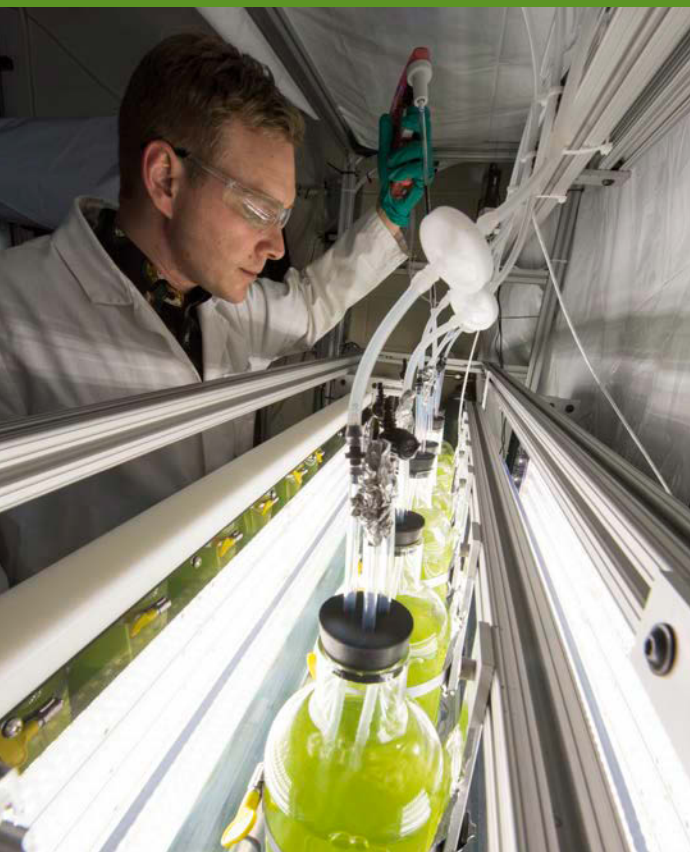


Work with Us!

Find out how you can work with NREL in the following research areas:

- Bio-derived polymer synthesis
- Strain improvement
- Conversion to fuels and products
- Fuel testing
- Techno-economic analysis
- Life cycle assessment
- Carbon capture optimization
- Compositional analysis.

Let's develop promising technologies together!



For More Information

Lieve Laurens, Algae Platform Manager
Lieve.Laurens@nrel.gov
303-384-6196

Algal Biofuels Research Program
www.nrel.gov/bioenergy/algal-biofuels.html

Algal Biofuels Research Laboratory
<https://www.nrel.gov/docs/fy17osti/67432.pdf>

Microalgae Compositional Analysis
www.nrel.gov/bioenergy/microalgae-analysis.html

NREL's algal biofuels research is supported in part by the U.S. Department of Energy's Bioenergy Technologies Office.

Photos by Dennis Schroeder, NREL 50140, 25534, 50136, 25521



National Renewable Energy Laboratory
15013 Denver West Parkway, Golden, Colorado 80401
303-275-3000 • www.nrel.gov

Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

NREL/BR-5100-72567 • October 2018

NREL prints on paper that contains recycled content.



Transforming ENERGY

Accelerating Commercialization of **Algal Biofuels** through Partnerships



Overcoming algal biofuels challenges with fundamental and applied R&D.

NREL is accelerating algal biofuels commercialization through:

- Advances in applied biology
- Algal strain development
- Development of fuel conversion pathways
- Techno-economic analysis
- Robust and high-throughput compositional analysis methodologies
- Jobs training with Algae Technology Educational Consortium

NREL scientists and engineers are addressing challenges across the algal biofuels value chain, including algal biology, cultivation, harvesting and extraction, and fuel conversion.

Through partnerships, NREL can share knowledge and capabilities in the following areas.

Algal Biology

A fundamental understanding and ability to engineer algal biology to improve biomass productivity and composition is key to developing cost-effective algal biofuels processes. NREL scientists are experts in the isolation, characterization, and metabolic engineering of microalgae species. They are identifying and manipulating genes and pathways involved in underlying metabolic processes, such as carbon fixation and storage. In addition, they have developed a high-throughput, non-destructive technique for assessing biomass and biochemical production throughout cultivation.

Cultivation

NREL researchers study algal growth capabilities and perform compositional analysis of algal biomass. Laboratory-scale photobioreactors and 1-m² open raceway ponds in an on-site greenhouse allow for year-round cultivation of algae under a variety of conditions. A bioenergy-focused algal strain collection is being established at NREL, and our laboratory houses a cryopreservation system for long-term maintenance of algal cultures and preservation of intellectual property.

Characterization

Sound analytical data underpin projects from strain improvement to process development. NREL has invested in the establishment of both robust and high-throughput analytical tools for algae characterization.

Harvesting and Extraction

NREL is investigating and demonstrating a cost-effective conversion process (Combined Algal Processing, or CAP), suitable for a variety of species and conditions, yielding distinct and highly valuable fractions of soluble carbohydrates, protein, and extractable lipids. NREL is equipped to work with partners to scale this process from bench to pilot scale and demonstrate cost-effective conversion metrics.

Fuel Conversion

NREL's excellent capabilities and facilities have been applied to algal biofuels processes, with dedicated catalytic conversion process development of algal lipids to renewable diesel fuel blendstock, as well as biological conversion of the carbohydrate fraction to ethanol at close to theoretical efficiencies. Analysts are also testing algal fuel properties to measure energy content and ensure compatibility with existing fueling infrastructure.

Techno-Economic Analysis

NREL scientists and engineers are conducting rigorous techno-economic analyses of algal biofuels processes. In addition, they are performing a full life cycle assessment of the entire algae-to-biofuels process.