U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY

Farm to Flight: Are Sustainable Aviation Fuels Good for the Environment?

Bioenergy Research and Education Bridge (BRIDGES) Program Case Study Fact Sheet

According to the International Air Transport Association (IATA), over 450,000 flights have taken to the skies using sustainable aviation fuel. *Photo from iStock 1294131545.*

Student Introduction to the Greenhouse Gas Emissions of Aviation Biofuels

Jet fuels are typically made with petroleum-based feedstocks. However, aviation biofuels can be developed using renewable feedstocks like agricultural residues or wet wastes like manure. Can biofuels make aviation green, or are they just another way to pollute?

Students will be introduced to the challenges and benefits of bioenergy technologies, as well as to exciting careers within the bioenergy field. Students will assume the role of a sustainability specialist in the cutting-edge biofuel industry to compare the use of sustainable and petroleum-based jet fuels, including their greenhouse gas emissions.

Students will use a fuel life cycle analysis tool, developed at the U.S. Department of Energy's (DOE) Argonne National Laboratory, to practice essential skills in synthesizing information, analyzing data, and communicating ideas.

Activity Highlights

- Case studies are designed by scientists and industry professionals.
- Learn about bioenergy-related career pathways.
- Sharpen your skills in complex systems thinking, collaboration, and communication.

BRIDGES Content Advisors

- U.S. Department of Energy (DOE) Bioenergy Technologies Office (BETO)
- Energy Sciences Division, Argonne National Laboratory
- Environmental Sustainability, United Airlines
- DOE's BETO BRIDGES National Review Board

- Explore this problem with a real fuel life cycle analysis tool developed at Argonne National Laboratory.
- No prior knowledge in bioenergy or analysis required.

Learning Goals

- Describe what bioenergy and sustainable aviation fuels are and how fuels are evaluated for environmental impact (metrics: energy, water usage, air pollutants, and greenhouse gas emissions).
- Explain life cycle analysis and describe the jet fuel pathways of petroleum fuels compared to biofuels made from waste and biomass feedstocks.
- Understand what a life cycle analytical tool is and its system boundaries, processes, inputs, and outputs.
- Using data from the fuel life cycle analysis tool, demonstrate that biofuel pathways result in fewer total greenhouse gas emissions compared to its petroleum counterpart.

Classroom Implementation

- Designed for use in a high school, community college, technical institute, or university courses.
- Requires approximately 3 hours of class time to complete.
- Students will need computers with internet access and Microsoft Excel installed. If students do not have Microsoft Excel, data can be provided in digital slide format.
- Can be taught in person or online, either synchronously or asynchronously.
- All instructional materials for both students and instructors are provided.

About the BRIDGES Program

The Bioenergy Research and Education Bridge (BRIDGES) is an education and workforce development program designed to assist educators in teaching bioenergy topics to prepare a national bioenergy workforce. Funded by the U.S. Department of Energy (DOE) Bioenergy Technologies Office (BETO), the BRIDGES Program includes real-world case studies and scenarios with expertise from education and community partners as well as industry and government partners. Learn more at energy.gov/BRIDGES.

More Information

For questions about BRIDGES or if you are interested in partnering, please email Bioenergy_Bridges@ee.doe.gov. ■

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