Short-Term Energy Outlook: Jet Fuel Consumption Forecast

Concepts, Data Sources, and Techniques
Handbook of Energy Modeling Methods

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1. Introduction

Kerosene-type jet fuel is a refined petroleum product used in most commercial and military aircraft engines. In 2023, jet fuel accounted for 10% of total U.S. liquid fuels consumption. U.S. jet fuel consumption peaked in 2019 at 1.74 million barrels per day (b/d). The COVID-19 pandemic caused U.S. jet fuel consumption to decline 38% in 2020 as travel restrictions and changing travel patterns reduced demand for commercial aviation. So far in 2024, U.S. jet fuel consumption remains below the 2019 high.

Jet fuel is used by three categories of users:

- Commercial aviation, which includes passenger airlines and air freight companies
- General aviation, which includes recreational flying and business aviation
- Military and government aviation, which covers public sector users

We estimate commercial aviation typically accounts for 85% of jet fuel consumed in the United States. General aviation accounts for 8% of jet fuel consumption, and U.S. military and U.S. government consumers account for 7% of jet fuel consumption. The *Short-Term Energy Outlook* (STEO) Jet Fuel Consumption Module produces separate forecasts for jet fuel consumed by commercial aviation, general aviation, and military and government aviation in the United States. Those three forecasts are added together to produce the total U.S. jet fuel consumption forecast.

Jet fuel consumption refers to deliveries of jet fuel out of the primary supply chain (including from refineries, blenders, pipelines, and bulk terminals) and is referred to as *product supplied* in our weekly data from the *Weekly Petroleum Status Report* (WPSR) and in our monthly data from the *Petroleum Supply Monthly* (PSM). Forecast jet fuel consumption in our STEO reflects jet fuel leaving the primary supply chain.

The Jet Fuel Consumption Module includes assumptions on aircraft fuel efficiency and commercial aircraft capacity from the Federal Aviation Administration's (FAA) Aerospace Forecast, and it uses data from multiple federal government data sources to inform the forecast.

2. Module Outputs

The module forecast outputs include:

- Total U.S. jet fuel consumption
- U.S. commercial jet fuel consumption
- U.S. general aviation jet fuel consumption
- U.S. military and U.S. government jet fuel consumption

3. Data Sources

The data sources for jet fuel consumption include:

- EIA *Petroleum Supply Monthly* (PSM) for monthly product supplied data

- EIA *Weekly Petroleum Status Report* (WPSR) for estimated monthly product supplied volumes calculated from weekly data for the two most recent months
- Bureau of Transportation Statistics (BTS) for commercial aviation jet fuel consumption and commercial aircraft activity data
- FAA Aerospace Forecast Table 31 for general aviation jet fuel consumption data
- Defense Logistics Agency (DLA) for military and government jet fuel consumption data

Many of these data sources have a lag in publishing data. BTS and DLA data is typically released 2–3 months after the period covered. FAA data for general aviation jet fuel consumption is released once a year and only provides annual data.

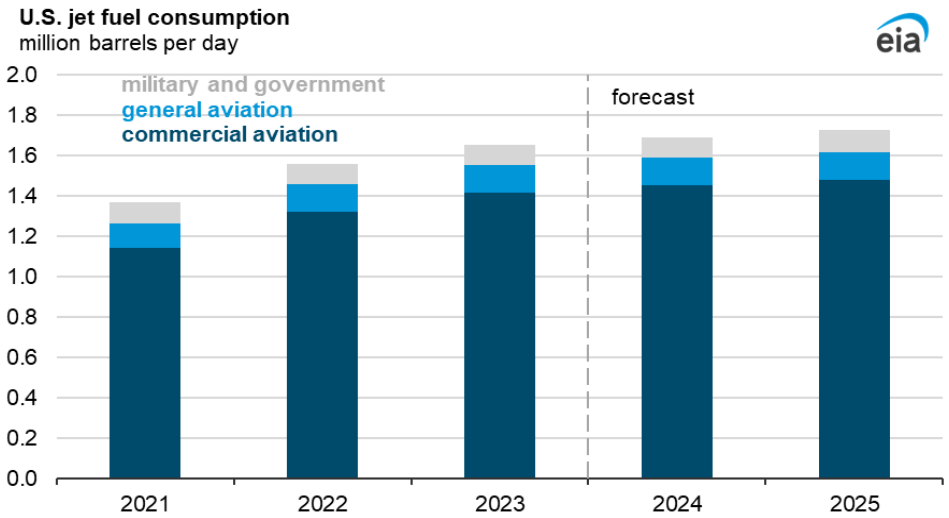
4. Jet Fuel Consumption Model

4.1 Total U.S. jet fuel consumption forecast

The U.S. jet fuel consumption (JFTCPUS) forecast is the sum of three components: commercial aviation jet fuel consumption (JFFAAUS), general aviation jet fuel consumption (JFGAAUS), and military and government jet fuel consumption (JFMGAUS).

JFTCPUS = JFFAAUS + JFGAAUS + JFMGAUS

Changes in commercial aviation usually have the largest impact on changes in total U.S. jet fuel consumption.



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, October 2024

4.2 Commercial aviation jet fuel consumption forecast

We forecast commercial aviation jet fuel consumption as a function of two things: flight activity and jet fuel efficiency. We use BTS data on available seat miles as a proxy for commercial aviation activity. The dataset includes both U.S.-based and foreign-based commercial airlines with over $20 million in annual revenue. We also use BTS data for U.S.-based commercial jet fuel consumption. We determine foreign-based commercial jet fuel consumption by subtracting other jet fuel users' consumption from the total

and taking the remainder. We use the FAA's long-term growth assumption and analyst judgement to produce the forecast for flight activity.

We estimate commercial aircraft fleet fuel efficiency in available seat miles per gallon as total available seat miles divided by total commercial jet fuel consumption in gallons (1 barrel is equal to 42 gallons):

EFF = RMPTPUS / (JFFAAUS * 42),

where

- EFF = commercial aviation fleet fuel efficiency, available seat miles per gallon;
- RMPTPUS = commercial aircraft activity, available seat miles; and
- JFFAAUS = consumption of jet fuel by commercial users, million barrels per day.

Factors adding uncertainty to the forecast include delays in new aircraft deliveries from Boeing, which puts downward pressure on fuel efficiency growth; a shortage of air traffic control workers in the United States, which puts downward pressure on commercial flight activity; and the global macroeconomic outlook, which typically has a positive relationship with commercial flight activity.

4.3 General aviation consumption forecast

We use the FAA's Aerospace Forecast for general aviation jet fuel consumption as an exogenous input into our forecast. We apply the annual growth rate to monthly consumption.

4.4 U.S. military and U.S. government consumption forecast

We model U.S. military and government jet fuel consumption using an ordinary least squares regression equation that uses the following independent variables:

- A lagged dependent variable
- Monthly dummy variables to capture seasonality