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

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Chairman

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When California gasoline prices spike, everyone wants to know why

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

Amy Graff | 10/6/2022



San Francisco Examiner

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

Grace Toohey | 10/8/2022



Los Angeles Times

You are looking for answers



CALIFORNIA
ENERGY COMMISSION

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



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

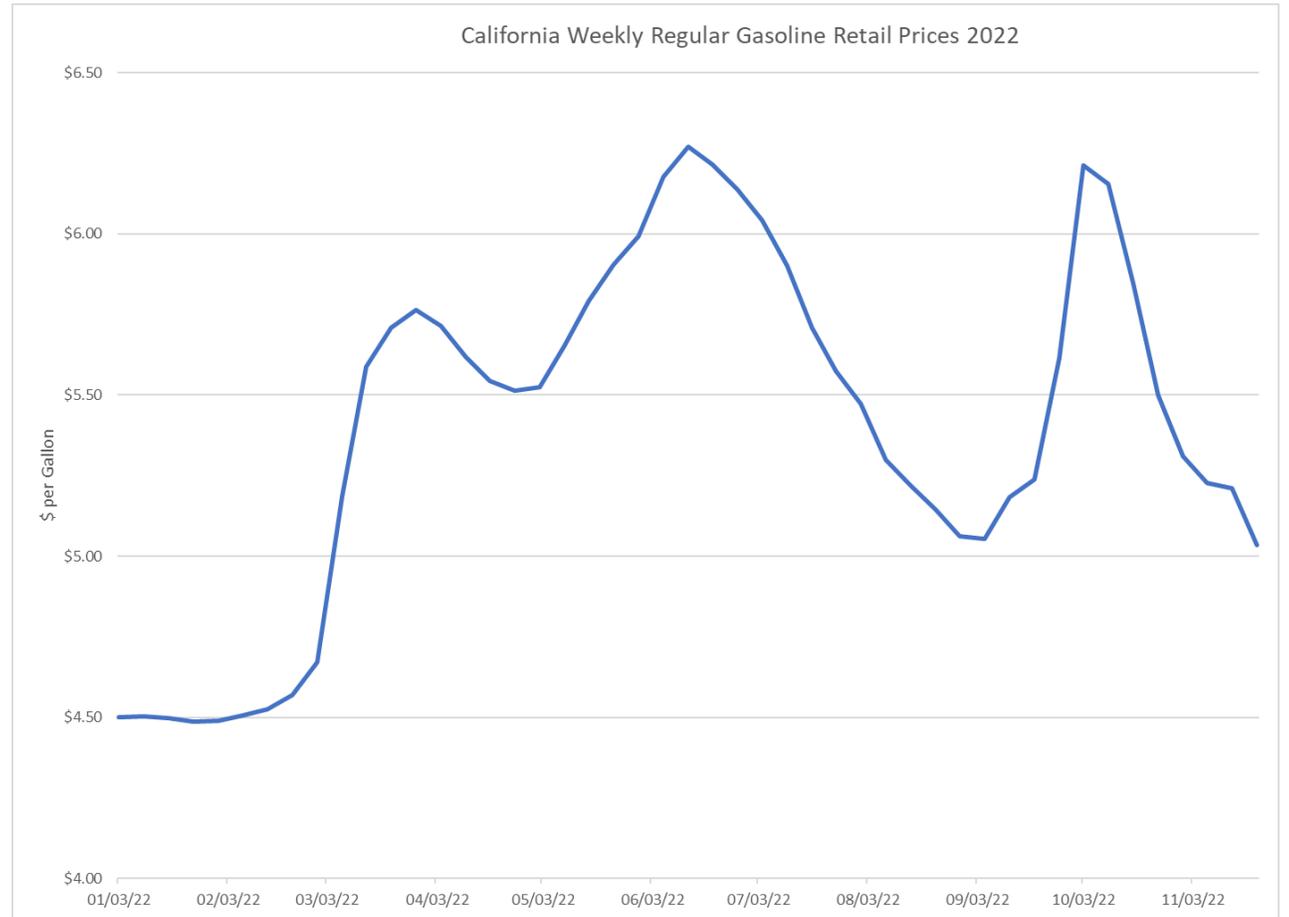


Today's session is designed to provide useful information about these critical issues



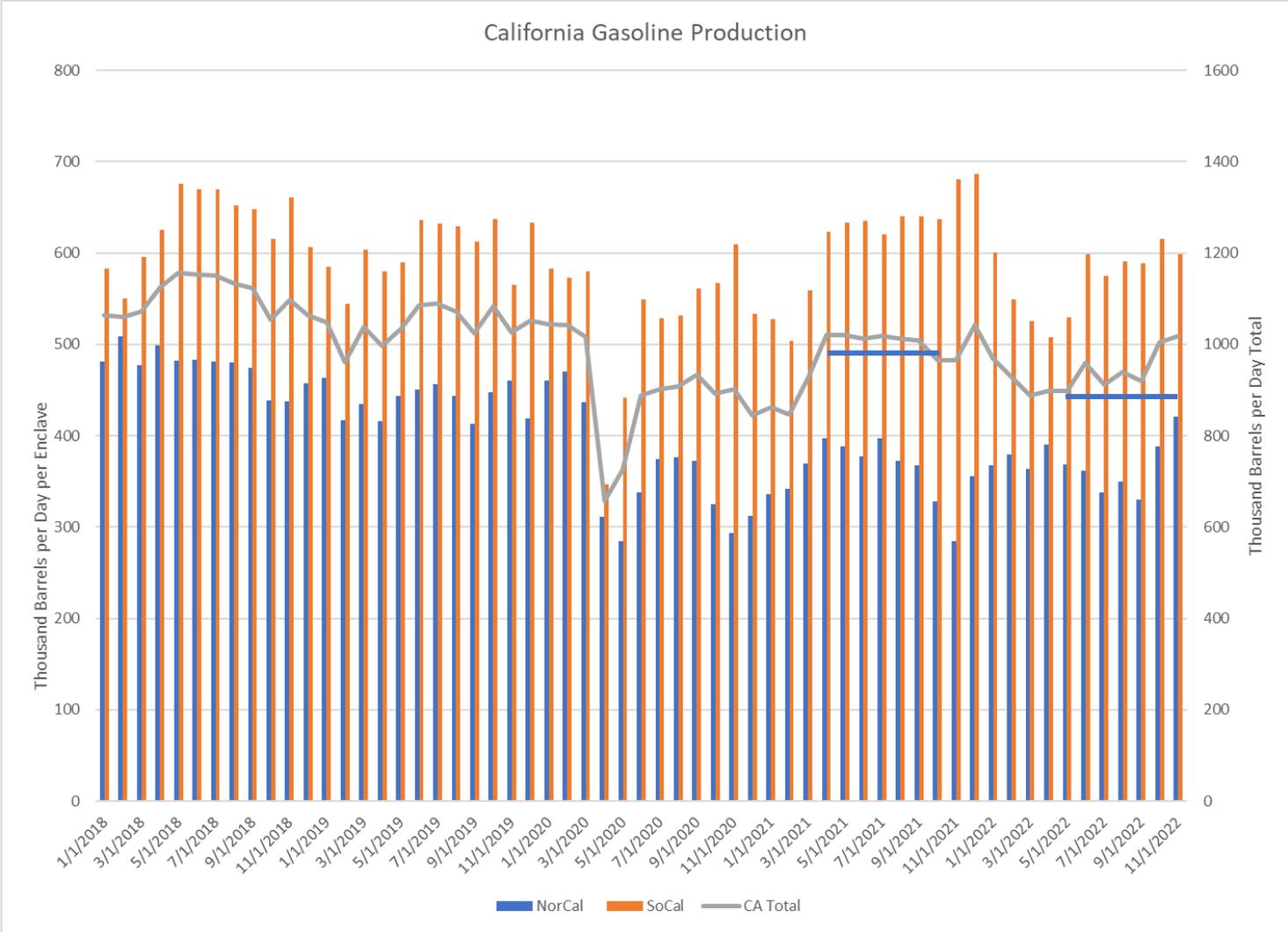
What caused the September price spike?

Retail prices rose dramatically



Source: EIA

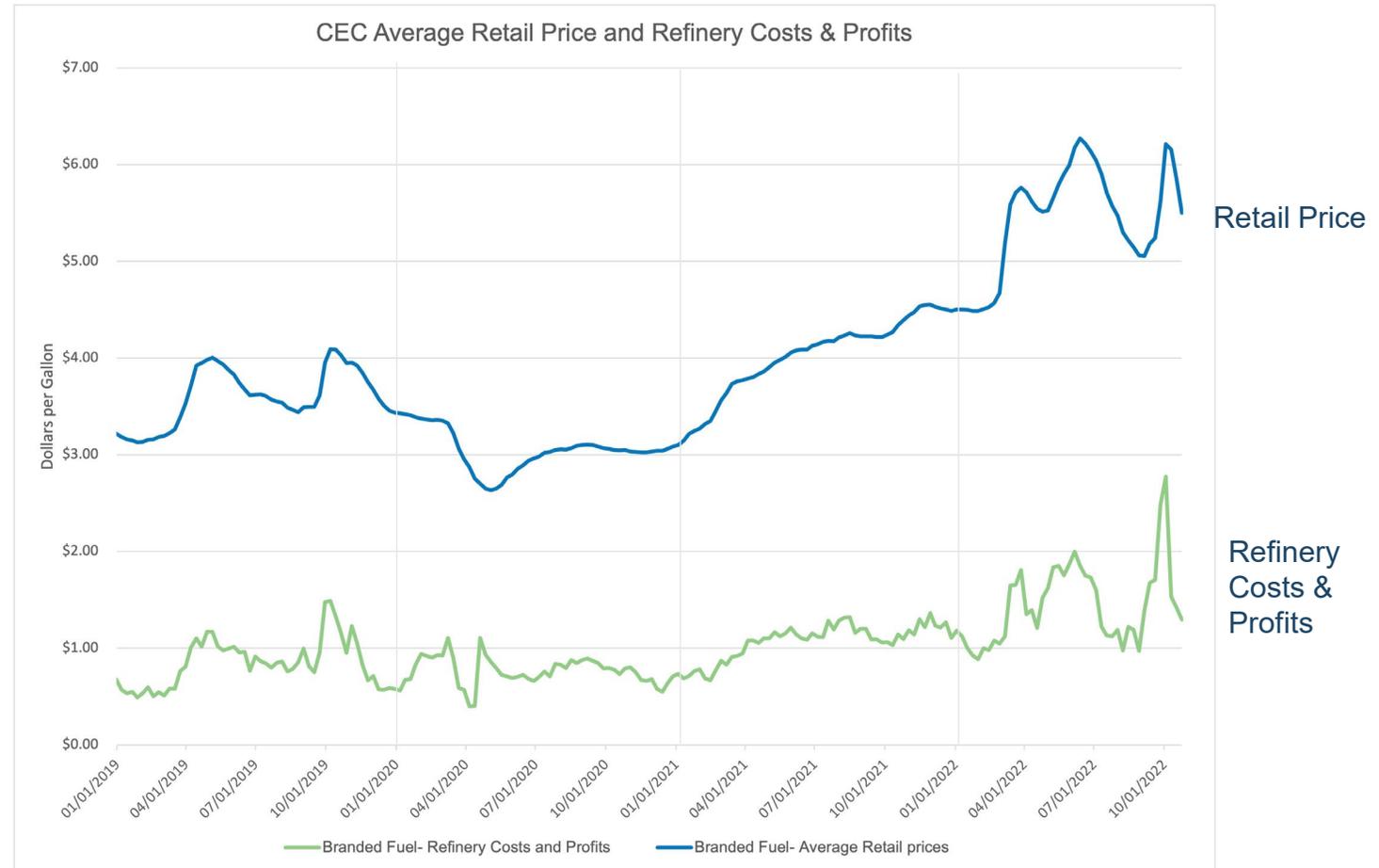
The refineries made about 88 kbd less gasoline in the summer of 2022 than summer of 2021.



Source: CEC Data

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 Martinez shut down in April. Globally about 1.5 million barrels of refining capacity closed because of the pandemic.*
3. As the economy improved into 2021 refining cost & profit rose above \$1/gallon as petroleum demand grew faster than supply.
4. The Ukraine war caused a further shortfall in global refined capacity starting in March 2022.
5. Unscheduled refinery maintenance created a spike in Sept/Oct 2022 that was short lived.



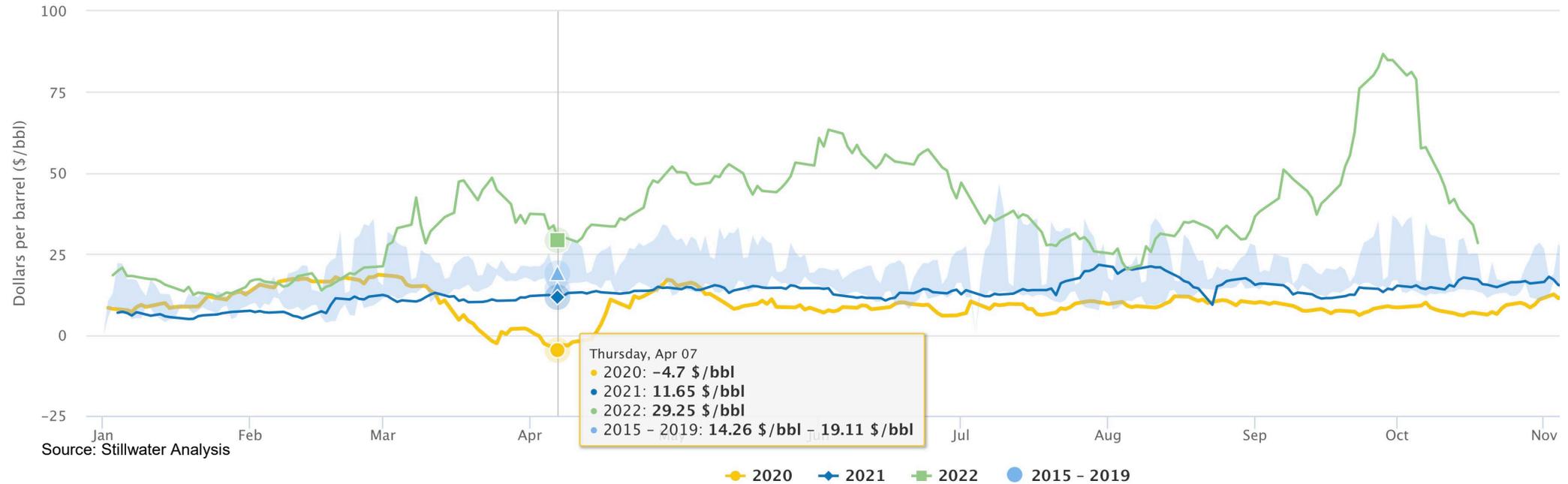
Source: CEC

*Source: [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



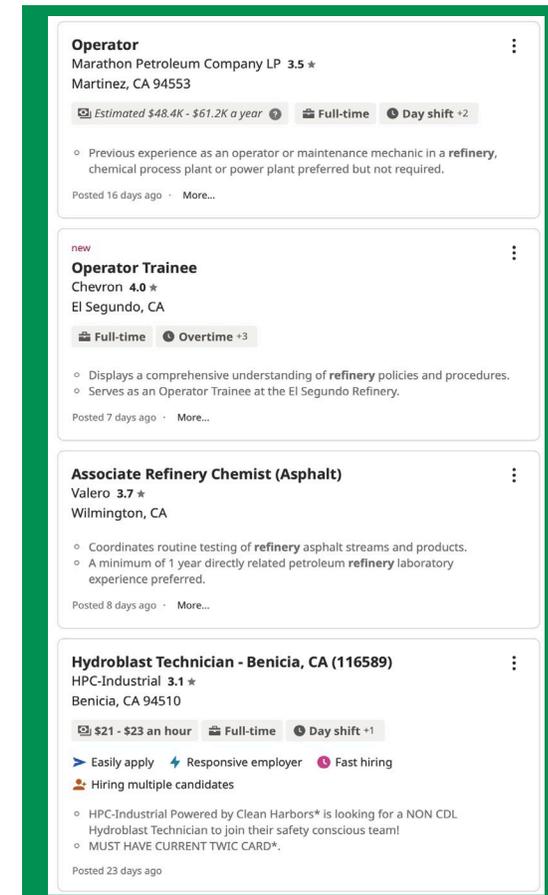
1. At the height of the pandemic lockdowns in 2020, petroleum demand cratered, and refiner margins followed.
2. At operating refineries, maintenance budgets were slashed, and maintenance crews were unable to assemble due to COVID.
3. Marathon's 161 kbd Martinez refinery was idled in April 2020. In August 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.

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

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

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.”



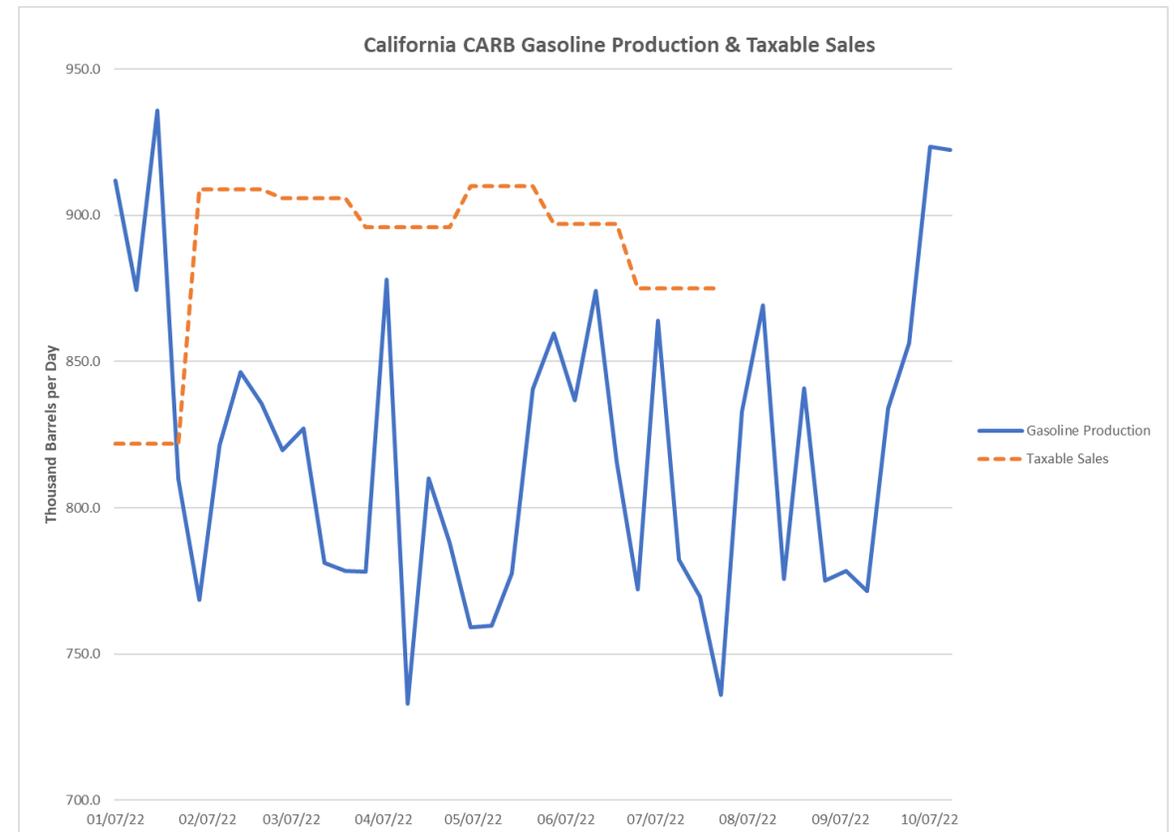
The screenshot displays four job listings from Indeed.com, each with a green border. The listings are:

- Operator** at Marathon Petroleum Company LP (3.5 stars), Martinez, CA 94553. Salary: Estimated \$48.4K - \$61.2K a year. Full-time, Day shift +2. Requirements: Previous experience as an operator or maintenance mechanic in a refinery, chemical process plant or power plant preferred but not required. Posted 16 days ago.
- Operator Trainee** at Chevron (4.0 stars), El Segundo, CA. Full-time, Overtime +3. Requirements: Displays a comprehensive understanding of refinery policies and procedures; Serves as an Operator Trainee at the El Segundo Refinery. Posted 7 days ago.
- Associate Refinery Chemist (Asphalt)** at Valero (3.7 stars), Wilmington, CA. Requirements: Coordinates routine testing of refinery asphalt streams and products; A minimum of 1 year directly related petroleum refinery laboratory experience preferred. Posted 8 days ago.
- Hydroblast Technician - Benicia, CA (116589)** at HPC-Industrial (3.1 stars), Benicia, CA 94510. Salary: \$21 - \$23 an hour. Full-time, Day shift +1. Features: Easily apply, Responsive employer, Fast hiring, Hiring multiple candidates. Requirements: HPC-Industrial Powered by Clean Harbors* is looking for a NON CDL Hydroblast Technician to join their safety conscious team! MUST HAVE CURRENT TWIC CARD*. Posted 23 days ago.

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.



Source: CEC & CDTFA

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.

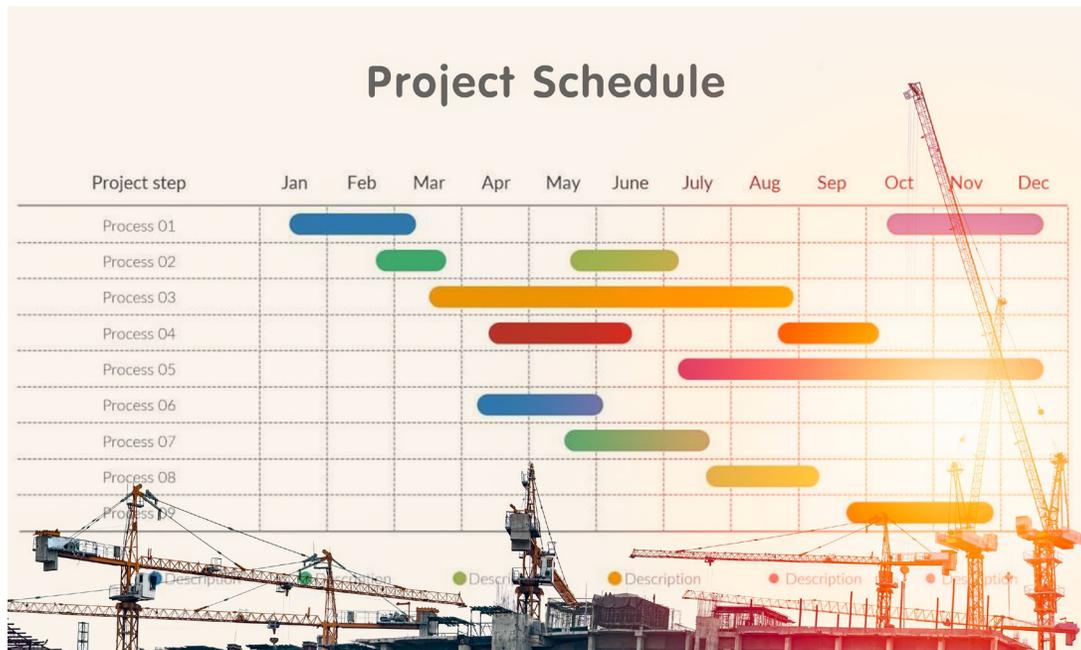
A note about refinery maintenance: Planned or unplanned maintenance is time, resource, and capital intensive. Routine maintenance is planned well in advance to meet these needs.

1. All refinery processing units require routine maintenance.
 - a. A process unit down for maintenance is said to be in turnaround.
 - b. The turnaround cycle can vary from a few months to 5+ years, depending on permitting, operating severity, unit performance, etc.
 - c. Normally the maintenance of separate units is grouped together.
2. A major turnaround will bring down the crude unit, catalytic cat cracker, hydrocracker, and or/coker. These are on a 3–5-year cycle.
 - a. The duration is often 5-7 weeks for a major turnaround.
 - b. Planning for a major turnaround starts 18 to 24 months in advance.



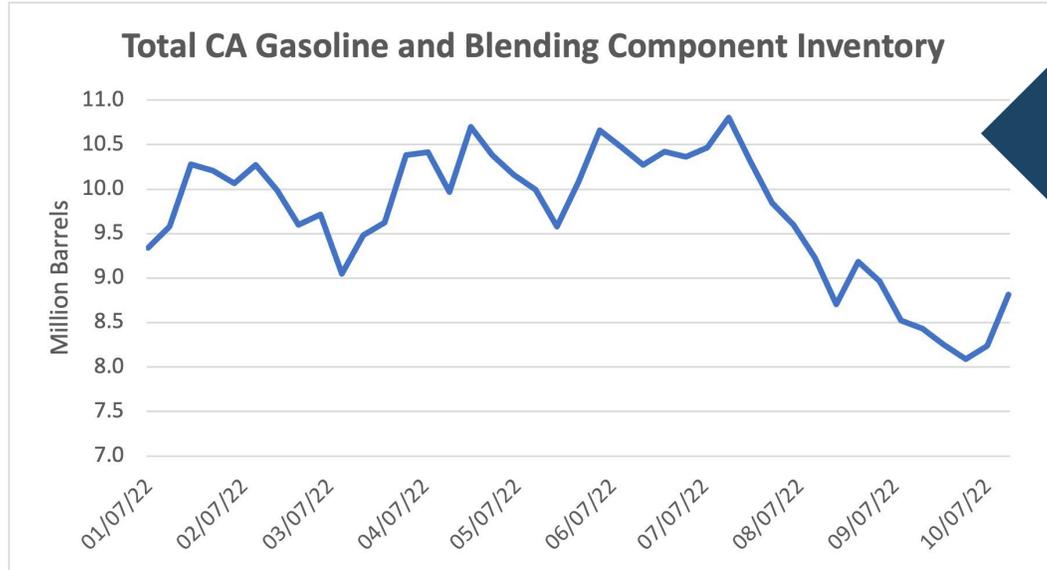
Source: Aegion Energy Services

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



1. Refiners time turnarounds for the slack demand season.
 - a. In California, slack demand season is January to March and October/November.
2. Refiners do not coordinate the timing of turnarounds with their competitors because of 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. As part of turnaround planning, refiners plan to replace lost gasoline production by scheduling additional supply through inventory build, purchases from other refineries, and/or imports.

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

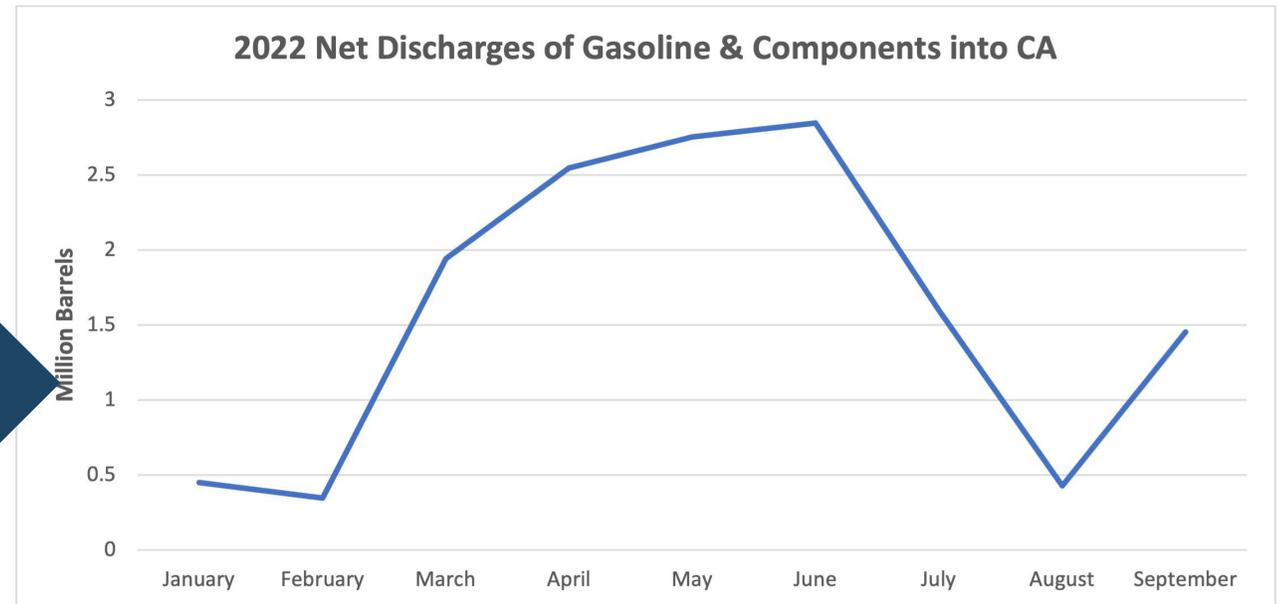


Source: CEC

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.

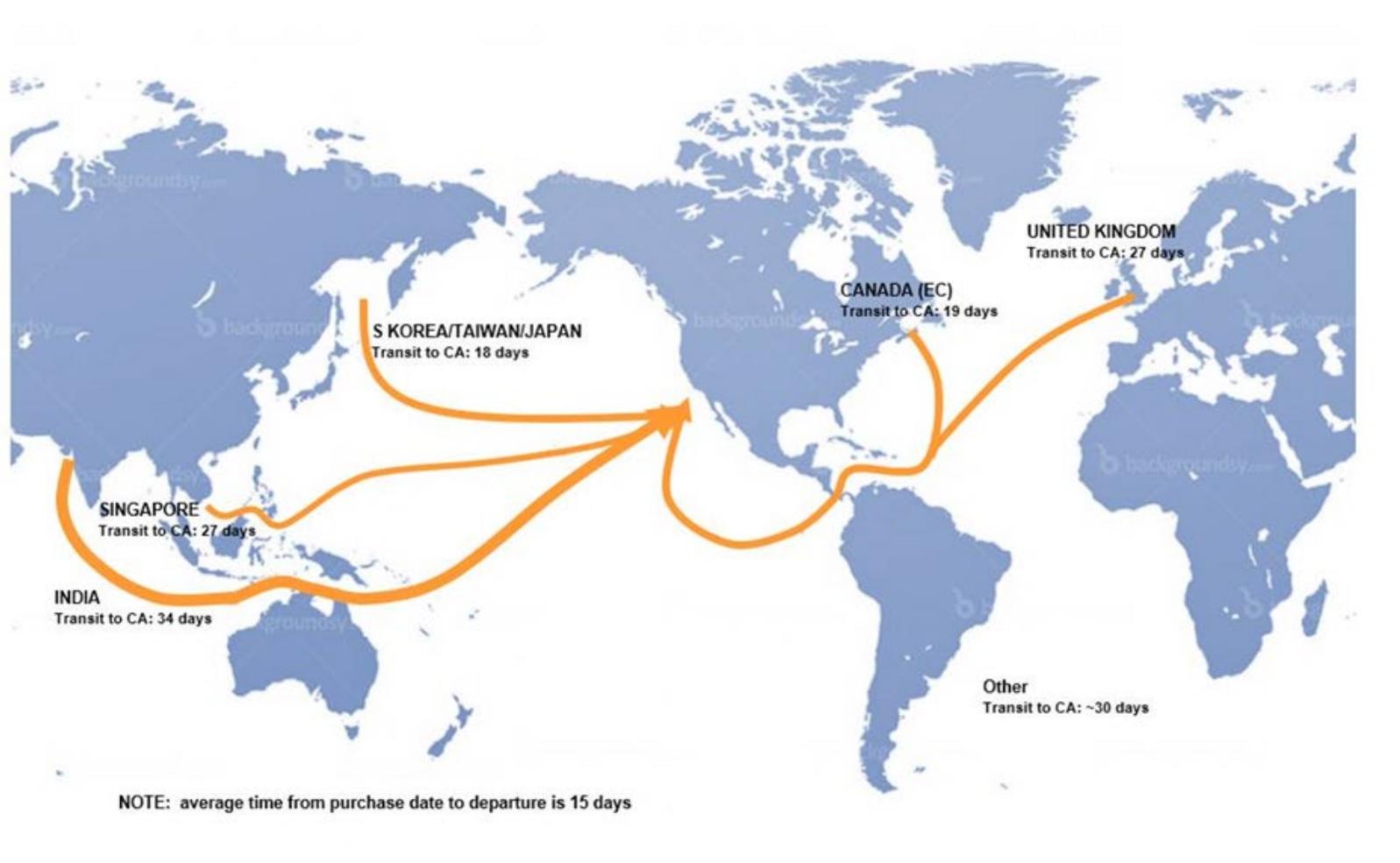
With production offline and inventory at the bottom of the barrel, imports are needed to make up the difference.

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

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.

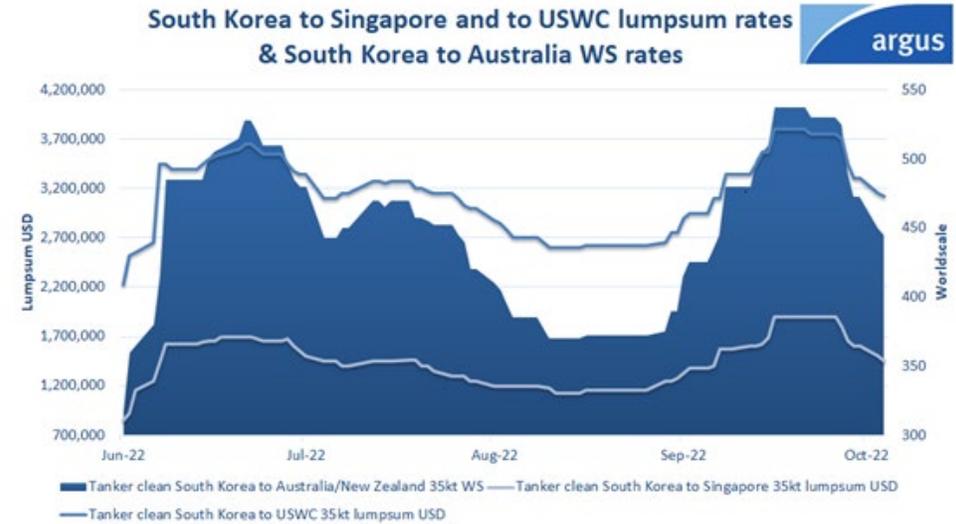
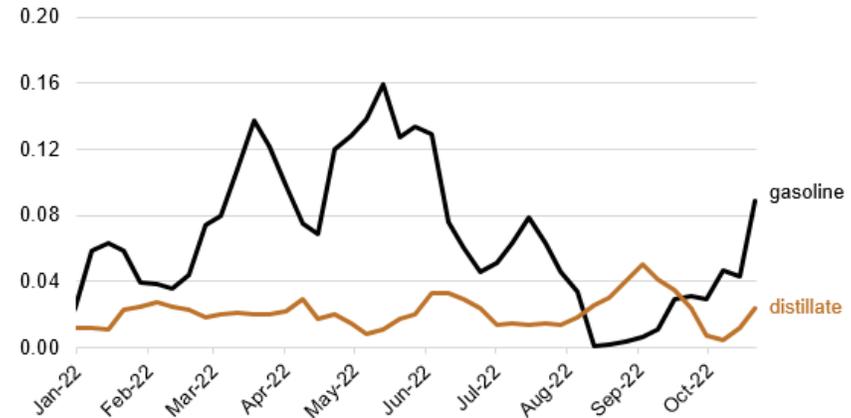


Figure 4. 2022 West Coast (PADD 5) gasoline and diesel imports (rolling four-week averages) million barrels per day



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 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 ₁₀ 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 ₁₀ 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.

Crude Oil at Wellhead



Spot Gasoline at Pipeline Hub



Truck Loading at the Rack



Delivered to the Station



Sold to Consumers



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

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

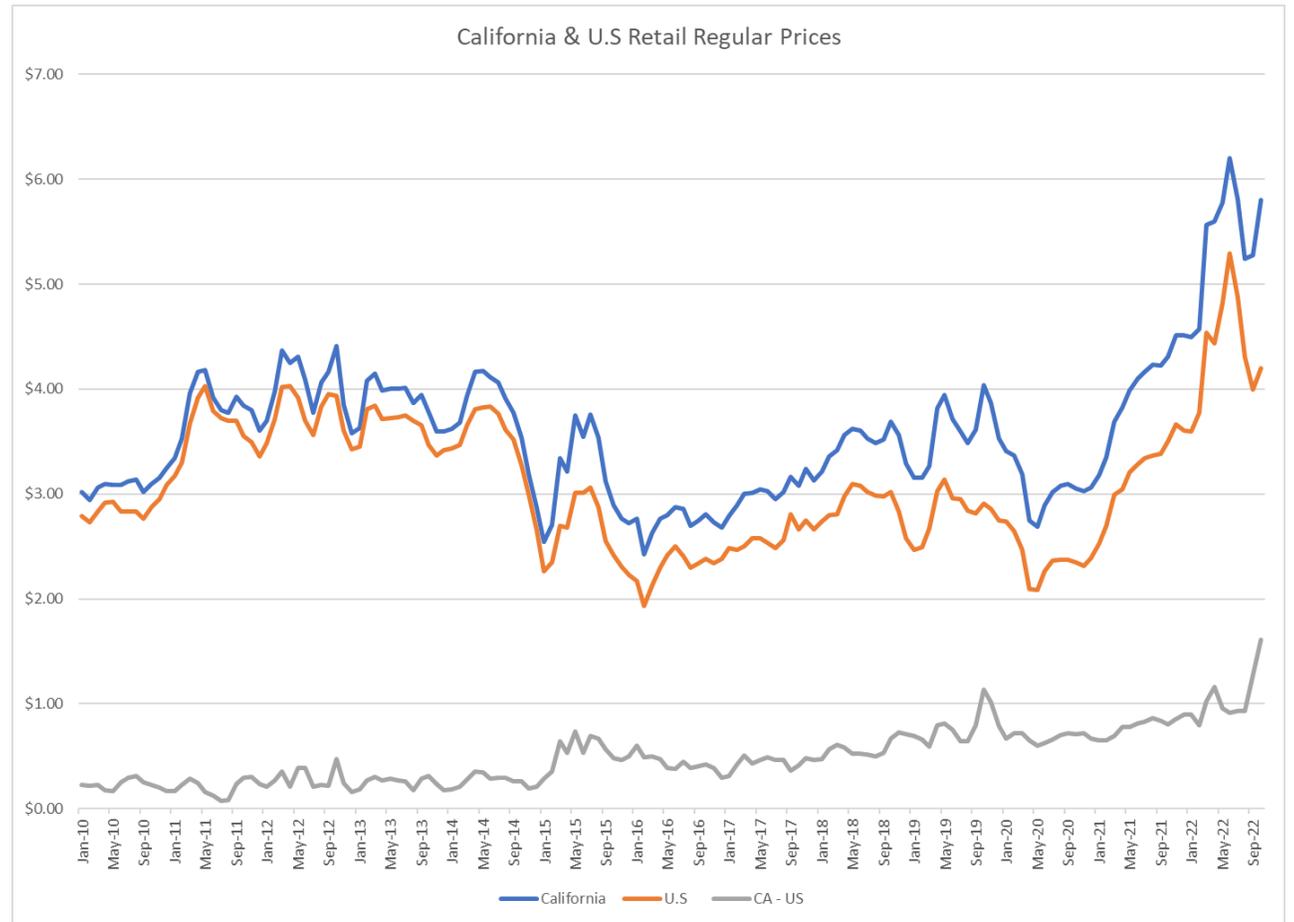
This helps to explain why competition doesn't force retail margins to U.S. average.

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?

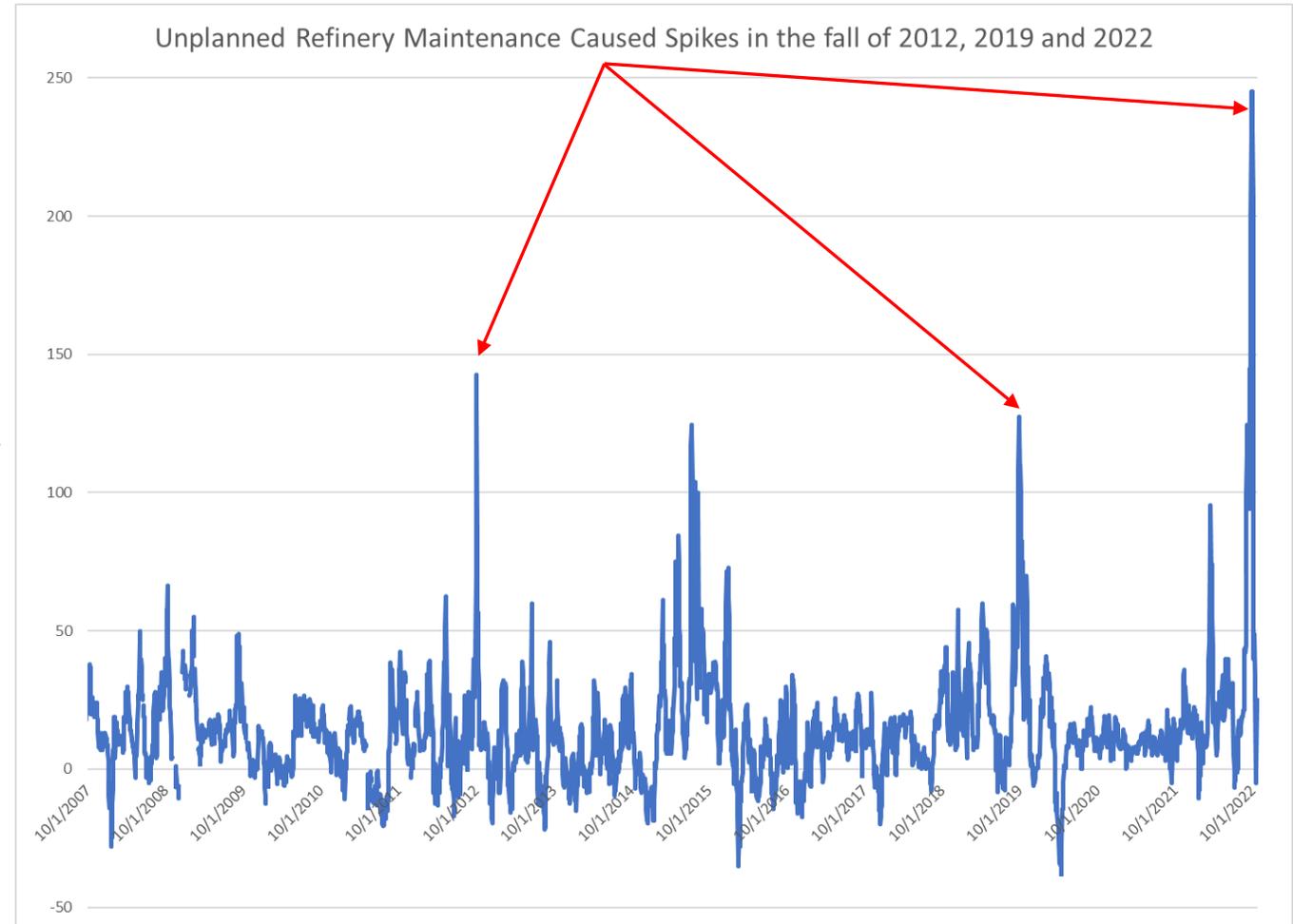
California consumers pay more for fuel



Source: EIA

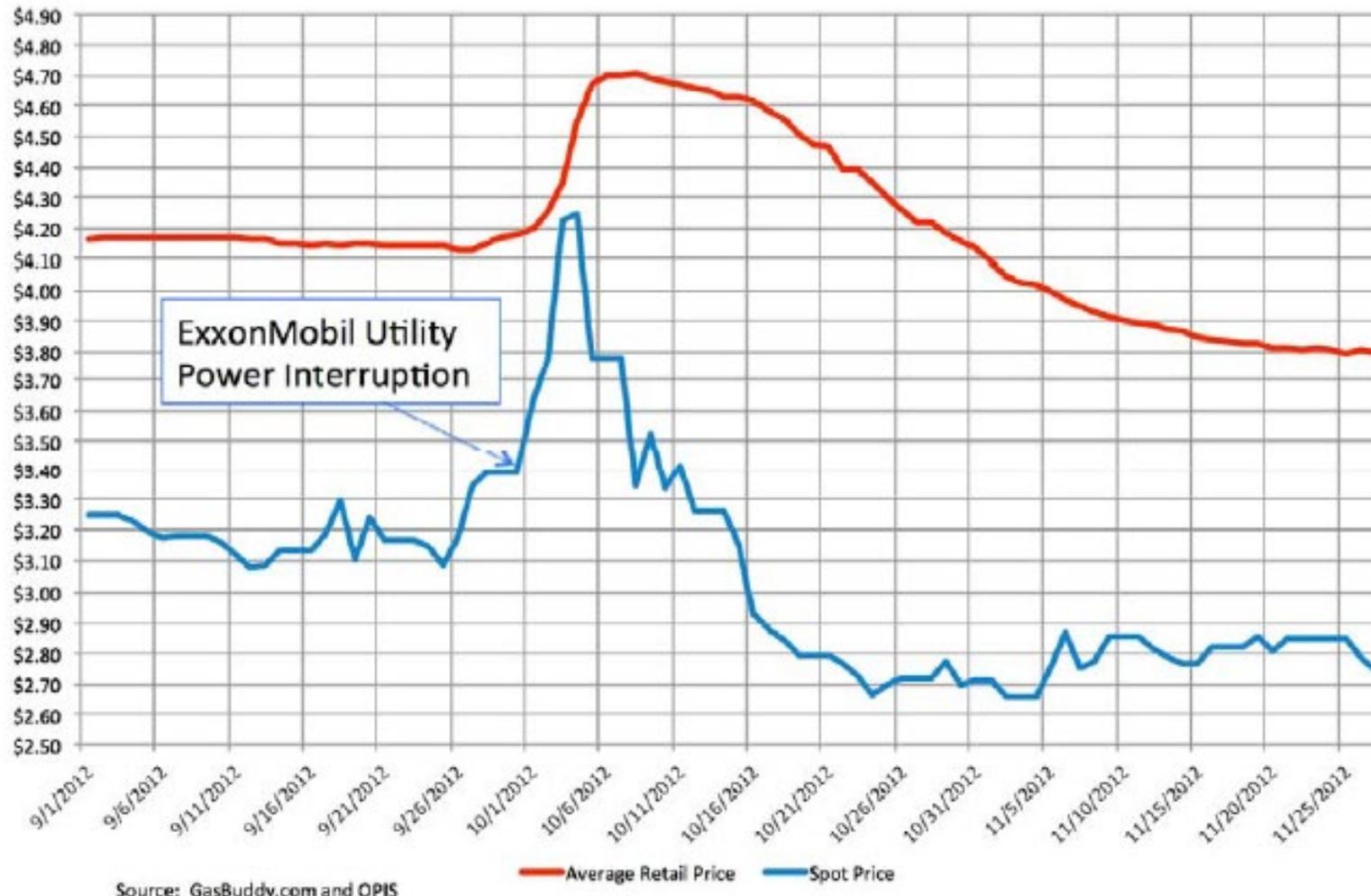
Fall price spikes are not uncommon.

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.



Source: GasBuddy.com and OPIS

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.



Stillwater Associates[®]
...experience runs deep

Thank you.
Questions?