Glenn Algae Project

The sustainability of aviation directly depends on the availability of fuel. With the growing gap between production and demand, increasing prices, and concentration of known reserves in politically unstable regions, biofuels are considered a viable alternative to securing the future of aviation.

Biofuels are a renewable energy source that can be customized to different fuel needs, including jet fuel. NASA Glenn has initiated a pilot program to develop in-house capabilities to study two principal sources of biofuels: sea water algae and arid land halophytes.

In order to forward the application of biofuels to aviation needs, the program is focused on

- studying the optimized properties and growth parameters
- developing collaborations with aviation companies, commercial ventures, and government agencies

Fischer-Tropsch reactor

General Information

NASA Glenn Research Center
www.nasa.gov/centers/glenn/home/

Glenn Test Facilities Guide
http://facilities.grc.nasa.gov/documents/facilities_Booklet_2005.pdf

Glenn Research Center Resume
www.nasa.gov/centers/glenn/about/

Business Development and Partnership
http://newbusiness.grc.nasa.gov

University of Delaware collaboration to investigate the use of traditional farming equipment for cultivating and harvesting of salt-tolerant plants.

Business Development and Partnership Office

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National Aeronautics and
Space Administration

Algae to Fuel

Algae to Alternative Fuels

Objectives

- Characterize properties and kinetics synthesis of alternative fuels/blends
- Characterize combustion emissions of alternative fuels/blends
- Model and simulate combustion of alternative fuels/blends
- Validate combustion emission and fuel performance

Unique Expertise

- Fuel ignition characterization
- Fischer-Tropsch synthesis kinetics conversion process evaluation studies
- Fuel chemistry
- Advanced diagnostics
- Biologically derived
- Bioengineering
- Basic and applied combustion research including emission characteristics of alternative fuels

Glenn's Good Earth Pledge

Grow salt water algae (so that we do not use fresh water).
Use arid land (so that arable land is not used for food).

Macro-algae

Competencies

Combustion

The research is focused on providing improved understanding of combustion processes to include the chemical kinetics of reacting flows, heat transfer phenomena, flow physics modeling, and code development/verification. The advanced computational methods are applied to advanced and unique concepts to assess their potential. Advanced high-temperature materials, unique fuels, and low-NOx combustion systems are assessed.

Multidiscplinary Design and Optimization

The competency assesses program activities by calculating performance and economic benefits of advanced and unconventional technologies. These assessments help influence decision-making process and strategically guide the direction of technology portfolios.

Program Management

The ~100 project and program managers at Glenn have experience in managing 119 Centaur rocket launches, the Space Station Freedom power system, Ares launch vehicle systems, as well as numerous electric propulsion, communications, aeropropulsion, and microgravity projects.

Simulation and Modeling

The focus of this competency is design and modeling to identify systems as well as components. Virtual reality techniques are used to support the design of new technologies, and simulation of environment to provide testing for systems and components.

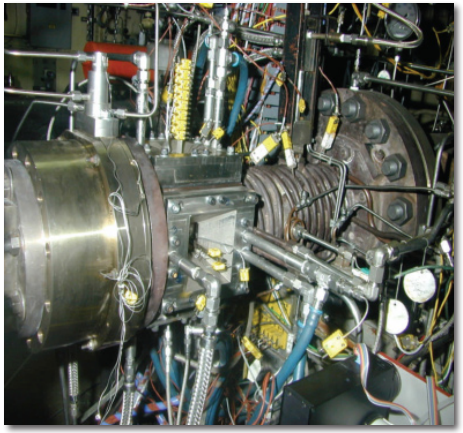
System Analysis and Engineering

This competency uses tools to analyze aerospace vehicles, propulsion, and power concepts. It is focused on the development and maintenance of systems engineering processes and the application of engineering processes at a systems level.

Analysis and Processing Equipment

Oil/lab press

Fat extractor



Flame tube

Glenn Green Lab