U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Sustainable Aviation Fuel Strategy at the Bioenergy Technologies Office

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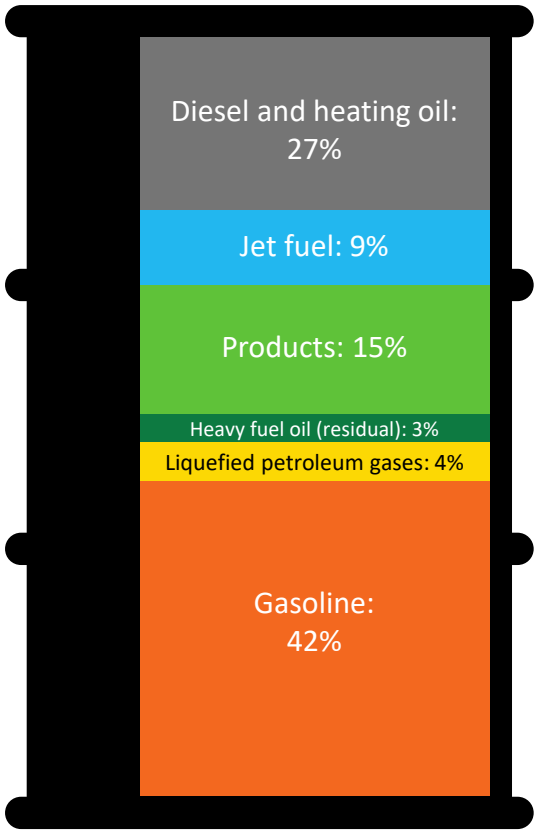
Our Economy is Built on Carbon



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BETO Critical Program Areas

Production and Harvesting

Feedstock Technologies

Lower cost, improve quality, and increase types of renewable carbon feedstock intermediates available for conversion.

Advanced Algal Systems

Increase algae productivity through algal strain improvement and efficient cultivation.

Conversion and Refining

Conversion Technologies

Reduce costs of deconstructing feedstock into intermediate products (such as sugars, intermediate chemicals, bio-oils, or gaseous mixtures).

Upgrading intermediates into liquid biofuels, bioproducts, and biopower.

Distribution and End Use

Systems Development and Integration

Systems research to combine tech components, unit operations, or subsystems developed by R&D programs into integrated processes.

Integrated processes tested (pre-pilot to demo scale) to identify further R&D needs or verify readiness for scale-up and commercialization.

Crosscutting

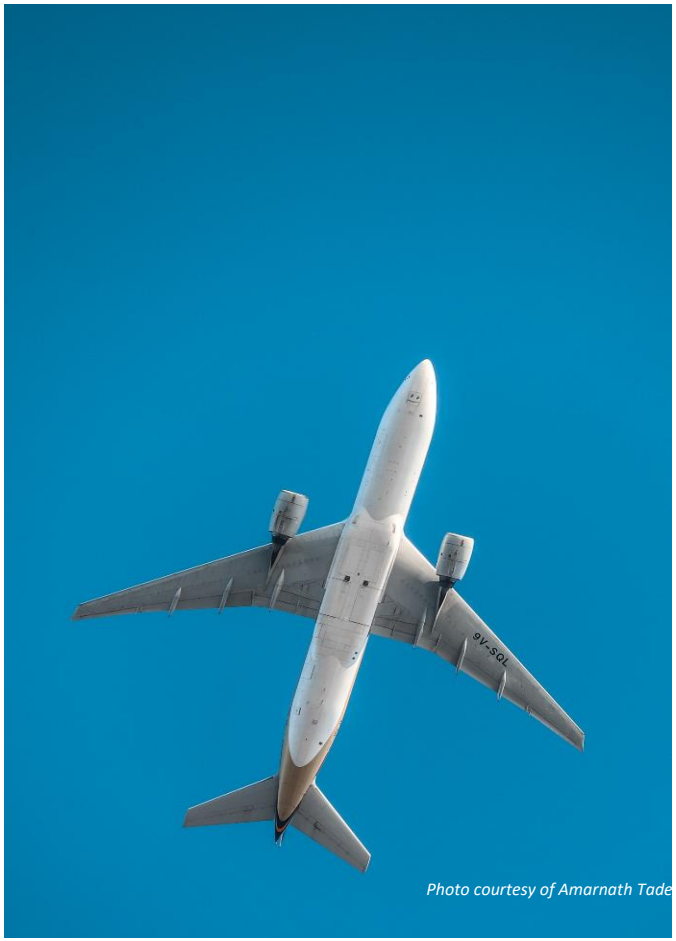
Data, Modeling, and Analysis

Track technology progress and identify opportunities and challenges related to economic/environmental impact of advanced bioenergy systems.

Challenges with Petroleum-Based Jet Fuels

- Aviation produces approximately two percent of human-caused CO_2 emissions:
  - Aviation sector contributes to 9%–12% of U.S. transportation greenhouse gas (GHG) emissions.
  - Addressing GHG emissions will require a global approach.
- **Demand for mobility in the United States projected to grow with population and economy:**
  - Aviation: +70% by 2050.
- Energy use for "hard-to-electrify" aircraft is projected to reach ~35 B gallon in 2050.

Source: U.S. Energy Information Administration , Annual Energy Outlook 2021, Reference Case, Table 11.



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SAF Grand Challenge

- The SAF Grand Challenge is the result of DOE, DOT, and USDA launching a government-wide Memorandum of Understanding (MOU) that will attempt to reduce the cost, enhance the sustainability, and expand the production and use of SAF while:
  - Achieving a minimum of a 50% reduction in life cycle greenhouse gas emissions compared to conventional fuel.
  - Meeting a goal of supplying sufficient SAF to meet 100% of aviation fuel demand by 2050.
    - A near-term goal of 3 billion gallons per year is established as a milestone for 2030
    - Mid-term goal of 17 billion gallons by 2040
    - Long-Term Goal of 35 billion gallons by 2050.

Potential Feedstocks for SAF Production

- Near-Term Feedstock: Fat, Oils, and Greases
  - Approximately 7 million dry tons/year in the US
  - HEFA processing can produce 1.1 billion gallons/year of jet fuel and 0.5 billion of green gasoline/year
  - GHG benefit is 75% compared to petroleum jet fuel.
- Mid-Term Feedstock: Ag/Forestry Residues & MSW
  - Approximately 335 million dry tons/year in the US
  - Gasification/fermentation/ethanol to jet can produce nearly 16 billion gallons/year
  - GHG benefit is >50% compared to petroleum jet fuel.
- Long-Term Feedstock: Energy Crops & Algae
  - Approximately 280 million dry tons/year in the US
  - Gasification/fermentation/ethanol to jet can produce over 20 billion gallons/year
  - GHG benefit is >50% compared to petroleum jet fuel.

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