February 2023

PETROLEUM WATCH

CALIFORNIA ENERGY COMMISSION

INSIDE

REFINERY NEWS

- **PBF Martinez:** On December 9, a compressor tripped causing a flaring event as reported by California Governor's Office of Emergency Services and CBS News.
  On December 22, a power dip led to flaring as reported by KRON.
- **Kinder Morgan:** On December 20, the pipeline that serves San Diego area temporarily shut down because of a leak as reported by CBSB and NBC7. The leak was repaired on January 5, 2023, as reported by the San Diego Union Tribune.

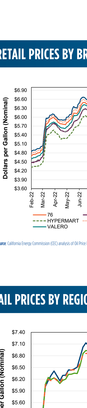
CALIFORNIA GASOLINE RETAIL PRICES BY BRAND

January 2023 vs. 2022

(Percentage Change)	
76	4% lower
ARCO	5% lower
Chevron	2% lower
Hypermart	7% lower
Shell	3% lower
Unbranded	5% lower
Valero	5% lower

January 2023 Averages

76	$4.51
ARCO	$4.25
Chevron	$4.72
Hypermart	$4.00
Shell	$4.65
Unbranded	$4.25
Valero	$4.41



Source: California Energy Commission (CEC) analysis of Oil Price Information Service (OPIS) data

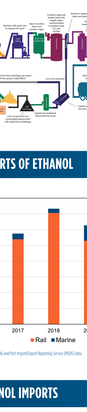
CALIFORNIA DIESEL RETAIL PRICES BY REGION

January 2023 vs. 2022

(Percentage Change)	
Northern CA	14% higher
Central CA	15% higher
Southern CA	14% higher

January 2023 Averages

Northern CA	$5.52
Central CA	$5.40
Southern CA	$5.47

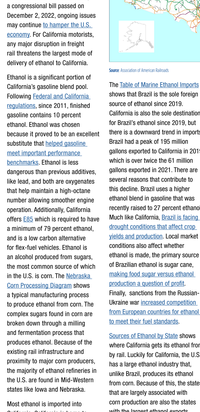


Source: CEC analysis of OPIS data

NEBRASKA CORN PROCESSING DIAGRAM

Source: Nebraska Corn Processing, LLC

MARINE AND RAIL IMPORTS OF ETHANOL



Source: CEC analysis of Petroleum Industry Information Reporting Act (PIIRA) and Port Import/Export Reporting Service (PIERS) data

TABLE OF MARINE ETHANOL IMPORTS

UNITED STATES (U.S.) IMPORTS

County	2015	2016	2017	2018	2019	2020	2021	2022
Brazil	88.1	35.7	76.6	53.1	195.0	143.7	60.8	39.7
Canada	3.4	0.5	0	0	0	0	0	0.3
Guatemala	0	0	0	1.2	0	0	0	0
Lithuania	0.6	0	0	0	0	0	0	0
Netherlands	3.7	0	0	0	0	0	0	0
Russia	0.2	0	0	0	0	0	0	0
Spain	2.5	0	0	0	0	0	0	0

CALIFORNIA IMPORTS

County	2015	2016	2017	2018	2019	2020	2021	2022
Brazil	40.9	31.8	72.4	53.1	195.0	143.7	60.8	39.7
Guatemala	0	0	0	1.2	0	0	0	0

Source: CEC analysis of PIIRA, Energy Information Administration (EIA), and PIERS data

Note: Values in table are in Million Gallons.

SOURCES OF ETHANOL BY STATE (2021)

Source: CEC analysis of PIIRA and PIERS data

Note: Values in Gallons

FEATURED TOPIC

ETHANOL IMPORTS

The threat of a major railroad strike in the United States (U.S.) loomed throughout the second half of 2022. Railroads account for 40 percent of all freight movement across the U.S., and a strike is estimated to cost the U.S. economy $2 billion dollars a day, affecting all sectors of the economy. While the strike was averted by a congressional bill passed on December 2, 2022, ongoing issues may continue to hamper the U.S. economy. For California motorists, any major disruption in freight rail threatens the largest mode of delivery of ethanol to California.

Ethanol is a significant portion of California's gasoline blend pool. Following federal and California regulations, since 2011, finished gasoline contains 10 percent ethanol. Ethanol was chosen because it proved to be an excellent substitute that helped gasoline meet important performance benchmarks. Ethanol is less dangerous than previous additives, like lead, and both are oxygenates that help maintain a high-octane number allowing smoother engine operation. Additionally, California offers E85 which is required to have a minimum of 79 percent ethanol, and is a low carbon alternative for flex-fuel vehicles. Ethanol is an alcohol produced from sugars, the most common source of which in the U.S. is corn. The Nebraska Corn Processing Diagram shows a typical manufacturing process to produce ethanol from corn. The complex sugars found in corn are broken down through a milling and fermentation process that produces ethanol. Because of the existing rail infrastructure and proximity to major corn producers, the majority of ethanol refineries in the U.S. are found in Mid-Western states like Iowa and Nebraska.

Most ethanol is imported into California. California is home to four refineries that can produce 188 million gallons of ethanol per year. In 2021, Californians consumed 13.8 billion gallons of gasoline, and 55 million gallons of E85. Therefore, a minimum of 1.42 billion gallons of ethanol was needed. The deficit of more than 1.23 billion gallons of ethanol was imported. The Marine and Rail Imports of Ethanol graph shows that most imports are by rail, accounting for 93 percent of all imports since 2015. In 2021, the last year of available, rail accounted for 1.48 billion gallons of ethanol, while marine tallied 61 million gallons. This exceeds the amount used by the transportation industry, which indicates that other industries are consuming roughly 300 million gallons of ethanol annually.

RAIL NETWORK MAP

Source: Association of American Railroads

The Table of Marine Ethanol Imports shows that Brazil is the sole foreign source of ethanol since 2019. California is also the sole destination for Brazil's ethanol since 2019, but there is a downward trend in imports. Brazil had a peak of 195 million gallons exported to California in 2019, which is over twice the 61 million gallons exported in 2021. There are several reasons that contribute to this decline. Brazil uses a higher ethanol blend in gasoline that was recently raised to 27 percent ethanol. Much like California, Brazil is facing drought conditions that affect crop yields and production. Local market conditions also affect whether ethanol is made, the primary source of Brazilian ethanol is sugar cane, making food sugar versus ethanol production a question of profit. Finally, sanctions from the Russian-Ukraine war increased competition from European countries for ethanol to meet their fuel standards.

Sources of Ethanol by State shows where California gets its ethanol from by rail. Luckily for California, the U.S. has a large ethanol industry that, unlike Brazil, produces its ethanol from corn. Because of this, the states that are largely associated with corn production are also the states with the largest ethanol exports. Nebraska, South Dakota, Kansas, Texas, and Iowa accounted for 1.31 billion of the 1.48 billion gallons of ethanol exported to California in 2021. Total U.S. production in 2021 was 15 billion gallons of ethanol, making California the destination of 9.9 percent of all U.S. production.

If there is a long-term rail disruption, the California transportation industry would be in a difficult position. If a physical track was destroyed due to a landslide or maintenance issue, it would be possible to reroute the train deliveries, as there are eight entry points into California. A more systematic issue such as a rail strike, where trains did not operate and ethanol was not delivered, would need emergency measures to be taken. Industry has roughly seven to ten days' worth of ethanol inventory, so the effects would not be felt for a little over a week. California production and foreign imports combine for a quarter of the needed ethanol supply so a small amount of gasoline could still be manufactured as usual. It is uncertain if there is another gasoline additive that could replace ethanol in sufficient quantities while maintaining the current standards for the gasoline formulas. The 75 percent of remaining gasoline would need some type of waiver to be allowed to be sold in California. It could be possible that pure gasoline would have to be sold without ethanol to ensure that California has sufficient supply.

As the regulations for approving a 15 percent ethanol gasoline mixture, or E15, moves forward, the added demand for ethanol will require additional infrastructure. A five percent increase in the ethanol mixture of gasoline would increase demand approximately 690 million gallons based on 2021's gasoline demand. Additional refineries built in California could possibly process more ethanol, but it would require years of construction and an increased demand in corn that might not be readily available. Foreign sources of ethanol will not be reliable as Brazil is the only major supplier, so any major crop failure or increased demand would limit supply and spike prices. Domestic production to meet the increased demand is ideal, but transporting additional ethanol from the Midwest to California could be an issue. Petroleum fuels are not transported into California by pipeline. Even if they were, ethanol would not be transported in these pipelines as ethanol's affinity for water can damage oil pipelines, causing pitting and increasing the possibility of leaks. This leaves California reliant on a robust and well-run rail system as the only option for the short and medium term to meet its current and future demand of ethanol.

Visit our website for more information about California's Petroleum Market.

The CEC welcomes feedback on Petroleum Watch.
Please contact Media and Public Communications Office at mediaoffice@energy.ca.gov