MOST
POLICY INITIATIVE

Biodiesel

What are the economic and environmental impacts of biodiesel production?

Research Highlights

Biodiesel is a renewable fuel made primarily from soybean oil in the U.S.

Missouri is the third largest producer of biodiesel in the nation.

Biodiesel use reduces most engine and greenhouse gas emissions. However, increased demand for biodiesel may increase food costs.

Biodiesel can be produced from vegetable oils, animal fats, and recycled restaurant grease.

Biodiesel is derived from plant and animal sources and considered a renewable fuel under the federal Renewable Fuel Standard program. In the U.S., soybean oil is the primary source for biodiesel production (EIA, 2022a).

Pure biodiesel (B100) alone is rarely used as a transportation fuel. B100 is typically mixed with petroleum to produce lower percentage blends such as B5 (up to 5% biodiesel) and B20 (5% to 20% biodiesel) (DOE, 2).

- B5 is safe for operation in any petroleum diesel engine. According to international standards, it may be referred to as "diesel fuel" without any special labeling.
- Most diesel engines do not require modifications to use up to B20.

Higher level blends like B100 contain less energy per gallon compared with petroleum diesel and can freeze or gel at low temperatures.

Biodiesel Production in the United States

The U.S. produces 2.3 billion gallons of biodiesel per year (EIA, 2022b). Domestic biodiesel production can improve energy security by reducing dependence on foreign trade.

Over half of U.S. biodiesel production occurs in the Midwest, mainly in Missouri, Iowa, and Illinois (**Figure 1**)(EIA, 2022c).

Missouri has the third largest biodiesel production capacity in the nation.

- Six plants produce 238 million gallons/year.
- From 2007 to 2019, production capacity in Missouri increased over 5x (MODOA).
- The share of U.S. production capacity that Missouri produces increased from 7.6% to 11.5% over the same period.

Biodiesel can reduce greenhouse gas emissions and most engine emissions.

Diesel Engine Emissions: Biodiesel has little to no sulfur, and its use in diesel engines reduces emissions of carbon monoxide, hydrocarbons, and particulate matter relative to petroleum diesel (Hasan, 2017). However, nitrogen oxide emissions are higher in biodiesel than petroleum diesel. Increased nitrogen oxide emissions can form acid rain, aggravate respiratory diseases, and affect air visibility and haze (EPA, 2022).

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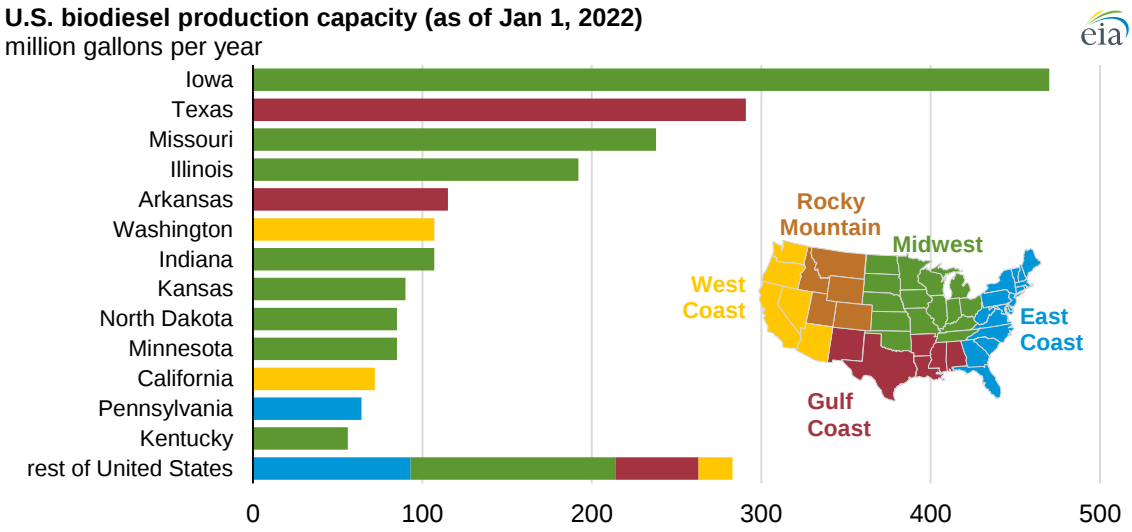

Figure 1. U.S. biodiesel production capacity as of Jan 1, 2022 (EIA, 2022c).

Life Cycle Greenhouse Gas Emissions: High biodiesel fuel blends like B100 reduce GHG emissions more than lower percentage blends. However, the exact environmental impact of biodiesel is difficult to determine because of the secondary effects of increased biodiesel usage. For instance, biodiesel production can increase the demand and cost for soybeans, which can lead to switching crops and converting spaces to create more agricultural land (Chen, 2018).

- Without considering land change effects,, B100 made from soy could reduce greenhouse gas (GHG) emissions by 76% relative to conventional petroleum diesel.
- Considering land change effects, soy biodiesel could reduce GHG emissions by 66-72% relative to petroleum diesel.

Biodiesel costs can limit its widespread use.

Biodiesel Prices: The high cost of biodiesel can limit the feasibility of replacing petroleum diesel in many cases (Gebremariam, 2018).

- The cost of raw materials (e.g., soybean oil) accounts for most production costs.
- Cheaper feedstocks are typically low quality, and require additional treatment steps to create a usable diesel blend.

Food Prices: Crops used to produce biofuel could otherwise be used for human consumption or as animal feed. Competition for the supply of these crops could lead to increased food prices, but estimates of this increase vary widely.

- One study estimates that U.S. corn ethanol production accounted for 14-43% of rising corn prices from 2000-08 (Persson, 2014).
- A different study from 2019 study suggests that biofuel production has had little to no effect on food prices (Shrestha, 2019).
- Studies on how biodiesel production affects soybean prices specifically are lacking.

Recent Legislation

Lawmakers approved HB 3 during the 2022 special legislative session, which included:

- **tax credits for biodiesel retailers** ($0.02 per gallon for blends between 5% and 10%; $0.05 per gallon for blends over 10%)
- **tax credits for biodiesel producers** ($0.02 per gallon)

These incentives are set to expire, or "sunset," on December 31, 2028. Governor Parson had vetoed a previous version of this bill during the regular session (HB 1720) due to shorter sunset lengths. *For more information, please read our memo on Agricultural Tax Incentives.*

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