



# California Energy Commission Hearing on California Gasoline Price Spikes, Refinery Operations, and Transitioning to a Clean Transportation Future

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2. Our clients: government agencies, oil and renewable fuels companies, trade associations, technology developers, private equity firms, and law firms.
3. Leading experts on renewable and petroleum fuel supply and demand and the regulations that drive the market.
4. Stillwater's **Library of Credit Price Outlooks** helps fuels producers, importers, traders, and investors in GHG-regulated jurisdictions make smart credit market decisions.
5. **Questions about the energy transition?** Our team of experts is available to provide specific analysis and tailored strategy for your needs.



## When California gasoline prices spike, everyone wants to know why

Why gas prices are shooting up in California and not in other states

Andy Gault | 1/16/2022



San Francisco Examiner

California repeatedly warned about spiking gas prices, fragile supply. But fixes never came

Grace Rubin | 1/18/2022



Los Angeles Times



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Severin and I know that gas prices have gotten too high when reporters call looking for an interview on the issue.

# You are looking for answers



**CALIFORNIA**  
**ENERGY COMMISSION**



As the state's primary energy policy and planning agency, the Energy Commission is committed to reducing energy costs and environmental impacts of energy use while ensuring a safe, resilient, and reliable supply of energy.

# What to do about gasoline supply and price today and through the energy transition?



The issues include;

1. Everyday high gas prices.
2. Price spikes due to refinery issues and geographic isolation.
3. Historic rapid transition to a different form of transportation energy.

You want to understand today's problems and plan for the future



There are a lot of moving pieces.

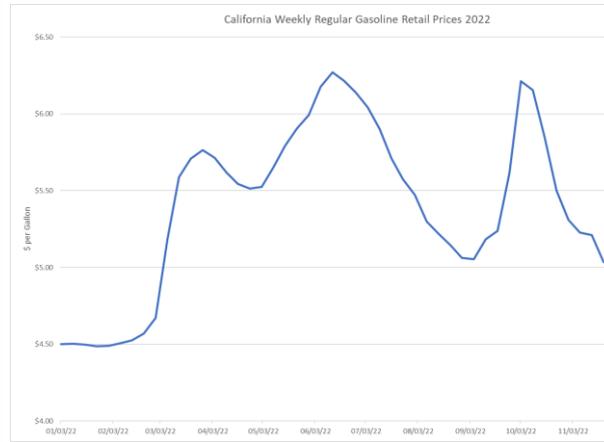
Today's session is designed to provide useful information about these critical issues



Important information will be presented today.

## What caused the September price spike?

Retail prices rose dramatically



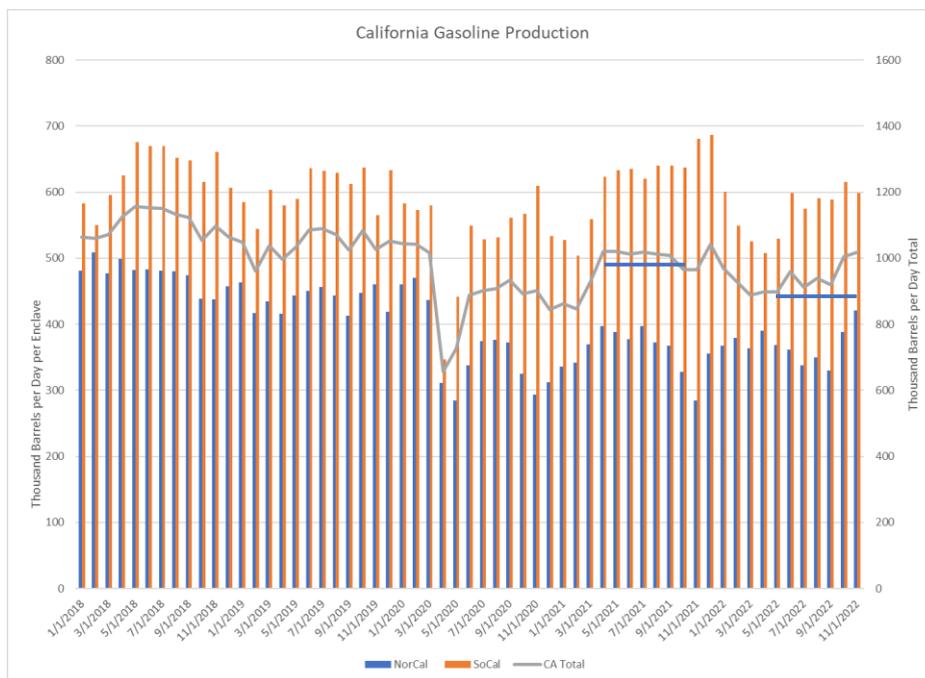
Source: EIA



## The price spike was a supply issue caused by:

1. A reduction of refinery gasoline production by 88 kbd vs prior year. This is equivalent to a mid sized refinery's output. We think this is generally a Covid hangover, but there are other factors as well.
2. Gasoline imports were also lower than 2021, caused by a near tripling of freight rates.
3. This resulted in a strong inventory draw to decade record low inventory levels.
4. Consequently, spot prices rose as supply dried up, pushing retail prices up.

# The refineries made about 88 kbd less gasoline in the summer of 2022 than summer of 2021.



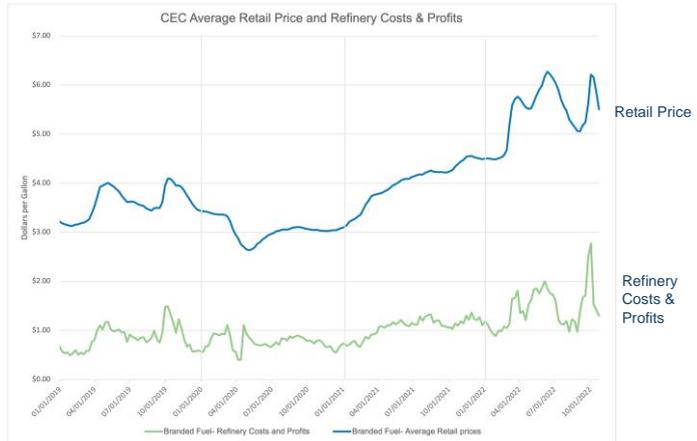
Source: CEC Data



Some of this is general refinery performance and some may be related to the ban on Russian gasoil that had been a feedstock for gasoline production.

## The pandemic created a new factor in gasoline supply.

1. With shrinking refining capacity, operating refining costs & profits have increased.
2. COVID hit in March 2020 and Marathon Martinez idled production in April. Marathon announced they would idle the refinery permanently in August 2020, and approved plans to convert the refinery to renewable fuel production in March 2021.<sup>1, 2, 3</sup>
3. Globally, excluding China, about 3 million barrels per day of refining capacity closed since January 1, 2020.<sup>4</sup>
4. As the economy improved into 2021 refining cost & profit rose above \$1/gallon as petroleum demand grew faster than supply. The Ukraine war caused a further shortfall in global refined capacity starting in March 2022.
5. The Ukraine war caused a further shortfall in global refined capacity starting in March 2022.
6. Unscheduled refinery maintenance created a spike in Sept/Oct 2022 that was short lived.



Source: CEC

Sources:

1. [East Bay Times, Marathon Martinez refinery set to idle production](#)
2. [CBS Bay Area, Marathon Martinez Refinery 'Indefinitely Idled' due to Pandemic-Driven drop in Auto Travel](#)
3. [Marathon, Marathon Petroleum to Proceed with Conversion of Martinez Refinery to Renewable Fuels Facility](#)
4. [RBN, Already Gone Part 2: Refinery Shutdowns Around the World](#)



# The current price spike starts with the pandemic.

## Historic and Recent Refining Margin Index After RVO (RMIR)

Source: Stillwater Analysis



1. At the height of the pandemic lockdowns in 2020, petroleum demand cratered, and refiner margins followed.
2. At operating refineries, maintenance budgets were slashed, and maintenance crews were unable to assemble due to COVID.
3. Marathon's 161 kbd Martinez refinery was idled in April 2020. In August 2020, Marathon announced they would convert the refinery to renewable fuel production. This represents about 8% of in-state capacity.
4. In August 2020, P66 announced it would close the Santa Maria crude processing facility, idle processing at their 114 kbd Rodeo facility, and convert the Rodeo site to renewable fuel production expected in 2023. This represents another 7% of petroleum product production capacity.

Shuttered petroleum refinery capacity is gone for good.

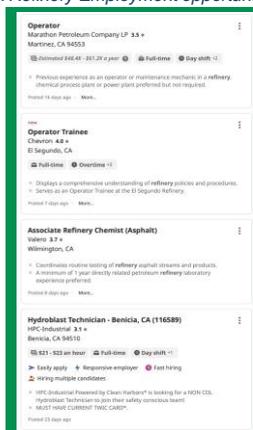


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## As the effects of the pandemic ease, just like other industries, refiners are facing a labor shortage.

1. At the height of the pandemic, many experienced personnel retired and will not return to the refinery work force.
2. Refinery maintenance firms report continued problems with labor availability and productivity.
3. “It’s a struggle to find the right people to do the work.”

*Indeed.com currently lists 236  
CA Refinery Employment opportunities*



The screenshot displays three job listings from Indeed.com:

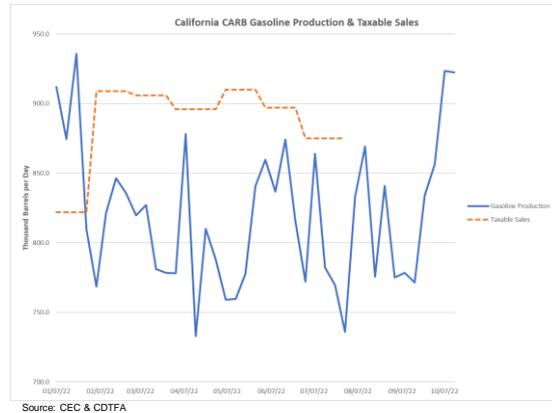
- Operator** at Marathon Petroleum Company LP, 3.8 rating, Maricopa, CA 94503. Salary: \$46,481 - \$51,281 a year. Full-time, Day shift. Requirements: Previous experience as an operator or maintenance mechanic in a refinery, chemical process plant or power plant preferred but not required.
- Operator Trainee** at Chevron, 4.2 rating, El Segundo, CA. Full-time, Overtime. Requirements: Displays a comprehensive understanding of refinery policies and procedures. Selected as Operator Trainee at the El Segundo Refinery.
- Associate Refinery Chemist (Asphalt)** at Valero, 3.7 rating, Wilmington, CA. Requirements: Coordinates routine testing of refinery asphalt streams and products. A minimum of 5 year directly related petroleum refinery operating experience preferred.
- Hydroblast Technician - Benicia, CA (116589)** at HPC Industrial, 3.1 rating, Benicia, CA 94510. Salary: \$21 - \$22 an hour. Full-time, Day shift. Easy apply, Responsive employer, Fast hiring. Requirements: HPC Industrial Powered by ChemPartner® is looking for a H2O/C2E Hydroblast Technician to join their safety conscious team. MUST HAVE CURRENT TWIC CARD.

Sources: [Indeed](#)  
Stillwater conversations with industry contacts



## With refinery closures, a short West Coast gasoline market is the new normal.

1. CA gasoline demand is made up of in-state refinery gasoline production, movements from the PNW, and imports from abroad.
2. 2022 CA gasoline production volumes peaked in late January at 936 kbd.
3. Gasoline production saw a decline through August and a sustained low in September, just below 779 kbd for two weeks.
4. Gasoline production averaged 820 kbd through early October.
5. Taxable gasoline sales through July were 887 kbd. Assuming sales remained at that level into August and September, inventories would have to be drawn to maintain consumer supply if imports failed to materialize.



Pre-pandemic, PNW and Bay Area enclaves that were long product could cover the LA market when it was short. That flexibility was lost with the Martinez closure.

In the face of an already short supply cycle and a tight labor market, refiners pushed routine maintenance schedules until pandemic conditions eased...  
Then Russia invaded Ukraine.

1. Spring 2022 planned turnarounds were deferred after Russia invaded Ukraine.
2. To keep up with demand, refiners deferred maintenance through the summer.
3. This led to a pileup of planned and unplanned outages in the fall.

Refinery	Location	Start Date	Planned/Unplanned	Notes
Chevron	Richmond	9/11	Unplanned	Equipment failure
P66	Carson	9/16	Unplanned	Reformer overhaul after reformer fire on 9/4/22
Marathon	Carson	9/3	Planned	Unit shutdown for planned flaring
Valero	Benicia	9/20	Planned	Work on units
P66	Anacortes	9/30	Planned	Scheduled turnaround maintenance

Sources: [WSJ California Gov. Gavin Newsom to Propose 'Windfall' Oil Profit Tax](#)  
[Reuters, Los Angeles Wholesale Gasoline Hits New High on Refinery Outages](#)

September saw five West Coast refineries down for maintenance.

A note about refinery maintenance: Planned or unplanned maintenance is time, resource, and capital intensive. Routine maintenance is planned well in advance to meet these needs.

All refinery processing units require routine maintenance.

1. A process unit in planned maintenance is said to be in turnaround.
2. Maintenance of interdependent process units is typically performed at the same time for efficiency, including limiting shutdowns.
3. The turnaround cycle can vary from a few months to 5+ years, depending on permitting, operating severity, unit performance, etc.
4. Normally the maintenance of separate units is grouped together.
5. Major turnarounds routinely take 5-7 weeks to complete.
6. Planning for turnarounds start 24-36 months in advance.



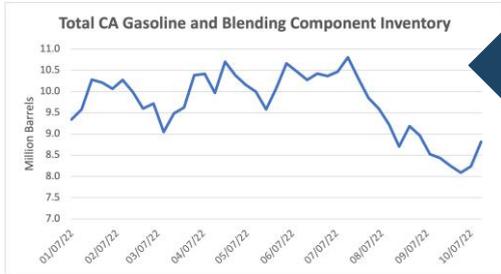
Source: Aegion Energy Services

## Schedules for turnaround timing & duration are also established well in advance.



1. Refiners schedule turnarounds during slack demand periods.
  - a. In California, slack demand season is January to March and October/November.
2. Coordinating turnaround schedules with competitors raises anti-trust concerns.
3. Maintenance contractors frequently coordinate the timing because their people and equipment will be working at several refineries at the same time.
4. To replace production lost during a turnaround, refiners can plan to build inventory in advance, and/or purchase product from other suppliers, including importers.
5. Inventory levels are critical to commodity markets because they are linked to supply and demand, and ultimately, prices.

# Low inventory & lack of imports contributed to scarcity in the market.

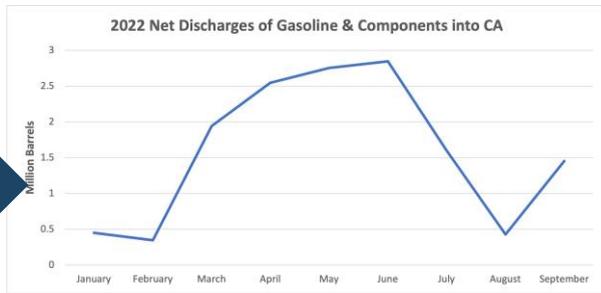


Source: CEC

CA gasoline inventory saw a steady draw down from a height of 10.8 million barrels in July to a low of 8 million barrels at the end of September.

With production offline and inventory at the bottom of the barrel, imports are needed to make up the difference.

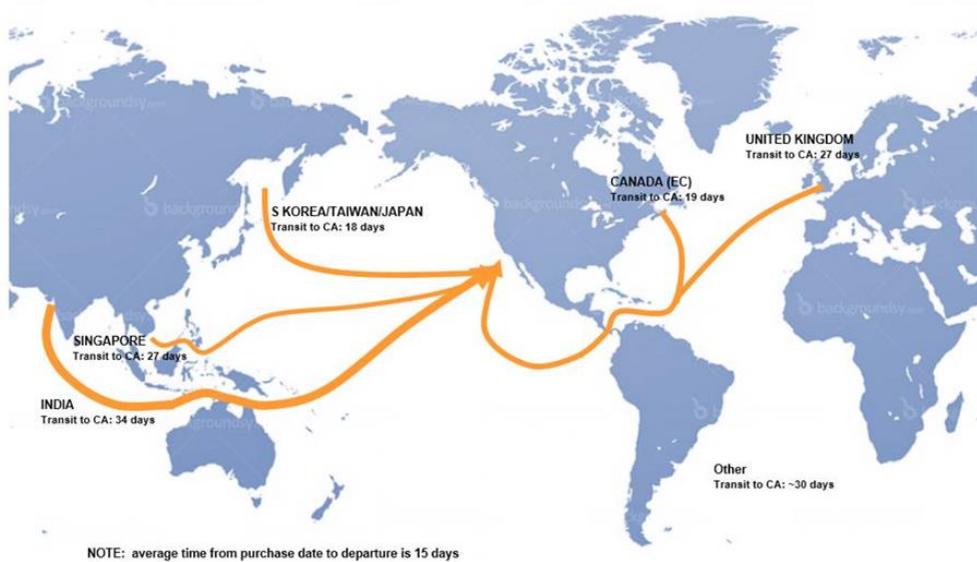
But import volumes were low during the summer, dropping from a high of 2.8 million barrels reported in May to a low of 0.4 million barrels in August.



Source: California State Lands Commission (SLC)



# When gasoline production falls short, additional supply comes by tanker from around the globe.



Source: Stillwater Analysis



After the decision to buy is taken, it takes 5-6 weeks to get a cargo into California from abroad.

Cargos rarely come from the US Gulf Coast because of the tightness in the US Flag fleet. AKA Jones Act.

## The cost of freight has skyrocketed, creating a barrier for imports.

1. According to industry sources, imports in the summer were low because freight rates are “astronomical” and gasoline blending components in Asian refineries were hard to find.
2. Asian region production may have been interrupted by COVID outbreaks.
3. Freight rates spiked in June and again in September, probably as the result of high prices on the West Coast.
4. One broker said that freight rates from Asia Pacific nearly tripled, raising the freight cost from 7-10 cpg to 25 cpg.

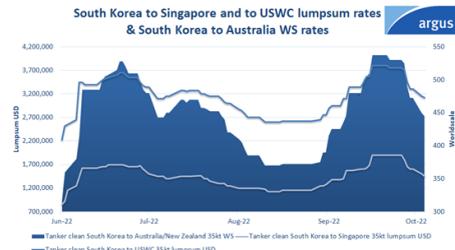
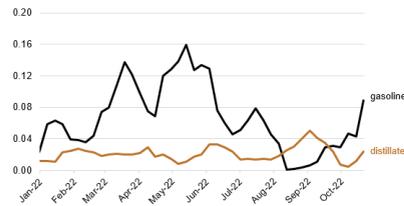


Figure 4. 2022 West Coast (PADD 5) gasoline and diesel imports (rolling four-week averages)



Data source: U.S. Energy Information Administration, Weekly Petroleum Status Report

Sources: Argus, Weight of Freight: crouching tanker, hidden dragon  
EIA, This Week in Petroleum  
Stillwater discussions with industry sources

What are the recommendations to prevent spikes and reduce gasoline prices?

First, we need to understand the two basic issues.

There are two issues on the table:

1. Price spikes
2. Ongoing high retail prices

The 2 basic issues are:

1. The Energy Commission needs to take a serious look at the impact of local and state regulations on the viability of the oil industry.
2. Gain an understanding of how oil is priced along the supply chain to ensure that any measures applied to pricing issues are applied at the right place in the supply chain from the well head to the consumer.
  - a. A component of the Mystery Gas Surcharge is the gross profit margin that can be defined as the difference between retail price and rack price. Stillwater's analysis indicates that this is higher than the rest of the country because of a lack of competition. One factor in the lack of competition is that California has twice as many licensed drivers per station as the rest of the country.
3. Finally, the CEC should review the work the Commission has done in the past in this area, especially including the work in 2002-2003 on the Strategic Fuel Reserve and related issues.

## The U.S. refining industry has been shaped by government regulations for the last 40 years.

**Refining Capacity in California compared to the U.S.**

	1982 – 1992	1993 - 2022
California	Decreased 18% 	Decreased 16% 
U.S. less California	Decreased 11% 	Increased 19% 

Source: [EIA](#)

1. Refineries retooled to meet federal, state, and local requirements. Some shut down early on rather than make the investment.
3. Since 1993 the refining industry has grown nationwide.
4. California's refining industry has shrunk.

## California's refining industry is unique in the U.S. because of state regulations.

1. California has a waiver from the Clean Air Act to write its own regulations.
  - a. CARB regulates mobile emissions.
  - b. The Air Districts handle stationary emissions.
2. CARB has set more restrictive standards for gasoline & diesel than national standards
  - a. Surviving refiners retooled to produce the CARB specification
  - b. These boutique fuels create barriers to entry for outside suppliers
3. Less visible to the public is the impact of the regional Air Districts which mandate significant capital expenditures in the refineries and distribution systems.



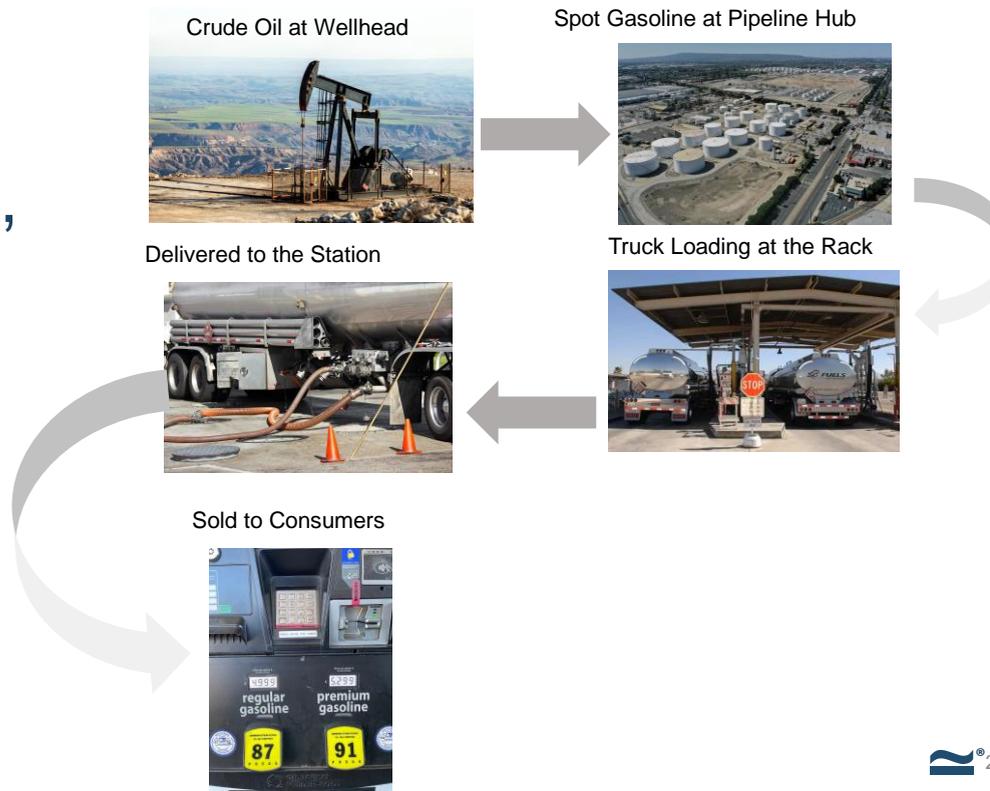
## Refiners are reluctant to make long-term upgrade investments because state climate and air quality initiatives disincentivize petroleum production.

California Climate & Air Quality Initiative	Impact on Refiners	Result
Low Carbon Fuels Standard (LCFS)	Incentivizes renewable fuel production and disincentivizes petroleum product production.	Some refiners convert from petroleum to renewable fuel production leading to a short petroleum products market.  LCFS compliance is an added cost to consumers.
Cap & Trade (C&T)	Incentivizes reduced emissions by requiring refiners to buy allowances to offset emissions above the declining cap.	The application of C&T to gasoline and diesel is called Cap at the Rack (CAR). CAR is the calculated cost of C&T added to gasoline and diesel sold at the terminal.  C&T compliance is an added cost to consumers.
South Coast Air Quality Management District (SCAQMD) NOx Rule	Requires refiners and other fuels and chemicals facilities decrease NOx and CO emissions.	Affected LA-area refineries will have to install pollution control equipment to reduce NOx with a cost estimated by AQMD of \$2.3 to \$2.9 billion.  Cost of compliance may be passed on to consumers.
Bay Area Air Quality Management District (BAAQMD) Particulate Emissions Rule	Requires decreased allowed PM <sub>10</sub> emissions from refinery Fluid Catalytic Cracking Units (FCCUs).	Affected Northern CA refineries, Chevron Richmond and PBF Martinez will have to install wet gas scrubbers to reduce FCCU PM <sub>10</sub> with estimated costs between \$240M - \$1.48B. Both companies are currently suing BAAQMD over the rule.  Cost of compliance may be passed on to consumers.

Sources: [OPIS West Coast Spot Market Report](#)  
[CARB, Information for Entities That Take Delivery of Fuel for Fuels Phased into the Cap-and-Trade Program](#)  
[SCAQMD Board Meeting Minutes, November 5, 2021](#)  
[BAAQMD, Proposed Amendments to Regulation 6, Rule 5: Particulate Emissions from Petroleum Refinery Fluidized Catalytic Cracking Units, Final Staff Report](#)

California regulations have increased the cost of petroleum fuels and contributed to the decline in the refining industry in the state.

Turning to prices,  
oil prices are set  
at title transfer.



1. Crude oil prices can also be set going into or out of a pipeline, truck, or oil tanker.
2. In California, spot prices are set at the Kinder Morgan Pipeline hubs at Watson in the south and Concord in the north.
3. Rack prices will vary with the individual selling company. Some rack prices have the guarantee of the brand, like Chevron or Shell, i.e. “branded” or may have no brand, referred to as “unbranded”.
4. The price of gasoline delivered to the station is often referred to as “Dealer Tank Wagon” (DTW) or “Dealer Buy Price” (DBP)
5. The retail price that consumers pay may be reduced by loyalty programs. It is difficult to determine exactly what price consumers are paying by just looking at the price sign.
6. Price Reporting Agencies (PRA) monitor and publish prices along the supply chain. On the West Coast, OPIS is the major PRA. Others include Platts, Argus, Reuters, and Bloomberg.

# California has twice as many drivers per station than the rest of the country.

	<b>Licensed Drivers</b>	<b>Gas Stations</b>	<b>Drivers per Station</b>
California	27,000,307	8,490	3,180
Rest of US	201,195,693	136,510	1,474
US	228,196,000	145,000	

This helps to explain why competition doesn't force retail margins to U.S. average.



There are several reasons that California has a shortage of gas stations.

1. Real estate is expensive and often has a higher and better use than a gas station.
2. Permitting in California is more difficult than other states. Also, some municipalities have banned new gas stations.
3. Further, the state has set a goal of eliminating petroleum over time. These factors create barriers to entry for potential new competitors.

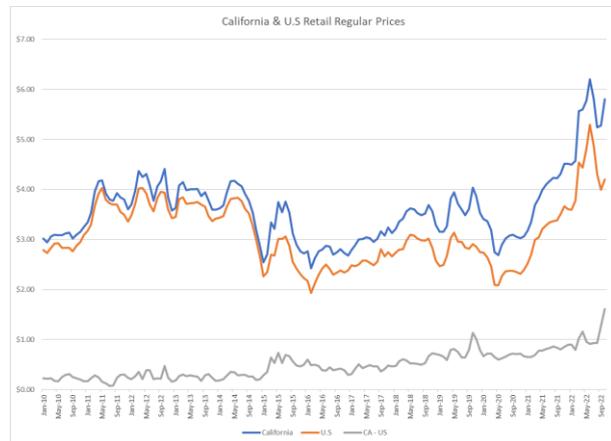
In addition, California has a higher percentage of stations whose delivered price is controlled by one of the branded oil refiners rather than unbranded distributor. The branded DTW price tends to be higher than the unbranded DTW price.

## What has been looked at in the past?

1. The best summary is the CEC's "Transportation Fuels, Technologies and Infrastructure Assessment Report", October 2003, 100-03-013D
2. Options for reducing price volatility are discussed, including
  - a. Strategic Fuel Reserve
  - b. State participation in forward markets
  - c. Identify steps to enhance marine & pipeline infrastructure
  - d. Streamline storage infrastructure storage

What is the impact on consumers?

California consumers pay more for fuel



Source: EIA

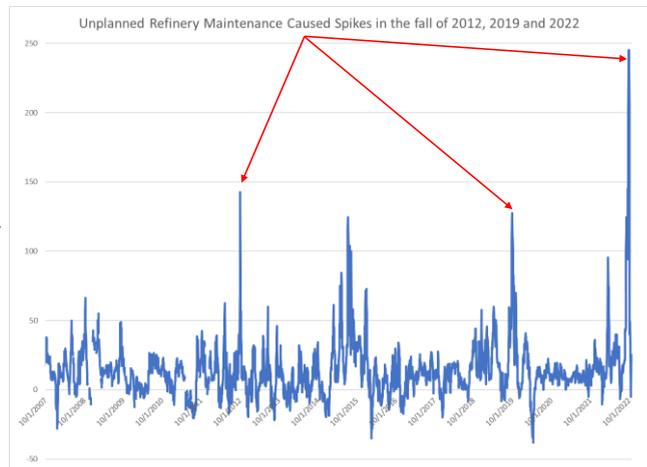
Price spikes occur around unplanned refinery maintenance and are more dramatic than in the rest of the country because of the isolation from alternative supplies.

After spot prices spike, retail prices are slow to return to prior levels

Not shown in this exercise, but other components of the higher prices include that California has higher excise, sales, and local taxes, plus the greenhouse gas fees that other states don't have.

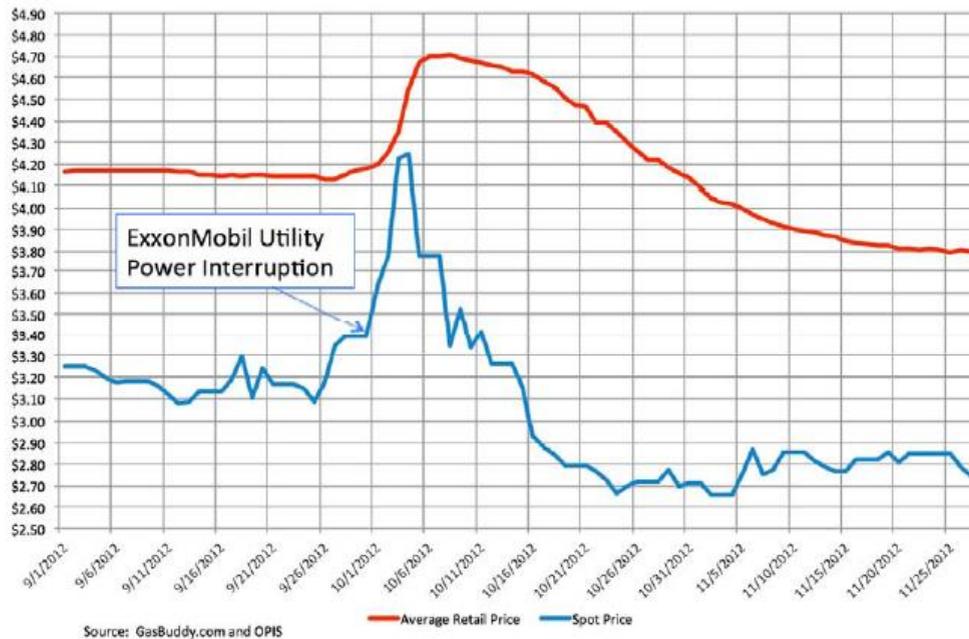
## Fall price spikes are not uncommon.

1. This chart shows LA spot gasoline price, relative to the NYMEX.
2. Spikes occurred in the fall of 2012, 2019, and 2022 due to unplanned refinery maintenance.
3. Refiners plan fall maintenance as a matter of course, but occasionally unplanned maintenance occurs in the season.
4. The 2015 high prices were related to the Torrance outage.



Source: OPIS

# Retail prices take time to recover from a supply disruption.



This is a 10-year-old example of Rockets & Feathers. In October of 2012, the ExxonMobil Torrance refinery experienced an electrical interruption, causing the refinery to go offline and stop producing gasoline. Spot prices “rocketed” up. The spot price dropped as soon as the market determined that supply would get back to normal. On the other hand, the retail market went up a bit slower than the spot but took weeks longer to come back to “normal” levels. Retail prices floated down, therefore, Rockets & Feathers.

What needs to be considered in the transition study?

This is an historic shift from oil & gas to electricity

What will it take to shift all the energy in the oil and gas pipelines to the wire?

We don't think anyone really knows.

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1. Realistic assumptions on how fast transportation alternatives can come on-line are imperative. For example, according to Stillwater's analysis of ARB data, the real success story of the LCFS is renewable diesel which makes up about 37% of diesel energy, while Electric Vehicles only make up 0.5% of light duty vehicle energy.
2. We are concerned that the fuels refineries will shutter before the transition is complete, leaving the market import dependent. We don't want the state's energy policy to export its strategic refining capacity to Asia Pacific or Europe.



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Thank you.  
Questions?



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