interest, such as muconic acid, which is a building block for bioplastics.
- **Pacific Northwest National Laboratory** is developing separation methods to remove nitrogen from wastewater sludge hydrothermal liquefaction biocrudes. Nitrogen removal ensures that subsequent processing steps can be run under milder conditions, resulting in reduced costs for producing renewable fuels.
- **Sandia National Laboratories** study how algal performance deteriorates when exposed to pests and predators under bio-contained, climate-controlled systems at the laboratory to 1,000 liter scales.

Researchers operate a catalytic fast pyrolysis reactor system used to produce bio-oil.
Photo by Dennis Schroeder, NREL 54886.

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For more information, visit:
energy.gov/eere/bioenergy

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