U.S. Energy Information Administration

Today in Energy

IN-DEPTH ANALYSIS

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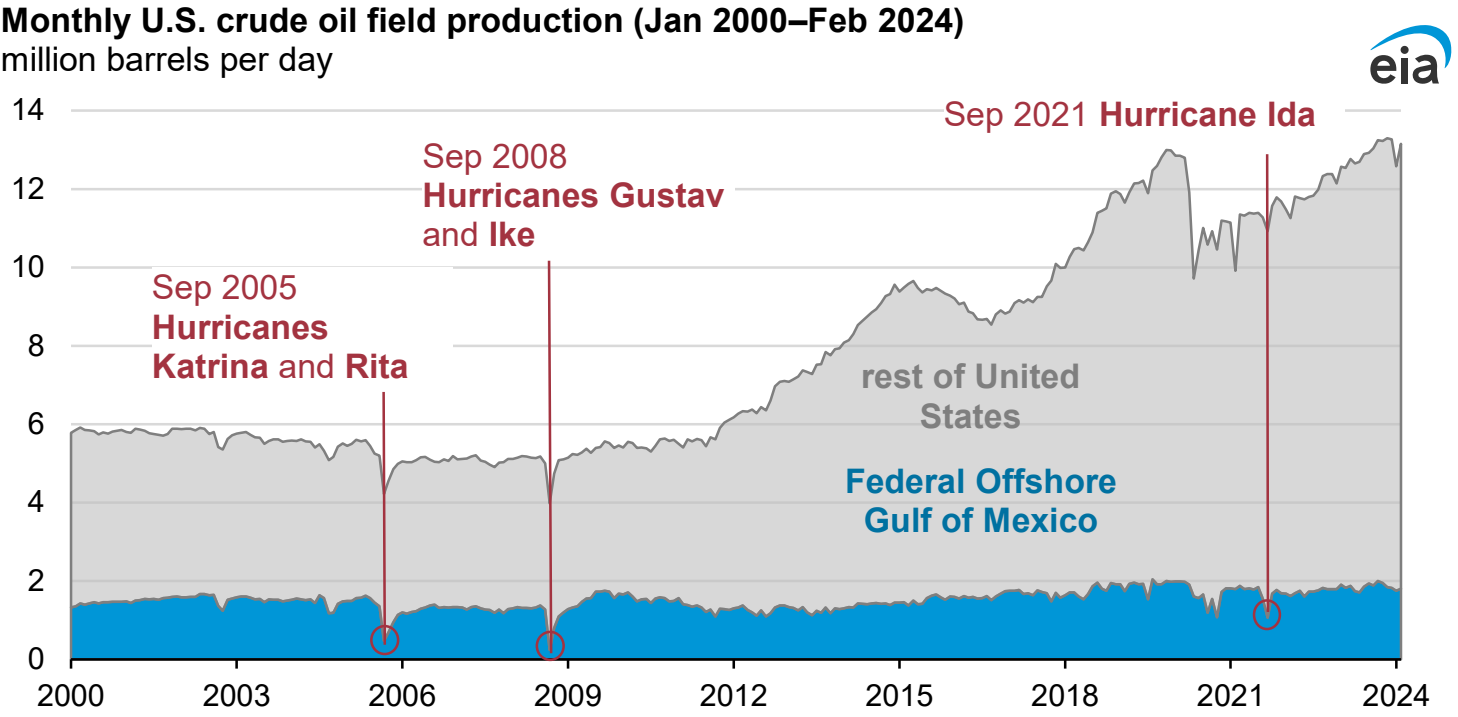
Forecast strong hurricane season presents risk for U.S. oil and natural gas industry



Data source: U.S. Energy Information Administration, *Petroleum Supply Monthly*

Meteorologists are forecasting a particularly intense Atlantic hurricane season this year; they expect 20–25 named storms with a possibility of 30 or more, according to reports from AccuWeather in April. Colorado State University similarly forecasts an estimated 23 named storms this year. The potential for a stronger hurricane season suggests heightened risk for weather-related production outages in the U.S. oil and natural gas industry.

The 2023 Atlantic hurricane season had 20 named storms, but only one hurricane made landfall in the United States. None of last year's storms had a significant impact on U.S. petroleum infrastructure. More information on energy infrastructure and potential storm risks is available using our Energy Atlas.

What is hurricane season?

The National Oceanic and Atmospheric Administration's (NOAA) National Hurricane Center defines the Atlantic hurricane season as running from June 1 through November 30. Generally, June is the month when the earliest named storms begin forming in the

Atlantic Basin, and the most severe hurricanes usually form in August and early September. In the United States, hurricanes most often hit the Southeast (PADD 1C) and the U.S. Gulf Coast (PADD 3).

How do hurricanes affect petroleum markets?

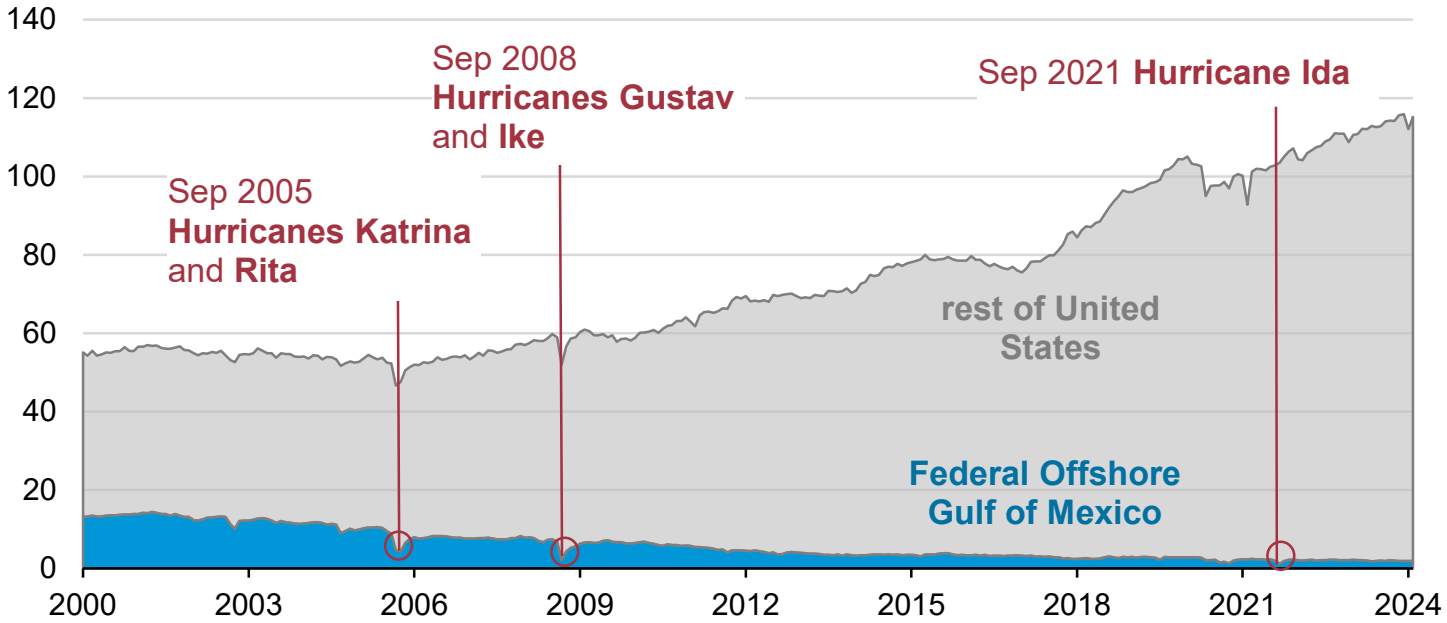
Hurricanes primarily affect petroleum markets by disrupting crude oil production and refinery operations. Offshore crude oil in the United States is concentrated in the Federal Offshore Gulf of Mexico (GOM) and could be significantly limited by inclement weather. Offshore oil and natural gas floating production units must contend with some of the most severe hazards associated with hurricanes and tropical storms; they must have emergency procedures to evacuate nonessential personnel and temporarily halt production. In 2023, GOM crude oil production accounted for 14% of U.S. crude oil production.

Refining of crude oil is also affected by hurricanes in certain parts of the Gulf Coast. Refineries along the Texas and Louisiana Gulf Coast account for almost half of U.S. refining capacity. These facilities risk flooding or power outages associated with major storms or hurricanes. Like offshore floating production facilities, many refinery operators will evacuate nonessential personnel and temporarily stop production if they believe severe weather might injure employees or damage their facilities.

Do hurricanes affect natural gas markets?

A hurricane could also reduce natural gas production in the GOM, which is mostly associated gas production; however, recent hurricanes have had a much smaller impact on total U.S. natural gas supply because natural gas production in the GOM has been declining for years. The GOM provided less than 2% of total U.S. marketed natural gas production in 2023, down from 17% in 2005 when Hurricanes Katrina and Rita interrupted significant volumes of natural gas production.

Monthly marketed natural gas production (Jan 2000–Feb 2024)
billion cubic feet per day



Data source: U.S. Energy Information Administration, *Natural Gas Monthly*

Hurricanes can affect U.S. natural gas demand by interrupting liquefied natural gas (LNG) export operations. The United States has nearly 13 billion cubic feet per day of LNG export capacity located on the Gulf Coast, making it vulnerable to weather-related disruptions such as hurricanes. Although LNG facilities generally have many layers of protection from direct impact, hurricanes can damage electrical and marine infrastructure and hamper ship movement. For example, the effects of Hurricane Laura, which made landfall in August 2020, temporarily halted LNG exports from Louisiana's Sabine Pass and Cameron LNG facilities.

What determines the scale of a weather-related impact on markets?

A storm's location is the main determining factor of the severity of its impact on petroleum and natural gas markets, followed by the storm's intensity. An intense storm that affects a region without production or refining capacity is unlikely to affect overall U.S. supplies.

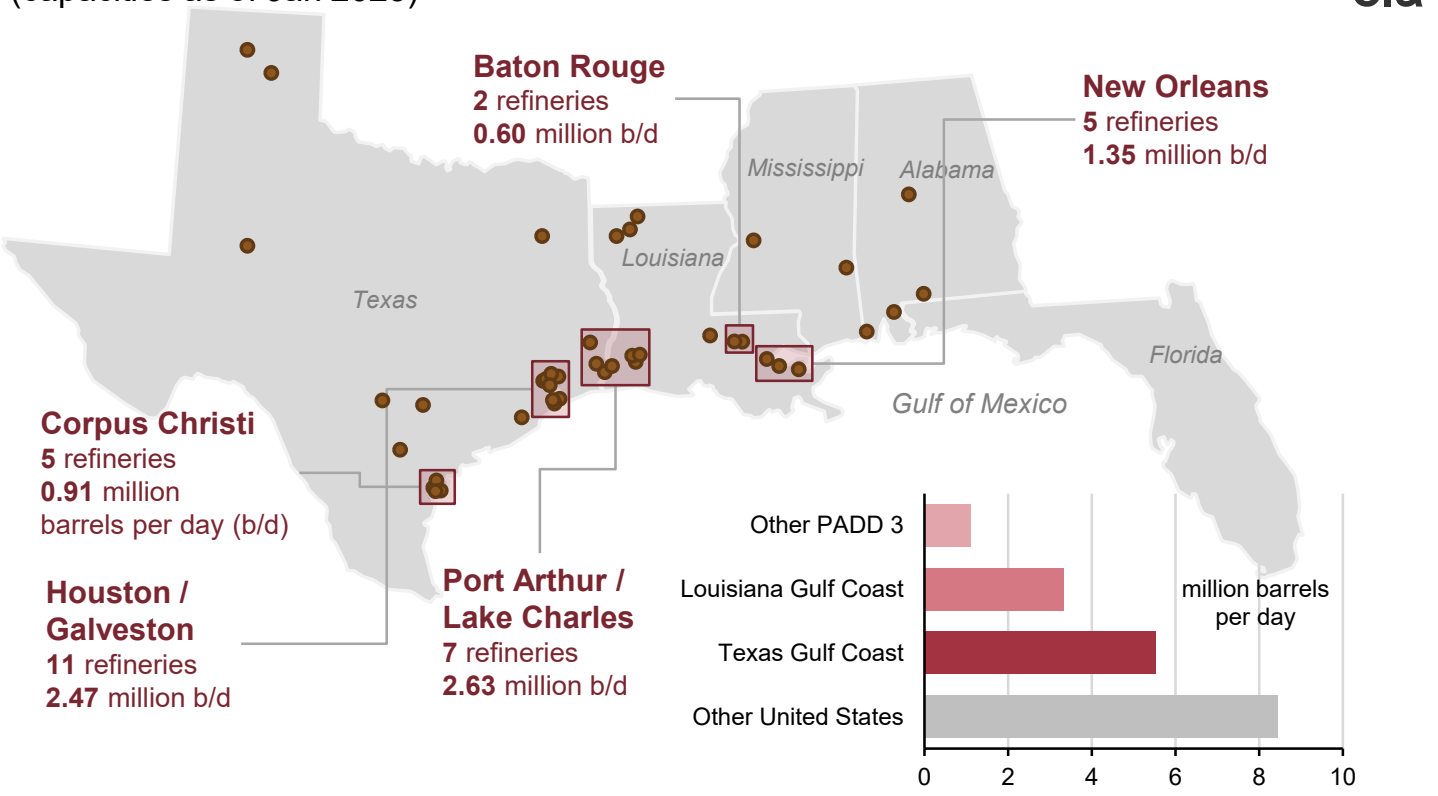
Hurricanes can affect local consumption, however. In instances where regions face an impending major hurricane or other emergency, changes in consumer behavior can lead to brief regionalized spikes in fuel demand, which could affect prices because of local supply shortfalls or panic-buying.

Hurricanes can also disrupt supply chains for petroleum products. Although petroleum fuels are not refined in Florida, the state has significant gasoline demand. Fuel supplies in Florida are primarily shipped on barges from Gulf Coast refineries, such as those in Texas and Louisiana. Hurricanes and tropical storms can lead to brief disruptions in these barge transfers, leading to associated shortfalls in local supply.

How much refinery capacity is at risk from hurricanes?

The Texas Gulf Coast refining region has clusters of refinery capacity in Corpus Christi, Port Arthur, and the Houston-Galveston region. The refining region has 5.5 million barrels per day (b/d) of refinery capacity and has the largest refineries in the United States, including Motiva's 626,000-b/d Port Arthur refinery, Marathon's 593,000-b/d Galveston Bay refinery, and ExxonMobil's 610,000-b/d Beaumont and 564,000-b/d Baytown refineries.

Petroleum refining centers in selected U.S. Gulf Coast states
(capacities as of Jan 2023)



Data source: U.S. Energy Information Administration, *Petroleum Supply Monthly*

Refineries on the Louisiana Gulf Coast account for an additional 3.3 million b/d of capacity, including Marathon's 596,000-b/d Garyville refinery northeast of New Orleans and ExxonMobil's 523,000-b/d Baton Rouge refinery.

The two refining regions combined account for 48% of total U.S. refinery capacity. The path of a single hurricane or major storm is unlikely to affect more than a single cluster of refineries. However, because of the total volume of refining capacity in either region, more than 1.0 million b/d of capacity could be temporarily taken offline in anticipation of a major storm.

Refineries that sustain major damage or flooding because of a storm may be taken offline for longer periods. Major storm damage costs a lot to repair. In the severe cases, this damage may lead to a refinery permanently closing. In 2021, Phillips 66's Alliance refinery in Belle Chase, Louisiana, closed following significant storm damage.

Hurricanes don't often hinder refining operations in the mid-Atlantic (PADD 1B) region, although the largest refinery on the East Coast—the 259,000-b/d Bayway refinery in New Jersey operated by Phillips 66—was affected by Hurricane Sandy in 2012. Similar incidents at Bayway or storms that limit imports into New York Harbor also present a potential risk to U.S. petroleum supplies.

Does EIA forecast hurricane impacts on oil in the *Short-Term Energy Outlook?*

In our *Short-Term Energy Outlook*, we assume a percentage of GOM crude oil production will be offline during each month of the hurricane season, based on the average percentage of offline monthly production during the previous 10 hurricane seasons (2014–23).

We do not forecast reduced refinery activity explicitly attributed to the hurricane season. However, seasonal impacts of downturns related to hurricanes are partially captured in monthly seasonality variables.

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