

PETROLEUM WATCH

CALIFORNIA ENERGY COMMISSION

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REFINERY NEWS

- Marathon Carson:** September 3 through September 9, shut down a unit according to [Reuters](#).
- Chevron Richmond:** On September 11, flaring occurred due to an equipment failure according to [California Office of Emergency Services](#) and [Reuters](#).
- Valero Benicia:** On September 20, planned work began on units according to [Reuters](#).
- Phillips 66 Wilmington:** On September 21, flaring occurred due to a fire on a reformer unit which resulted in the material burning up according to [California Office of Emergency Services](#) and [Reuters](#).

CALIFORNIA GASOLINE RETAIL PRICES BY BRAND

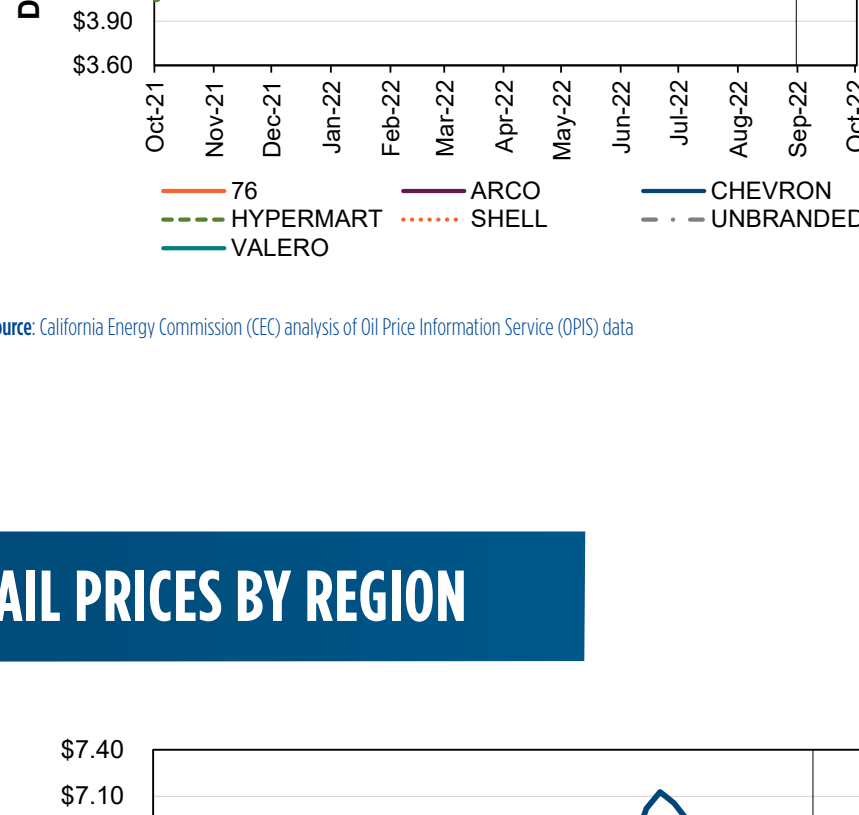
September 2022 vs. 2021

(Percentage Change)

76	25% higher
ARCO	26% higher
Chevron	27% higher
Hypermart	25% higher
Shell	27% higher
Unbranded	26% higher
Valero	26% higher

September 2022 Averages

76	\$5.59
ARCO	\$5.29
Chevron	\$5.86
Hypermart	\$5.05
Shell	\$5.75
Unbranded	\$5.34
Valero	\$5.51



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

CALIFORNIA DIESEL RETAIL PRICES BY REGION

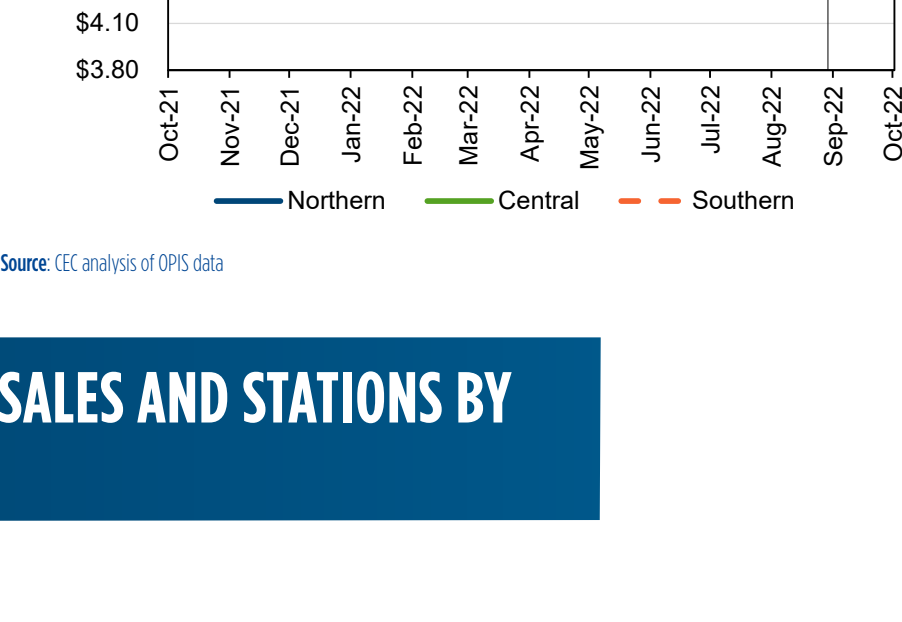
September 2022 vs. 2021

(Percentage Change)

Northern CA	39% higher
Central CA	43% higher
Southern CA	44% higher

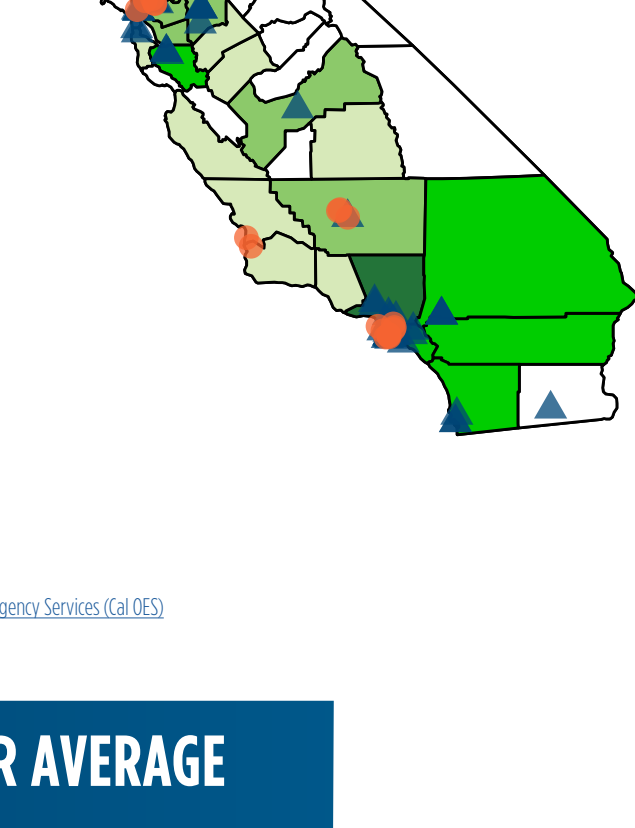
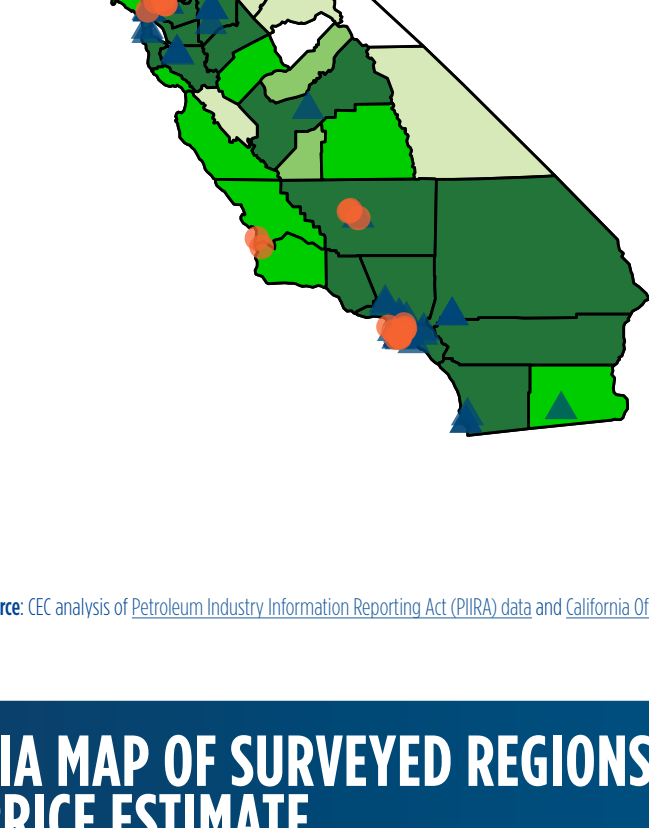
September 2022 Averages

Northern CA	\$6.24
Central CA	\$6.16
Southern CA	\$6.15



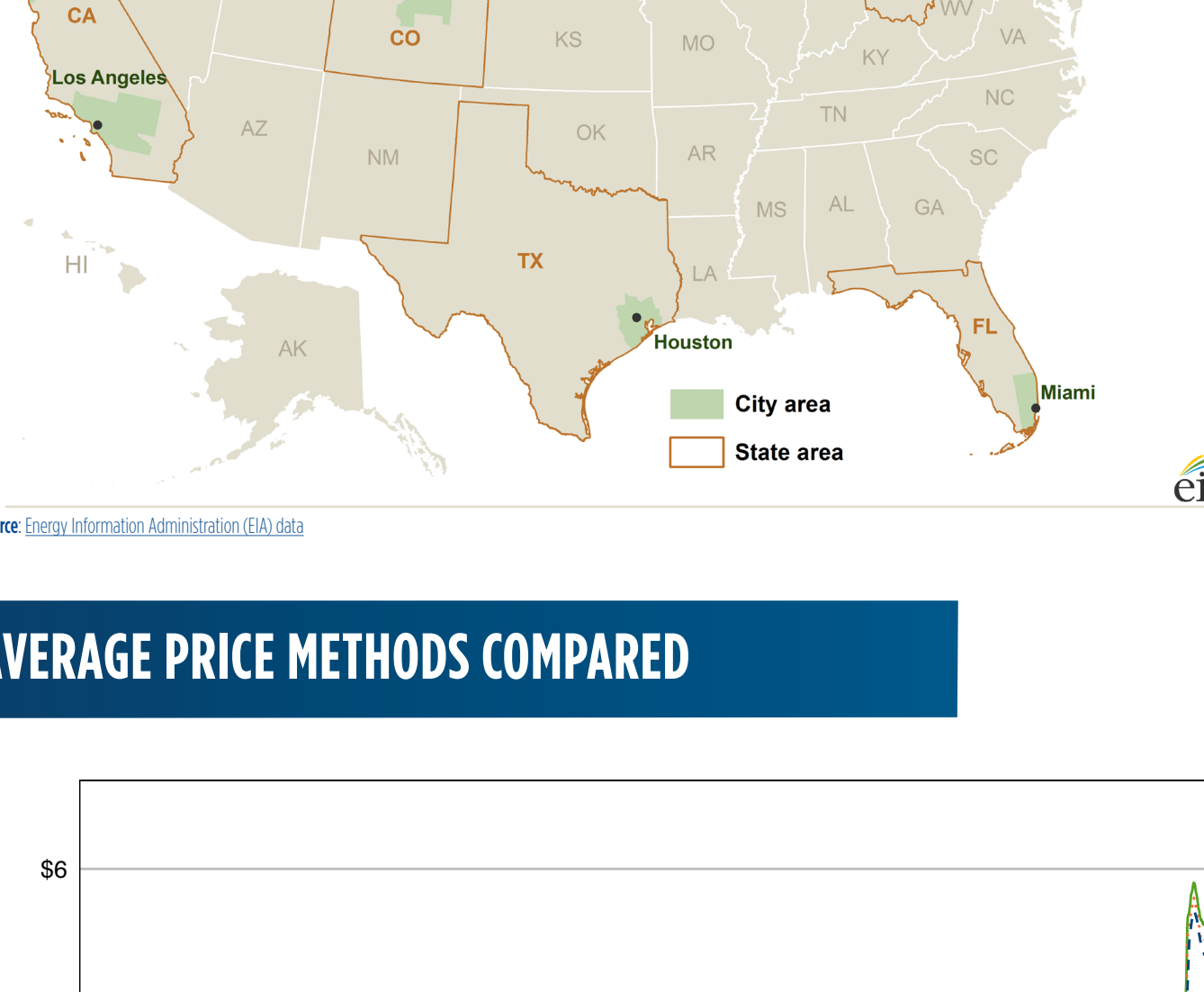
Source: CEC analysis of OPIS data

CALIFORNIA GASOLINE SALES AND STATIONS BY COUNTY (2021)



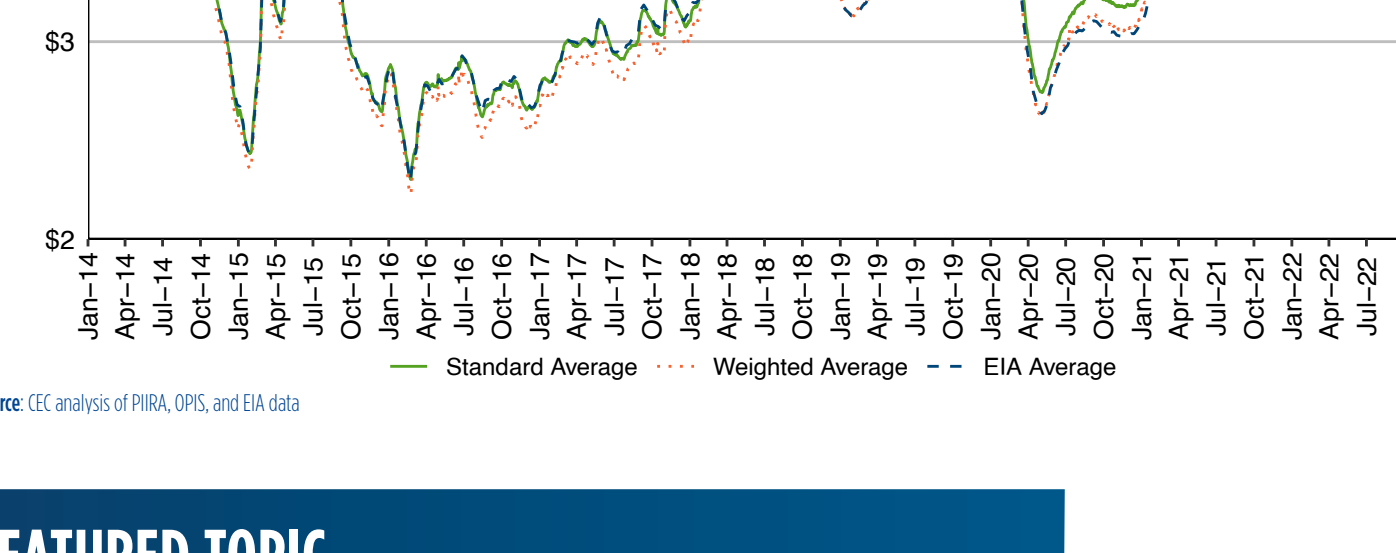
Source: CEC analysis of Petroleum Industry Information Reporting Act (PIRA) data and California Office of Emergency Services (Cal OES)

EIA MAP OF SURVEYED REGIONS FOR AVERAGE PRICE ESTIMATE



Source: Energy Information Administration (EIA) data

AVERAGE PRICE METHODS COMPARED



Source: CEC analysis of PIRA, OPIS, and EIA data

FEATURED TOPIC

AVERAGING GASOLINE PRICES

The average gasoline price for the day (or week or month, etc.) is often a simple average taking all the posted prices for that time period. The posted price is found on retail signs on the street or listed in mobile apps like GasBuddy. The simple average is calculated by summing the prices and dividing the number of prices in the set, but this method may not directly reflect what the average driver pays. Just because a station sets their price to [\\$9.00 per gallon](#) doesn't mean that the average driver fills up at that rate. Instead, weighing the costs by the volumes of gasoline sold yields a weighted average, producing a more accurate picture of what Californians spend on gasoline.

Most people are familiar with a weighted average from school, where exams and projects had more impact on the final grade than homework assignments. For example, a final exam may comprise 60 percent of the grade, midterms 30 percent, and homework the remaining 10 percent. Applying that same logic to the average gasoline price, stations that have a higher percentage of the state's total gasoline sales have a greater effect on the average price. This method helps reduce the effects of price outliers that may appear while accounting for the geographic and demographic qualities such as proximity to distribution infrastructure, population counts, number of retail stations in the area, or even fuel brand presence.

CALIFORNIA GASOLINE INFRASTRUCTURE

California has 8,435 retail stations (2021) spread out across its 58 counties according to the [California Retail Fuel Outlet Annual Report](#). [California Gasoline Stations by County \(2021\)](#) shows the distribution of sales (in gallons sold) and number of reporting retail stations within each county. Additionally, the map includes the locations of refineries and terminals that supply gasoline throughout the state.

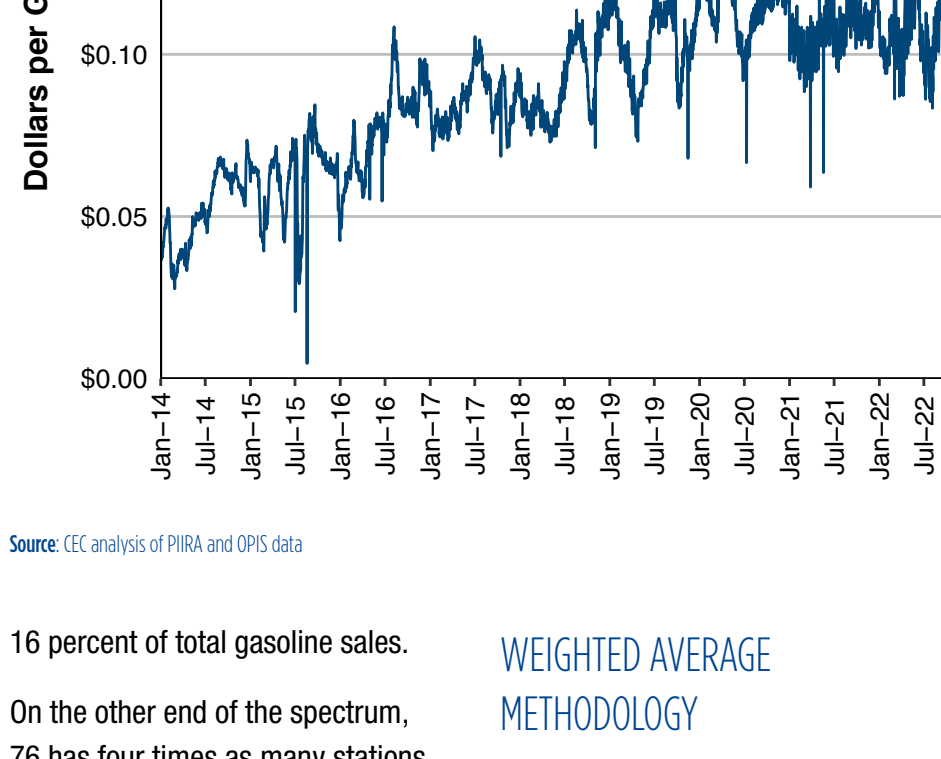
The production (refineries) and storage facilities (terminals) require a system of pipelines and delivery trucks to distribute fuel across the state (see the [March 2020](#) and [August 2021](#) Petroleum Watch for more information on delivery infrastructure). Distribution costs are another factor to consider when weighing gasoline prices.

As a result of the distribution network's setup, the average price of gasoline will generally rise on the regional level first, then statewide. California essentially has two separate regional markets due to pipeline infrastructure: Northern California and Southern California. The farther a station is from a refinery or fuel terminal, the more the retail station pays for their wholesale fuel since it costs more to deliver. Most stations (and sales) are near the refineries and terminals. Stations in rural areas that are farther from terminals have higher prices since it costs more to receive the fuel. They also have less sales volume, so their prices have less weight toward the average.

FUEL BRAND EFFECT ON PRICE AVERAGE

In addition to the geographic differences, not all fuel brands have the same pricing strategies according to [California Gasoline Retail Prices by Brand](#). Certain fuel brands tend to price higher than unbranded or hypermart stations. A hypermart station (Costco, Safeway, etc.) is defined as a station that is a company owned or operated supermarket or wholesale chain store that sells their own fuel at the same location. The [October 2020 Petroleum Watch](#) explored how more station locations for a specific brand did not equate to more sales of gasoline. Hypermarts have the least amount of presence by station count, less than three percent, but have over

STANDARD AVERAGE LESS STATION WEIGHTED AVERAGE



Source: CEC analysis of PIRA and OPIS data

16 percent of total gasoline sales.

On the other end of the spectrum, 76 has four times as many stations as hypermarts but only represents about eight percent of the sales volume. As a higher priced brand with many more posted prices going into the average, 76 has a larger impact on the standard average than hypermarts despite selling half the fuel volume. Chevron also brings up the standard average as the brand with the most stations (excluding unbranded) and usually has the highest prices as shown in [California Gasoline Retail Prices by Brand](#).

GASOLINE PRICE SOURCES

The California Energy Commission (CEC) uses two different sources for gasoline prices and other transportation fuel prices: the Energy Information Administration (EIA) and Oil Price Information Services (OPIS). Both use different methods for collecting and averaging prices. Both price sources include taxes.

EIA

EIA provides averages for retail gasoline prices on [weekly](#), [monthly](#), and [annual periods](#). They collect the prices every Monday by surveying stations over telephone, email, text, or fax and maintain their own process for error checking. Their survey also includes volumes sold to weigh the weekly average for that state. Additionally, only certain cities and metropolitan areas are included in their survey sample, rural counties seen in the sales and station map mentioned above are not included in their average.

[EIA Map of Surveyed Regions for Average Price Estimate](#) shows the specified metropolitan areas they sample prices from for each state. California is mainly composed of the San Francisco and Los Angeles areas where refineries and terminals have the most presence. This arrangement for choosing stations extends to the other states. The [June 2021 Petroleum Watch](#) explored this issue and found that California has a much wider distribution of price ranges. Sampling from a single metropolitan area is likely closer to entire state averages for Texas or New York.

It is important to note that EIA changed their methodology in May 2018, which noticeably lowered their weekly average. This changed the sampling frame, estimation methods, and how they defined the city areas. More information on their sampling methodology can be found on their [website](#).

OPIS

OPIS provides daily price reports that include prices from all stations in the nation. Included with the daily posted price is the fuel brand of the station and address. OPIS primarily sources their prices through credit card swipe data and does not limit their collection to specific cities or metropolitan areas, providing a wider pool of station prices compared to the EIA source. However, OPIS does not factor in the volume of sales. OPIS information is only available through a subscription but a public source for their pricing data is available through [AAA website](#). Visit the [OPIS website](#) for more information on the OPIS retail reports.

WEIGHTED AVERAGE METHODOLOGY

This Petroleum Watch calculates a weighted average based on each station's individual price and sales data by combining OPIS daily price information and the CEC's annual retail outlet data. This method only uses regular gasoline sales volumes since that is the price received through OPIS. Additionally, only the OPIS addresses that exist in the CEC's A15 database are used, which is about 84 percent of the OPIS addresses.

The weights (or coefficients) for the weighted average formula takes the reported total sales per year for each individual station and divides by the total sales per year of all stations. These weights allow an individual station's sales performance to adjust the daily average so that stations with higher volume (like the hypermarts and unbranded) have more impact on the daily average. [Average Price Methods Compared](#) lists three different daily price averages since 2014. The standard price is consistently higher than the weighted average (orange dotted) since 2014 by at least \$0.05 and increases to \$0.10 after 2019. The EIA average (blue dashed line) begins to match the weighted average after the method switch in May 2018. This suggests that EIA's sample area of just the San Francisco and Los Angeles regions is an accurate reflection of the state average as a whole.

[Standard Average less Station Weighted Average](#) plots the difference between the two average methods (excluding the EIA average). In 2014, the difference stayed within \$0.05 but increased after 2015, around the time of the Torrance Refinery explosion. This is also around the time when the ["Mystery Surcharge"](#) surfaced, an unexplained \$0.20-\$0.30 price gap in California's retail gasoline price. The station weighted average solves a portion of that mystery.

TAKEAWAYS

The standard average of gasoline prices is still useful for gauging the overall trend in the gasoline market. It captures the effect of crude oil prices, any changes in the supply market, and consumer demand. It's also easily available to most of the public since it does not require proprietary or confidential information to calculate. There are other shortfalls with using the standard average as well, such as ignoring the seasonal variations in pricing along with the local branding and locational nuances that get lost when averaging across the entire state. Averaging on the county, city, or zip code levels could alleviate some of these issues without the need for volume sales data.

Fortunately the EIA has a weekly average that does involve volume weighing and a reliable pool of stations to sample from. This is a good resource for a more accurate average price. However, in a time where gasoline prices are steadily over \$5-6 per gallon and [refiner margins](#) are nearly half of that, the \$0.10 - \$0.15 difference between averaging methods may not seem as significant. 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.

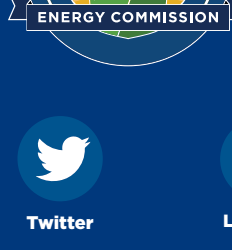
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