DOCKETED	
Docket Number:	23-SB-02
Project Title:	SB X1-2 Implementation
TN #:	256177
Document Title:	CDTFA_CEC Joint Report 2024 Review of the Gasoline in California and Related Impact on State Revenues
Description:	This document supersedes # TN Number: 256163
Filer:	Donnie Cox
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	5/3/2024 4:04:49 PM
Docketed Date:	5/3/2024

CALIFORNIA ENERGY COMMISSION

CALIFORNIA NATURAL RESOURCES AGENCY

California Energy Commission and
California Department of Tax and Fee Administration

JOINT AGENCY REPORT

2024 Review of the Price of Gasoline in California and Related Impact on State Revenues

May 2024 | CEC-200-2024-007

California Energy Commission and California Department of Fee and Tax Administration

Gentian Droboniku – California Department of Tax and Fee Administration
Reid Johnsen – California Department of Tax and Fee Administration
Jamie Mason – California Department of Tax and Fee Administration
Bryan Neff – California Energy Commission
Primary Authors

Damian Armitage – California Department of Tax and Fee Administration
Ryan Eggers – California Energy Commission
Jamie Mason – California Department of Tax and Fee Administration
Project Managers

Liang Ma – California Department of Tax and Fee Administration
Data Analytics

Michael Nyberg – California Energy Commission
Branch Manager (Acting) Data Integration Branch

Aleecia Gutierrez
Director, Energy Assessments Division, California Energy Commission

Trista Gonzalez
Chief Deputy Director, California Department of Tax and Fee Administration

Drew Bohan
Executive Director, California Energy Commission

Nicolas Maduros
Director, California Department of Tax and Fee Administration

ACKNOWLEDGEMENTS

Nicole Abercrombie – California Department of Tax and Fee Administration

Tamma Adamek – California Department of Tax and Fee Administration

Eric Anderson – California Department of Tax and Fee Administration

Elly Cazanis – California Department of Tax and Fee Administration

Olivia Figueroa – California Department of Tax and Fee Administration

Joe Fitz – California Department of Tax and Fee Administration

Katie Glenn – California Department of Tax and Fee Administration

Michael Hansen – California Department of Tax and Fee Administration

Gordon Mohr – California Department of Tax and Fee Administration

Steven Sisti – California Department of Tax and Fee Administration

Jeff Kessler – California Air Resources Board

Andrea Bailey – California Energy Commission

Kelsie Goff – California Energy Commission

Foua Moua – California Energy Commission

Jesten Ruiz – California Energy Commission

Xieng Saephan - California Energy Commission

Eric Sanchez – California Energy Commission

Alexander Wong – California Energy Commission

ABSTRACT

California Public Resources Code Section 25355.7 requires the California Energy Commission (CEC) and California Department of Tax and Fee Administration (CDTFA) to prepare a report every year to review the price of gasoline in California and its impact on state revenues. This report looks at information collected by CEC through the Petroleum Industry Information Reporting Act of 1980, as modified by Senate Bill (SB) X1-2 (Skinner, Chapter 1, Statutes of 2023) and Senate Bill 1322 (Allen, Chapter 374, Statutes of 2022), and information collected by CDTFA through the records request authority provided by SB X1-2. The information collected is used for analyzing trends that influence the price of gasoline which in turn impacts state revenues. Staff also analyzed several other data sources to provide a more comprehensive discussion of gasoline prices in California.

Topics included in this report:

- General refinery operations and production
- Product movements
- Distribution and makeup of retail facilities
- Retail prices and margins
- Tax revenue

Keywords: California Energy Commission, California Department of Tax and Fee Administration, gasoline, refinery, margins, prices

Please use the following citation for this report:

Droboniku, Gentian, Reid Johnsen, Nicolas Maduros, Jamie Mason, and Bryan Neff. 2024. *2024 Review of the Price of Gasoline in California and Related Impact on State Revenues*. California Energy Commission and California Department of Tax and Fee Administration. Publication Number: CEC-200-2024-007

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

High gasoline prices and pump price volatility have long impacted Californians and merit further investigation. The state's transportation fuels market is relatively isolated due to the lack of any pipeline bringing refined gasoline into the state and California's unique gasoline specification (California Reformulated Gasoline Blendstock for Oxygenate Blending or CARBOB). As a result, gasoline purchased in California is typically refined in the state. Given this reliance on in-state production, refinery outages and other supply shocks can send prices at the pump soaring well above levels paid by drivers in other states. Even in times of relatively stable supply, California drivers pay substantially more at the pump than the average American, particularly since 2015, even after accounting for any differences in state taxes or fees.

The summer and fall of 2022 saw California retail gas prices skyrocket well above $6 per gallon, peaking more than $2.25 above the prices in other states. To address the issue, Governor Gavin Newsom, among other actions, called a special session of the California Legislature to address gasoline prices. The resulting legislation, Senate Bill (SB) X1-2 (Skinner, Chapter 1, Statutes of 2023), was enacted in March 2023, and took effect in June 2023. It was designed to prevent extreme price spikes and price gouging by oil companies. Included in the legislation was the requirement that the California Energy Commission (CEC), together with the California Department of Tax and Fee Administration (CDTFA), provide an annual report to the Legislature on California gasoline prices and the associated impact on state tax revenue.

This report is the first such report called for under SB X1-2. This report provides an overview of the California oil and gas industry and analysis of consumption, prices, tax revenue and refining margins. It also provides an assessment of the retail gasoline market in California. The report is organized into five chapters and focuses largely on providing a better understanding of retail gasoline sales in the state and what factors may be driving retail prices higher. CEC and CDTFA have compiled this report using information collected under the Petroleum Industry Information Reporting Act of 1980, SB X1-2, and SB 1322, as well as information collected by CDTFA through records request authority provided by SB X1-2, public sources and proprietary sources.

Chapter 1 provides a general background on California's oil and gas industry. It looks at the declining number of refiners producing gasoline that meets the specifications set by the California Air Resources Board. It then follows the refined gasoline through the distribution channels to roughly 10,000 retail gas stations across the state. This chapter explains the difference between the types of gasoline retailers in the state and the market share of each category over time. It also traces the growth of hypermarts, high-volume retailers owned by large warehouse and grocery store businesses, in recent years.

Chapter 2 provides an overview of California gasoline prices and fuel consumption. It charts the growing gap between California and national prices, and it explains the various components that together impact prices at the pump. While Californians pay among the highest retail prices for gasoline, California ranks twenty-first in the nation for per capita spending on motor vehicle fuel. This disparity between rankings is the result of California's low per capita fuel consumption, despite the size of the state and the perceptions of California's commuting culture. Only five states use less fuel per person.

Chapter 3 explores both the gasoline excise tax and the sales and use tax. Between these two taxes, gasoline sales generated $8.8 billion in state and local revenue in Fiscal Year 2022–23.

Excise tax funds are used to construct and maintain public roads and mass transit systems in the state. Sales tax revenue supports local governments and county transportation projects. The Fuel Tax Swap of 2010 lowered the sales tax rate on gasoline and increased the excise tax, providing a steadier source of revenue for transportation. In 2017, SB 1 (Beall, Chapter 1) increased the excise tax rate by $0.12 per gallon and pegged the rate to California's Consumer Price Index. With the transition to zero emission vehicles (ZEVs), however, the Legislative Analyst's Office has estimated the gasoline excise tax revenues will decline by approximately $5 billion, or 65 percent, over the next decade.

Chapter 4 reviews the retail price impacts of refiner margins (the difference between the cost of crude oil and the price at which refiners sell gasoline) and spot market volatility. Refiner margins, which appear to be higher than historical averages over the past nine years, reached record levels in late 2022; they were almost double the previous high. The chapter also explores the spot market, through which large buyers and sellers may trade tens of thousands of barrels of gasoline. As the Division of Petroleum Market Oversight has reported, the spot market, which is thin and particularly volatile, has an outsized influence on wholesale and retail gasoline prices in California. Single reported spot market trades can drive gasoline prices sharply higher.

Chapter 5 focuses on the retail gasoline market in California, assessing how the structure and operation of the market impact pricing. Retail margins on gasoline sales in California have been growing, both nominally and as a percentage of selling price. Some branded retailers now have an average retail margin approaching $1.00 per gallon, up more than 300 percent over the past 10 years. Today's low-margin retailers have markups that were considered high margin only a decade ago. Brands can charge substantially different prices even though the gasoline sold is essentially interchangeable. To the extent that the same brands sell for different prices in the same vicinity, it appears that dynamic is driven by retailer margin and not by refiner or distributor wholesale pricing. Data show that the presence of additional gas stations in an area, particularly if they are unbranded, generally is correlated with lower retail prices. The chapter explores the impacts of price volatility on retail margins. When wholesale prices fall quickly, retail prices, on average, take more than a month to reflect fully those lower costs. Many of these pricing effects may be interrelated, and they may be exacerbated by the growing use across the industry of sophisticated pricing software systems designed to maximize profits. Lastly, the chapter calls for additional study of how California's reliance on dealer tank wagon contracts, which provide long term supply contracts for branded gasoline that include delivery, may impact retail pricing.

This is the first such annual report, and the teams at CEC and CDTFA continue to gather additional information from industry participants and third-party sources. The CEC and CDTFA have identified areas requiring additional study, including:

- the volume of imported gasoline and the impact of those imports on market prices.
- the interplay between volatility, driven largely by the spot market, and high retail margins.
- how shifts in pricing strategies for brands may be impacting the broader market.
- the impact of additional local stations on consumer prices.

- the widespread use of new pricing software systems and their impact on prices.
- retail outlet ownership concentration statewide and in local markets.
- how the strength of California's dealer tank wagon market may impact the high premiums charged for branded gasoline.

CEC and CDTFA look forward to presenting the Legislature with additional relevant information in subsequent reports.

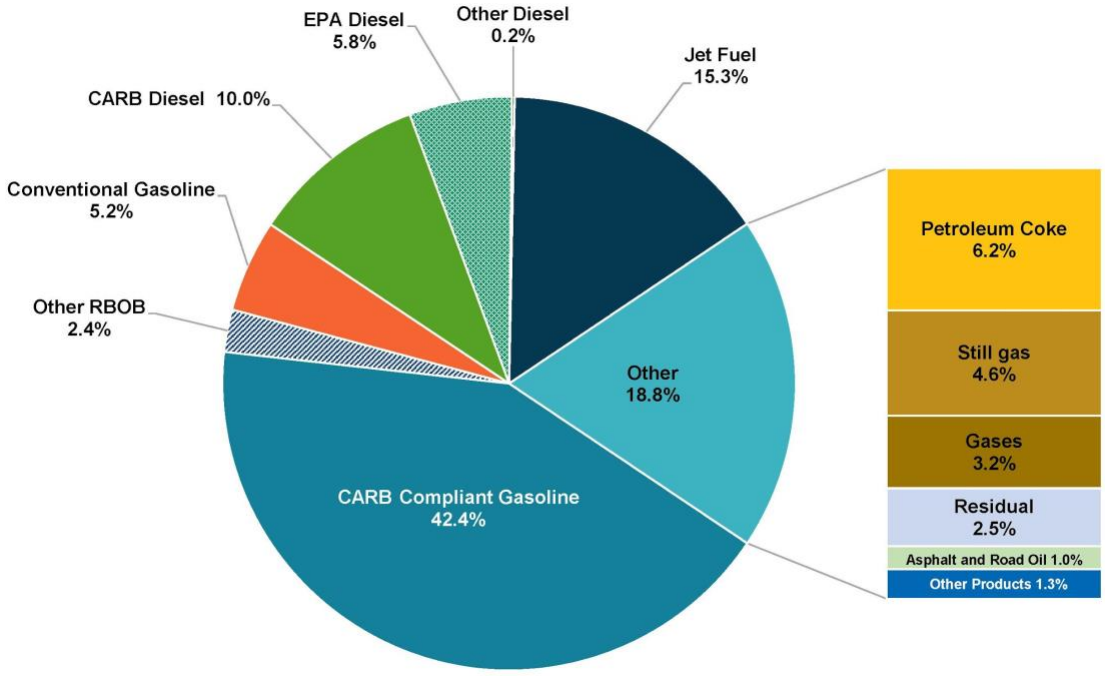
CHAPTER 1:
Background on California's Oil and Gasoline Industry

California's Oil Refineries

With no pipelines in place to transport refined fuel into the state and few refineries outside California currently structured to produce gasoline to California's specifications, the state's gasoline market, one of the largest in the world, has historically been served almost entirely by California refineries. Imported gasoline and blending components have accounted for only 3 to 7 percent of supply. This ability to supply the state's market with gasoline refined in California appears to be changing. Disruptions to refinery operations, the conversion of refineries to renewable diesel production, the presence of large suppliers that no longer have refining facilities in state, and other factors necessitate more frequent imports of refined gasoline into the state. New CEC data disclosure requirements regarding imported fuels will provide increased visibility into gasoline and blend stock imports. CEC staff intends further analysis on import and export flow in the next report.

Figure 1 illustrates the refined petroleum products of statewide refinery output during 2022, referred to as a *product slate*.

Figure 1: Product Slate of California Refineries, 2022



***Note: Does not include ethanol.**

Source: CEC analysis of the California Refinery Monthly Report (M810) and the Energy Information Agency (EIA) Monthly Refinery Report (EIA- 810)

CARB compliant gasoline makes up 42.4 percent of the refined product in the state (**Figure 1**). To reduce pollution, the California Air Resources Board (CARB) required new specifications

for California gasoline in March 1996, the California Reformulated Gasoline Blendstock for Oxygenate Blending (CARBOB).[1] CARBOB is formulated to meet the most stringent gasoline standards in the United States, including very low Reid vapor pressure (RVP), and reduced levels of sulfur, benzene, and other chemicals.[2] The use of CARBOB reduces harmful air toxins and is essential to meeting state and federally mandated air quality standards.

Refiners in California must use different equipment, add processing steps, and use more expensive blending components to create a lower polluting gasoline than anywhere else in the United States. Creating additional complexity, there are two CARB blends — a winter blend and a summer blend; the summer blend has a lower RVP (7.00 compared to 13.5 for winter blend for finished gasoline with ethanol), which reduces ground-level ozone.

The number of refineries producing CARBOB has steadily declined. In 1996, California had 25 active refineries. By 2020, only 15 refineries in California were producing CARBOB, and that number dropped to 10 in 2022 (**Table 1**).

1 California Air Resources Board. *California Reformulated Gasoline — An Overview,* https://afdc.energy.gov/files/pdfs/3002.pdf.

2 U.S. Government Accountability Office. June 2005. *Gasoline Markets: Special Gasoline Blends Reduce Emissions and Improve Air Quality, but Complicate Supply and Contribute to Higher Prices,* https://www.gao.gov/assets/gao-05-421.pdf.

Table 1: Refineries in California with Capacity, 2023

Refinery Name	Barrels Per Day	% of California Crude Oil Capacity	CARB Diesel	CARB Gasoline
Marathon Petroleum Corp., Los Angeles Refinery*	363,000	21.22%	Yes	Yes
Chevron U.S.A. Inc., El Segundo Refinery	269,000	15.73%	Yes	Yes
Chevron U.S.A. Inc., Richmond Refinery	245,271	14.34%	Yes	Yes
PBF Energy, Torrance Refinery	160,000	9.35%	Yes	Yes
PBF Energy, Martinez Refinery	156,400	9.14%	Yes	Yes
Valero Energy, Benicia Refinery	145,000	8.48%	Yes	Yes
Phillips 66, Los Angeles Refinery	139,000	8.13%	Yes	Yes
Phillips 66, Rodeo San Francisco Refinery**	90,200	5.27%	Yes	Yes
Valero Energy, Wilmington Refinery	85,000	4.97%	Yes	Yes
Kern Energy, Bakersfield Refinery	26,000	1.52%	Yes	Yes
San Joaquin Refining Company Inc., Bakersfield Refinery	15,000	0.88%	Yes	No
Lunday Thagard, South Gate Refinery	8,500	0.50%	No	No
Valero Wilmington Asphalt Refinery	6,300	0.37%	No	No
Talley Asphalt Inc., Kern Refinery	1,700	0.10%	No	No
Grand Total	1,710,371	100%		

*** Marathon Carson and Wilmington began reporting as one entity known as Marathon Los Angeles Refinery as of 2019.**

****Phillips 66 Rodeo and Santa Maria began reporting as one entity as of 2017. Phillips 66 Santa Maria officially ceased operations in January 2023.**

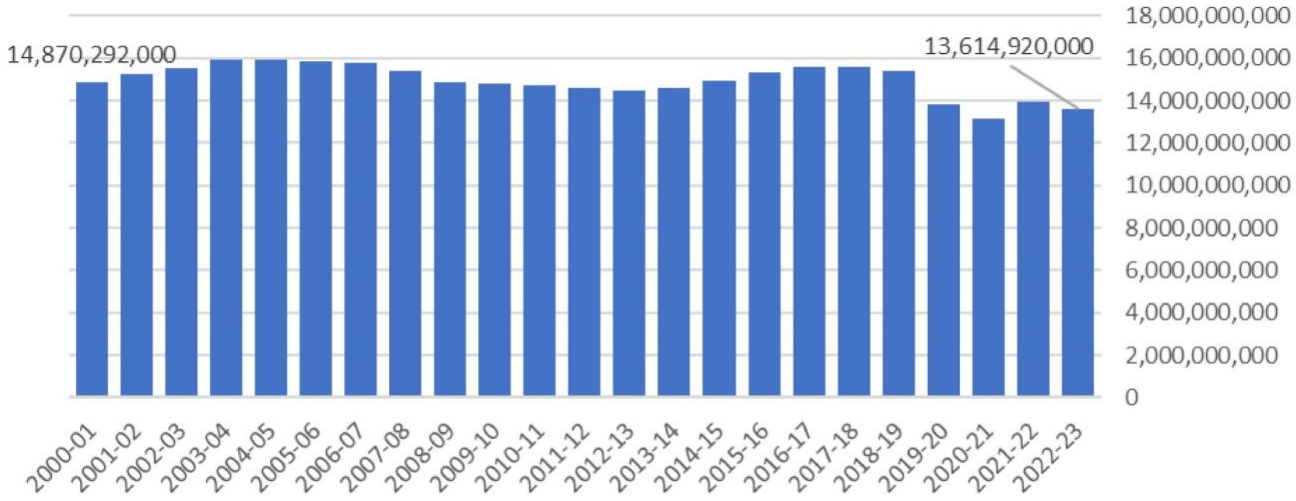
Source: U.S. Energy Information Administration, California Energy Commission Transportation Fuels Data.

These remaining refineries, which are located near marine terminals in Los Angeles and the San Francisco Bay Area, are the primary sources of transportation fuels, both gasoline and diesel, for California and Nevada. They also supply fuels to Arizona, Oregon, Central America, and South America. The California refineries have a combined crude oil processing capacity of 1.724 million barrels per day (BPD) and an average utilization rate of 82.7 percent. Their transportation fuels output averages 892,000 BPD of gasoline, 285,000 BPD of distillates, and 273,000 BPD of jet fuel. While there are other refining operations in California, they do not produce gasoline or diesel that meets CARB specifications. Rather, these facilities produce other products such as asphalt and lubricating oils.

In the past decade, four refineries in California that previously produced CARBOB have converted their refining processes or are converting to produce renewable fuel. These refiners are Bakersfield Refinery, owned by Global Clean Energy Holdings; Paramount Refinery, owned by World Energy; Rodeo Refinery, owned by Phillips 66; and Marathon's Martinez Refinery. Bakersfield Refinery had refined 66,000 BPD, Rodeo Refinery 90,000, and Marathon Martinez 166,000. Three of these refineries combined previously had a daily crude capacity of 322,000 BPD. Once these conversions are completed, these refineries will have a total capacity of roughly 115,000 BPD, 36 percent of their prior capacity. Going forward, none of the fuel being produced in these refineries will be CARB-compliant gasoline.

In-state gasoline production capacity is decreasing more quickly than demand. In Fiscal Year (FY) 2000–2001 (July 1, to June 30), gasoline sales were 14.8 billion gallons and by FY 2018-2019 sales had increased slightly to about 15.3 billion gallons. By FY 2022–2023, total sales declined to 13.6 billion gallons, an 11 percent decline since 2019. The decline in volume sales in FY 2019–2020 and 2020–2021, was mostly due to the COVID 19 pandemic, when millions of Californians sheltered at home. Since the pandemic has eased, the volume has increased slightly but has not reached pre-pandemic levels. **Figure 2** shows California gasoline sales volume between FY 2000–2001 and 2022–2023.

Figure 2: Gasoline Volume Sold (FY 2000–2023)

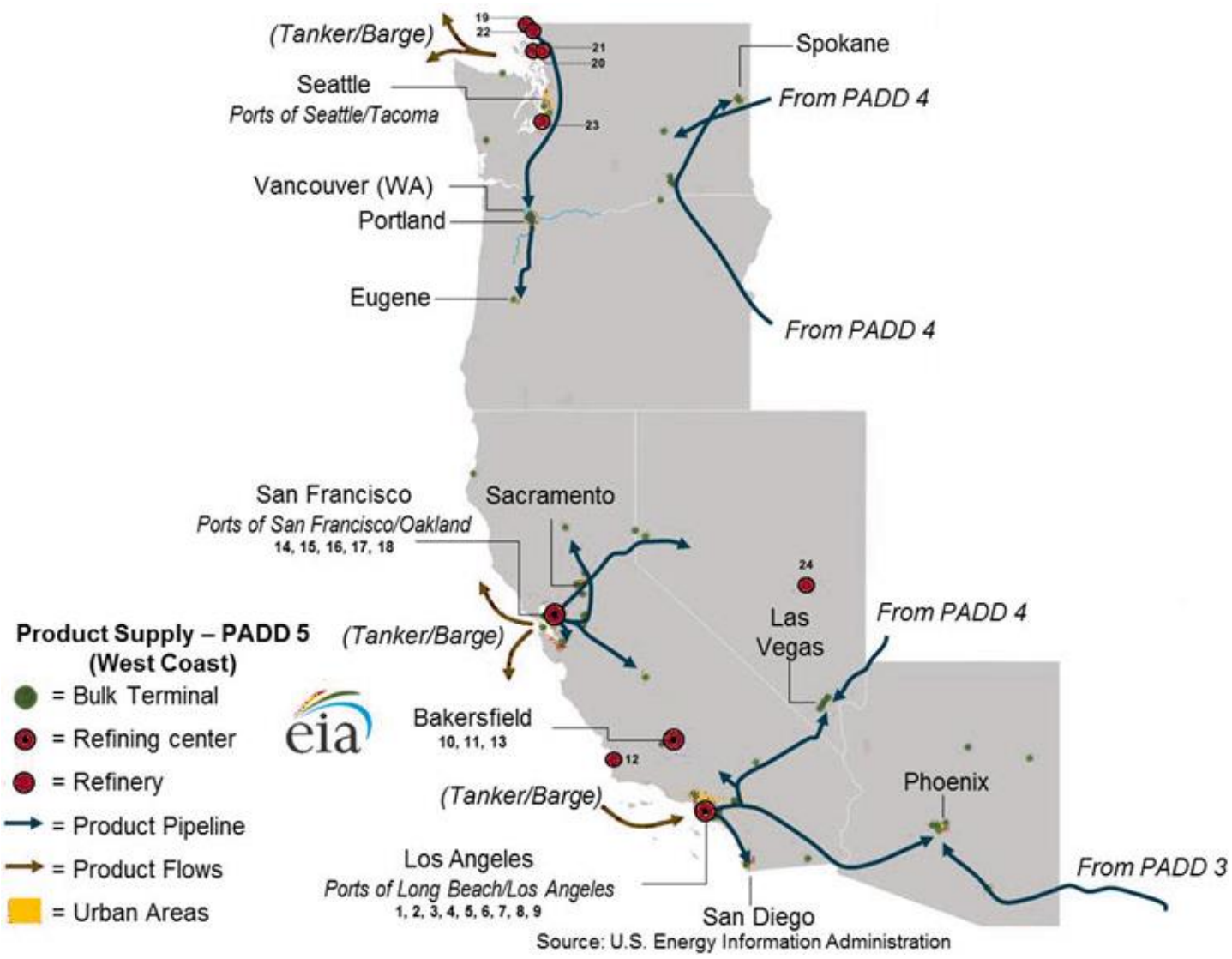


Source: CDTFA

California's Transportation Fuels Network

Refined gasoline is transported by pipeline to distribution terminals located around the state. Pipelines also connect California refining centers to distribution terminals in Nevada and Arizona; these pipelines operate only in one direction, sending gasoline and other transportation fuels to these neighboring states. This larger market region, combined with Washington, Oregon, Alaska, and Hawaii, makes up the Petroleum Administration for Defense District (PADD) 5. **Figure 3** shows the general location of California's refining centers and the associated proximity to water access (except for the Bakersfield area) to allow for receipts of crude oil, along with imports and exports of refined petroleum products and other feedstocks.

Figure 3: PADD 5 Refineries and Product Flows

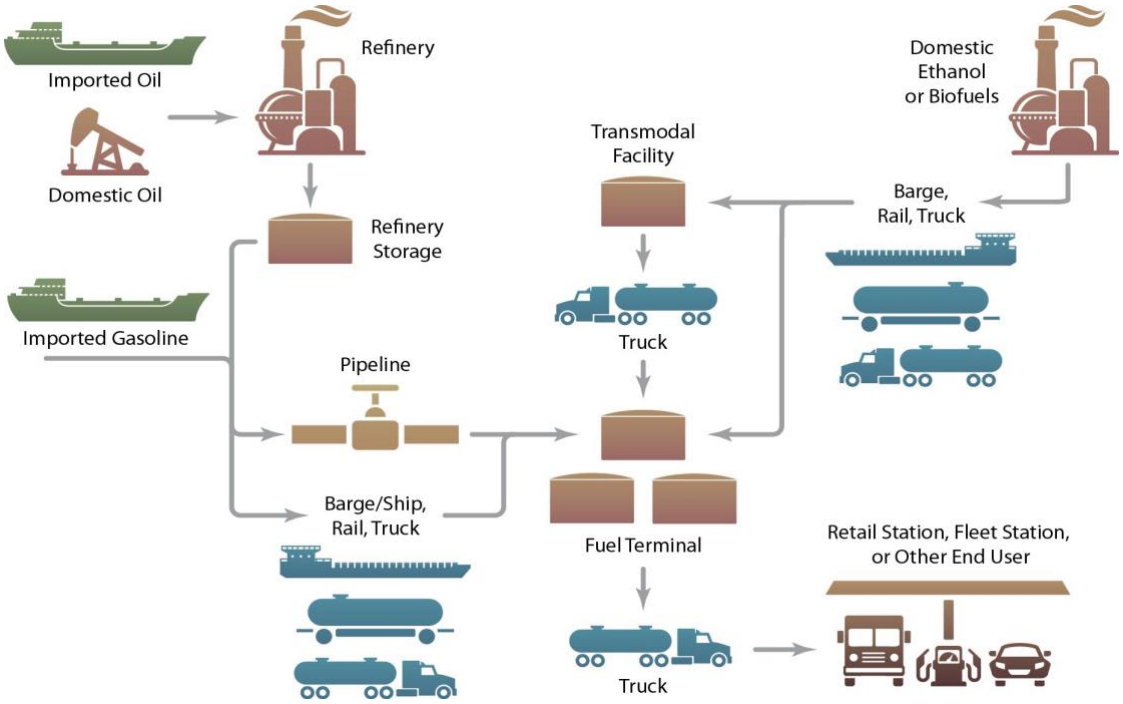


Source: U.S. EIA, West Coast Transportation Fuels Markets
https://www.eia.gov/analysis/transportationfuels/padd5/

Figure 4 shows the steps required to move transportation fuels from the point of production or import to the final point of retail distribution. Most gasoline and diesel fuel consumed in

California is transported from refineries by petroleum product pipelines to 60 distribution terminals throughout the state.

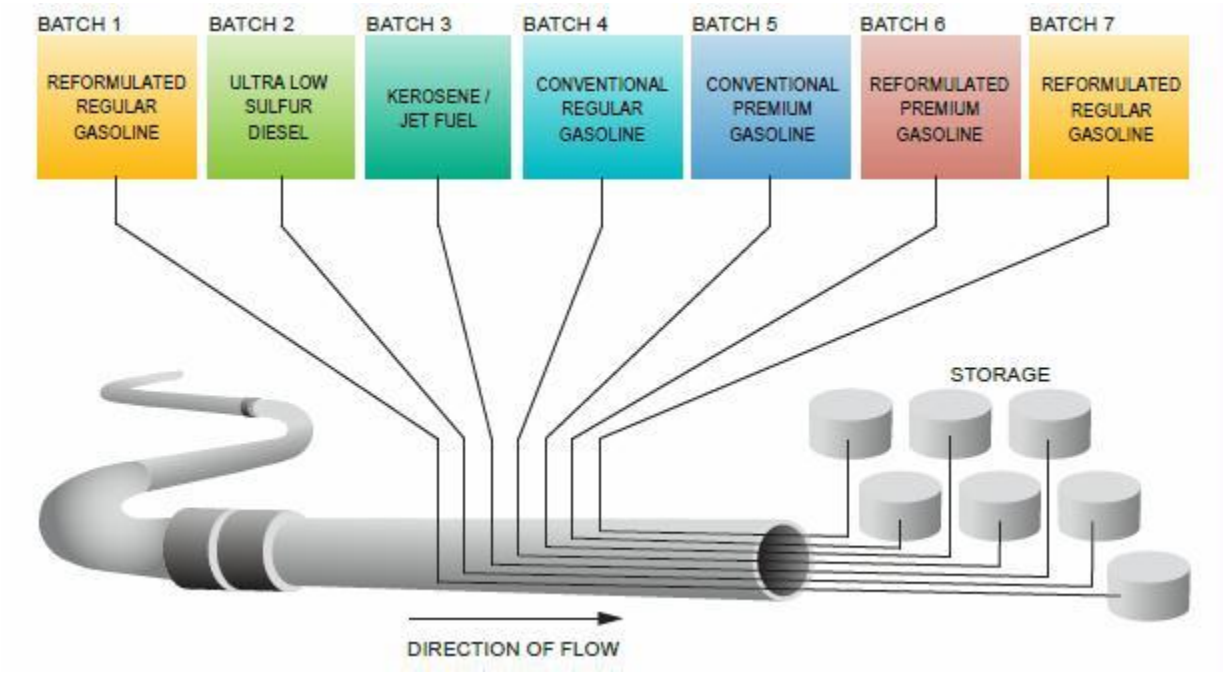
Figure 4: Distribution Flows for Transportation Fuels



Source: U.S. Department of Energy, *Alternative Fuels Data Center*
https://afdc.energy.gov/fuels/ethanol_production.html

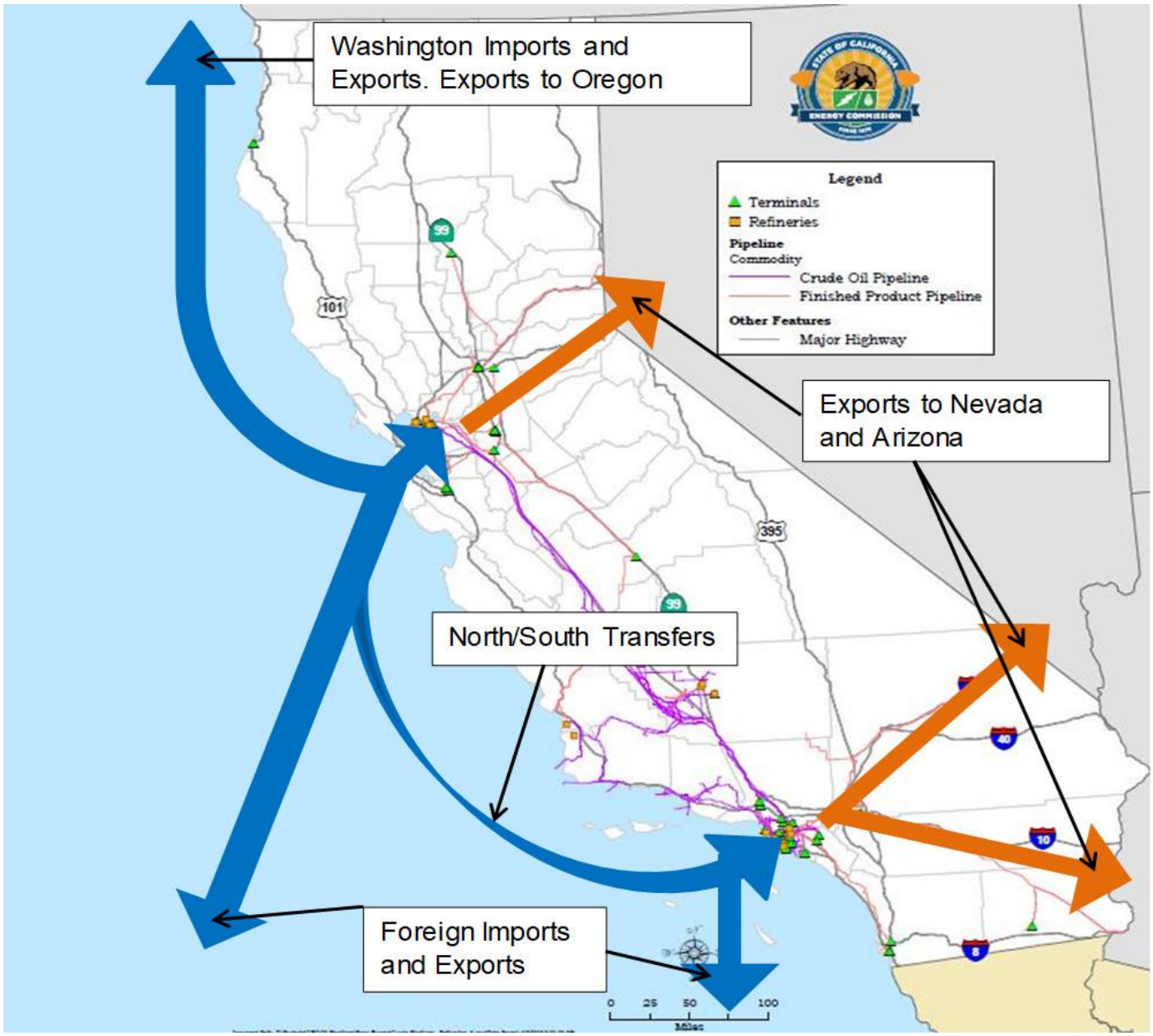
Several types of transportation fuels are pumped through the same pipelines using a "batch" sequencing process that keeps steady pressure within the pipeline to reduce the mixing between batches of different transportation fuels, shown in **Figure 5**. Most of this pipeline distribution capacity is owned and operated by Kinder Morgan, a common carrier operator that does not own any of the transportation fuels it ships; rather, it charges a fee per barrel based on approved tariff rates, along with terminal storage and distribution throughput costs. The California Public Utilities Commission (intrastate) and the Federal Energy Regulatory Commission (interstate) set tariff rates. **Figure 6** shows an overview of product movement corridors.

Figure 5: Petroleum Product Pipeline Batch Sequencing



Source: Energyskeptic.com https://energyskeptic.com/wp-content/uploads/2015/06/refined-products-pipeline-batches.jpg

Figure 6: California Petroleum Infrastructure and Finished Product Movements Corridors



Source: CEC

Terminal Racks

Gasoline is stored in large tanks at the terminal until it is loaded at the terminal racks, or simply ”racks”, which are large loading dispensers for transportation fuel trucks. At this point in the distribution supply chain, fuel additives are typically added to the gasoline to create the finished product. These distribution terminals receive fuel via petroleum product pipelines, typically from several suppliers, that is then commingled in the same community storage tanks for like types of fuel. Thus, gasoline delivered to a branded service station may not have originated from the refinery associated with that station’s brand but is generally a mixture of gasolines from more than one refinery.

The difference between gasoline sold at different branded stations is the type of proprietary additive packages used when the gasoline is loaded into a tanker truck before delivery to a service station. California refinery owners Marathon, Chevron, Phillips 66, and Valero each have proprietary additives used for fuel at their branded stations. Furthermore, BP and Shell supply branded fuel to large numbers of California stations, though they no longer refine gasoline in California. Gasoline sold at unbranded retail stations is still required to contain a generic additive package that meets detergent and deposit control minimum standards of section 2257 of the CARB Motor Vehicle Gasoline Regulations.[3]

Distribution terminals are also the point at which renewable fuels (ethanol, biodiesel, and renewable diesel fuel) are combined with petroleum-based fuels (gasoline and diesel) as the tanker truck is loaded. These “finished” transportation fuels are then delivered to wholesale facilities, private distribution sites (card-locks), and retail stations (truck stops and service stations).

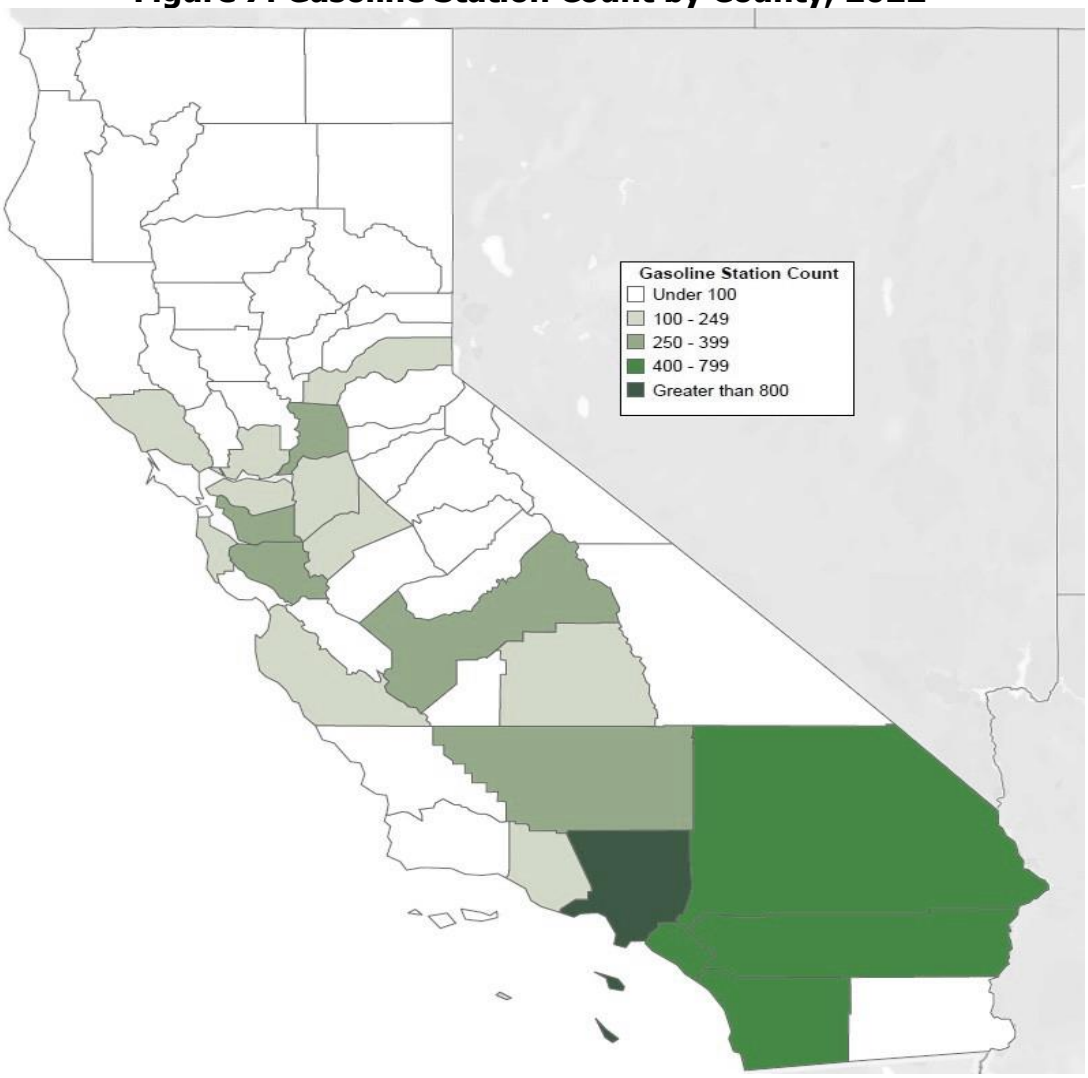
Retail Gasoline Stations

The CEC-A15 Annual Fuel Retail Outlet Report (A15) data indicate that there are slightly more than 10,000 retail gasoline outlets in California, and this number has remained largely stable over the past decade.[4] Unsurprisingly, California gasoline stations are generally located in population centers and near transportation corridors. **Figure 7** below shows the gasoline station count by county for 2022.

3 California Air Resources Board. *Gasoline Deposit Control Additives*, https://ww2.arb.ca.gov/resources/documents/gasoline-deposit-control-additives.

4 CEC conducts an annual review of locations selling fuel to the public.

Figure 7: Gasoline Station Count by County, 2022



Source: CEC analysis of A15 data

Three Categories of Retail Stations: Branded, Unbranded, and Hypermarts

For this review, retail gasoline stations are classified into three categories: branded stations, unbranded stations, and hypermarts.

Branded stations are typically those affiliated with large refiners and sell fuel with branded additives. Some of the larger brands in California include Chevron, Shell, Exxon, 76, Valero, and ARCO.

Unbranded stations generally sell gasoline without proprietary additives, though the gasoline sold is still required to contain a cleaning additive that meets CARB specifications. Unbranded stations can be small, independently owned gas stations or very large chains. The gasoline these unbranded stations sell is produced by the same refineries as branded stations and drawn from the same tanks as branded fuel.

A hypermart is a gas station owned or operated by a supermarket or wholesale store that sells fuel at its retail location. Costco, Safeway, and Sam's Club are among the notable hypermart

retailers in California. Typically, hypermarts sell unbranded gasoline without additional proprietary cleaning additives, though Costco blends in a proprietary additive at its stations.

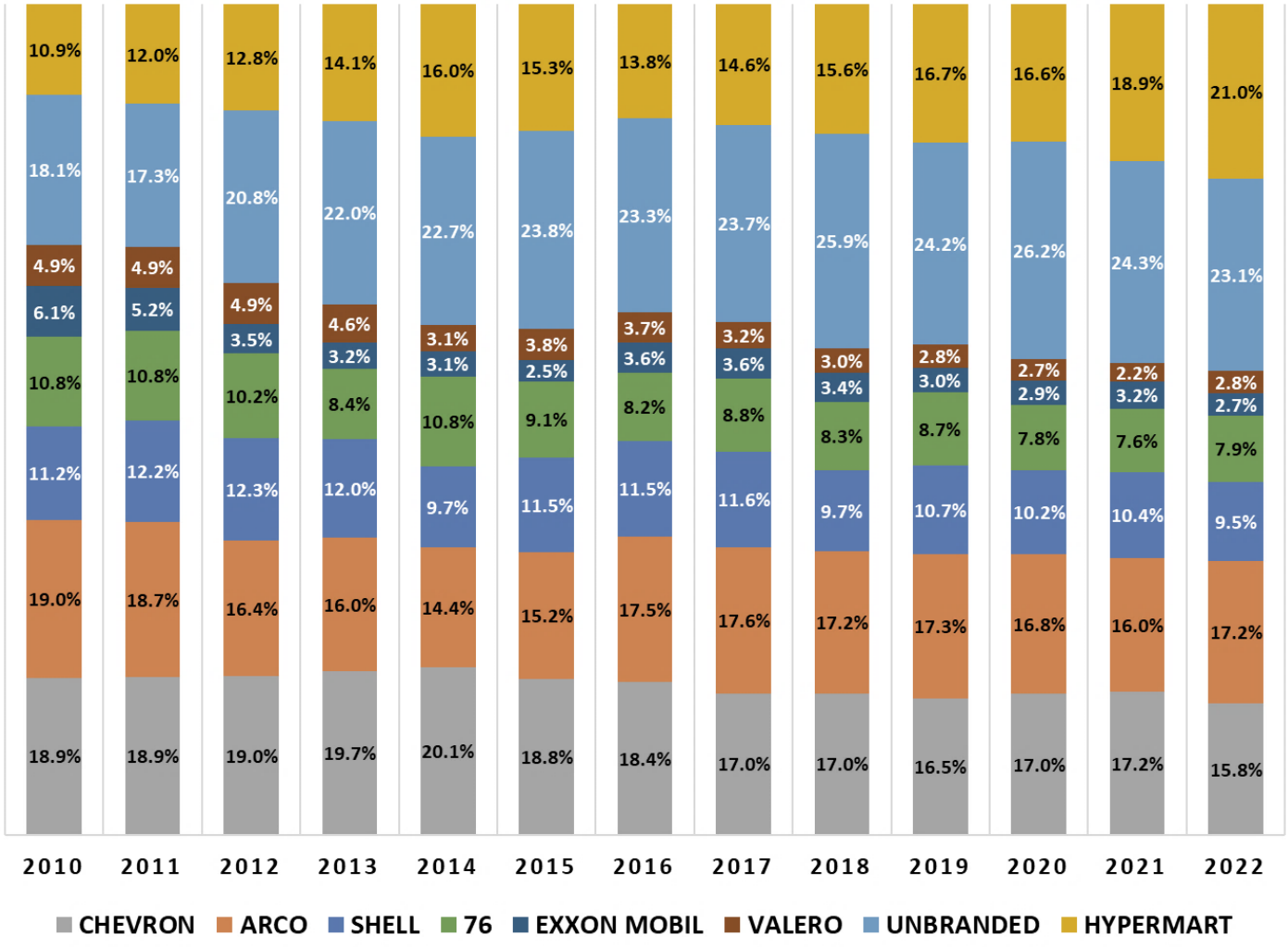
All gasoline sold in California must meet the specifications set by CARB. The fuel itself, within the various grades, is essentially interchangeable, regardless of the company that refined the fuel. The fuel sold under one brand name may have been produced by a different refiner.

The Growth and High Sales Volume of Hypermarts

While hypermarts make up a very small percentage of gasoline retail outlets (3.2 percent in 2022 according to CEC data), they account for more than 20 percent of all gasoline sold in California. The average California hypermart retail location sells eight times the volume of gasoline as the average nonhypermart station. CEC reporting for 2022 includes 263 responding locations characterized as hypermarts compared to 7,887 nonhypermart locations. Hypermarts reported a total of 2.4 billion gallons sold, for an average of 760,000 gallons per location per month. Nonhypermarts reported a total of 9.1 billion gallons sold, for an average of 96,000 gallons per location per month.

Figure 8 shows the market share of the major brands, along with the hypermart and unbranded categories.

Figure 8: California Retail Gasoline Market Share, 2010–2022



Source: CEC analysis of A15 data

CHAPTER 2:
California Gasoline Prices and Fuel Consumption

California Gas Prices vs. Other States

Between 2004 and 2014, the average retail price percent difference between California and the rest of the United States was roughly 6.5 percent. That difference spiked to roughly 30 percent in the spring of 2015, following the February 2015 fire at the Torrance Refinery (then owned by ExxonMobil). At that time, the Torrance Refinery produced 10 percent of California's gasoline supply.[5] Since 2015, this retail price difference has remained elevated far above pre-2015 levels, averaging 21 percent. UC Berkeley Professor Severin Borenstein has dubbed this unexplained price gap as the "mystery gasoline surcharge."[6] **Figure 9** below shows California gas prices compared to the average price in the rest of the United States, excluding taxes and fees.

Figure 9: Percentage Difference California — United States

Source: CDTFA calculations of U.S. Energy Information Administration (EIA)

The retail gasoline price differential increasingly exists for other states along the West Coast. Even excluding California, the price difference between West Coast states and the rest of the United States began to increase in the summer of 2014, as seen in

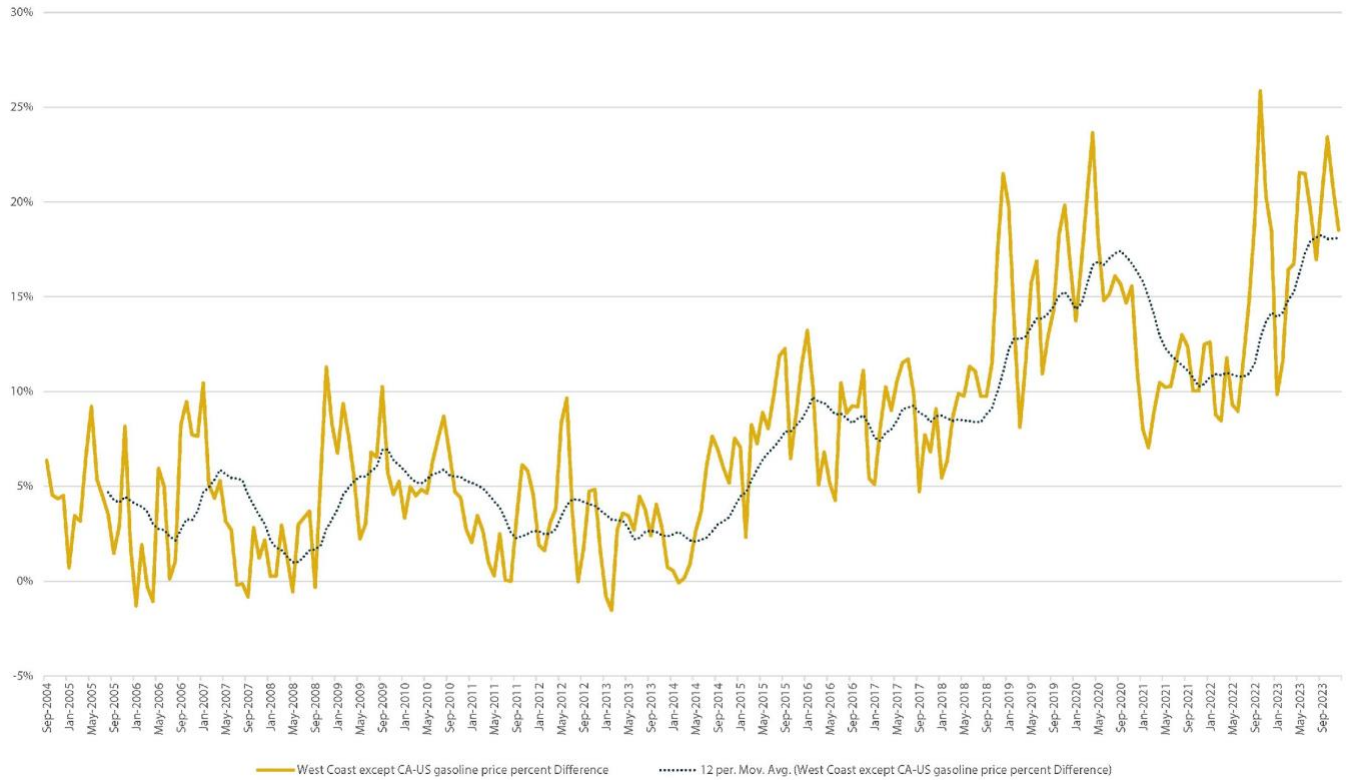
Figure 10.[7] Between 2004 and 2014, the average percentage difference in price between West Coast states and the rest of the United States was roughly 4 percent. Between 2015 and 2023, that average difference increased to 12 percent. In 2023, the percentage difference was 18 percent.

5 Borenstein, Severin, Kathleen Foote, Dave Hackett, Amy Jaffe, and James Sweeney. September 2017. Petroleum Market Advisory Committee Final Report, December 2014 to November 2016. California Energy Commission, CEC-200-2017-007, https://efiling.energy.ca.gov/GetDocument.aspx?tn=221306&DocumentContentId=22709.

6 https://energyathaas.wordpress.com/2023/01/09/whats-the-matter-with-californias-gasoline-prices/.

7 This includes EIA PADD 5 (West Coast): Alaska, Arizona, Hawaii, Nevada, Oregon, and Washington.

Figure 10: West Coast-U.S. Percentage Difference in Retail Gasoline Price, 2004-2023 (All Formulations)



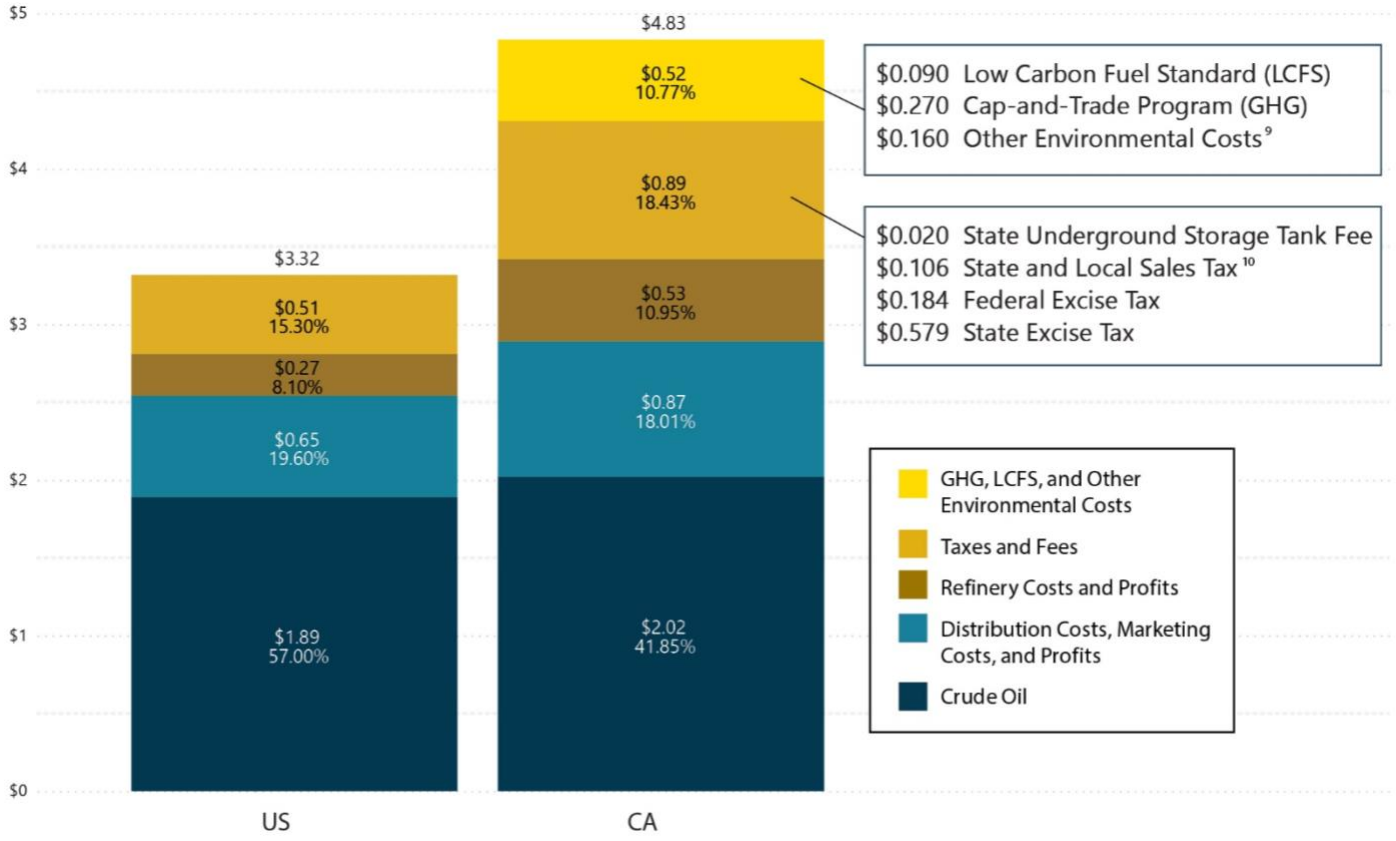
Source: CDTFA calculations of EIA data

Components of Gasoline Prices

The main components of the retail price of gasoline include crude oil costs, refining costs and profits, distribution and marketing costs and profits, environmental costs, taxes, and fees. **Figure 11** below summarizes the impact of these various components on the retail price of gasoline for California and the United States. [8]

8 CEC and LAO industry data were used for California. The U.S. average is based on EIA data.

Figure 11: Composition of a Gallon of Gasoline November 2023



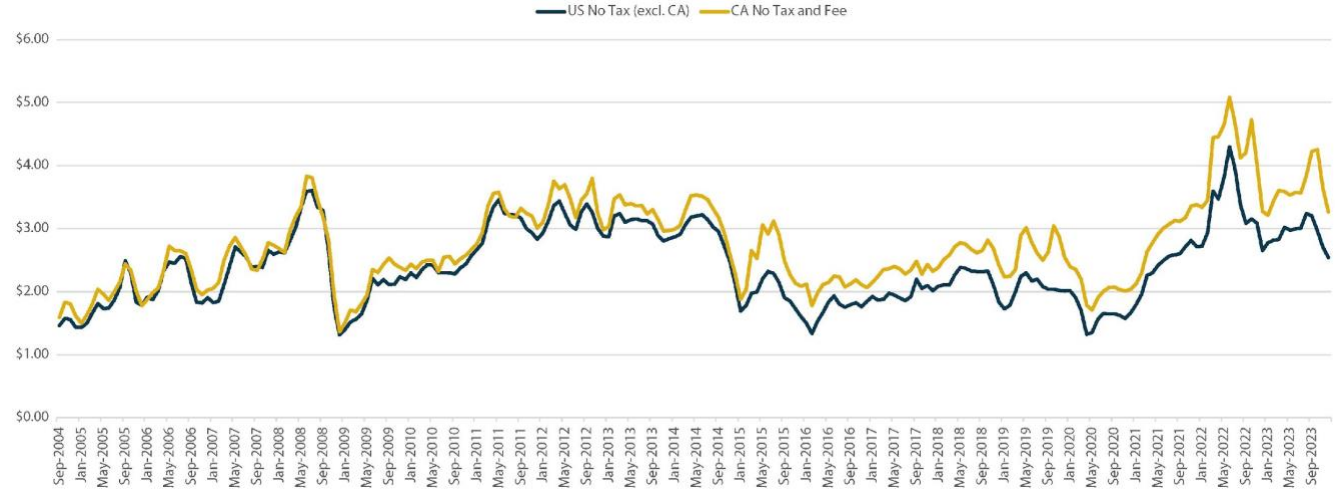
Source: EIA, CEC, and LAO

Some point to taxes as the source of the price differential with other states. While California's statewide taxes on gasoline are 38 cents higher per gallon than the national average, taxes do not fully explain the price difference. As **Figure 12** shows, the gasoline price gap between California and the rest of the nation has grown noticeably since 2015, even after taxes are considered.

9"Other Environmental Costs" are costs related to producing CARBOB winter and summer blends.

10 A statewide sales tax rate of 2.25 percent is used in the calculation. The actual sales tax rate on gasoline varies by jurisdiction. For FY 22/23, the average special district tax was an additional 1.34 percent.

Figure 12: California Gas Prices vs. All Other States, Excluding Tax, 2004-2023 (All Formulations)



Source: CDTFA calculations of EIA and CEC data

Impact of Business Costs in California

Industry also maintains that high prices and large margins reflect the higher costs of doing business in the state. Both data and experience confirm that California is a higher-cost state. One common method of comparing costs among companies, industries, or regions is to divide costs by revenues. For example, one company may have labor costs of 12 percent of revenues, while a rival company making similar products has labor costs of 10 percent of revenues. Labor costs of the first company are 20 percent higher than its rival. Using this method, California petroleum refiners' average costs per dollar of revenue can be compared with the U.S. petroleum refiners' average cost per dollar of revenue.

Table 2 shows California costs per dollar of revenue divided by U.S. costs per dollar of revenue in 2017 for selected major cost components of petroleum refineries, North American Industrial Classification Code (NAICS) 32411.[11]

11 The most comprehensive and detailed cost and revenue data available are from the U.S. Census Bureau Economic Census. These surveys are done every five years. The most recent Economic Census is for 2017.

Table 2: Cost Comparison of California and U.S. Petroleum Refineries

Cost Item	CA Costs of Petroleum Refining per Dollar of Revenue Divided by U.S. Costs per Dollar of Revenue in 2017
Annual payroll	126%
Cost of materials, components, packaging and supplies used, minerals received, or purchased machinery installed	100%
Total capital expenditures for buildings, structures, machinery, and equipment	133%
Total rental payments or lease payments	139%
Total other operating expenses	137%

Source: U.S. Census Bureau, *2017 Economic Census*

As shown in **Table 2**, California refinery costs are generally higher than the national average. Payroll costs are 26 percent higher (126 percent of the U.S. average). Costs of buildings and equipment are 33 percent higher. Rental and lease payments are 39 percent higher. All other operating expenses are 37 percent higher. The *Economic Census* data also show that crude petroleum costs account for average 88 percent of total costs (excluding depreciation) for California refiners, a bit lower than the average of 91 percent for U.S. refiners.[12]

Higher petroleum refining costs reflect generally higher costs and incomes in California. As per capita wages and other income in California are higher than the U.S. average, these costs are reflected in refining costs, as well as retail costs of gasoline stations and convenience stores. U.S. Bureau of Economic Analysis (BEA) data indicate that 2022 wages per capita were 23.6 percent higher in California than in the United States as a whole.[13] For gas station employees specifically, the 2017 Economic Census shows that California payroll costs per employee were 16.8 percent higher than the U.S. average.

While clearly a contributing factor, higher costs do not fully explain California's high gas prices. As discussed in Chapters 4 and 5 of this report, the margins for refiners and retail stations have more than doubled over the last decade.

Between 2013 and 2023, the refinery margin increased by $0.54 per gallon or 206 percent, from $0.26 to $0.80. The retail margins increased even more steeply. CEC estimates that in 2013 the average retail margin for gasoline was $0.22 per gallon. By 2023, the margin ballooned by $0.50 a gallon to $0.72, or an increase of 227 percent. CDTFA has found no data that costs have increased by similar rates over the studied period.

12 In addition to depreciation, total costs do not include cap-and-trade costs and costs of producing the unique formulation for gasoline sold in California.

13 U.S. Bureau of Economic Analysis, https://www.bea.gov/data/by-place-states-territories.

California Gasoline Consumption and Expenditures

While the per gallon price of gasoline in California is second only to Hawaii's, California ranks forty-fifth in per capita petroleum consumption, due in part to the state's energy efficiency. Per capita, California has more registered electric, hybrid, and plug-in-hybrid vehicles than any other state in the nation.[14] Almost 37 percent of all electric vehicles in the United States are registered in California, though the state makes up 12 percent of the country's population.[15] At 15.5 barrels of petroleum products per capita per year, California's per capita consumption is lower than all but five other states.[16] On average, the United States consumes about 22 barrels per capita related to transportation.

In terms of spending on gasoline per capita, California ranks twenty-first among the U.S. states.[17] In 2021, Californians spent $1,338 per capita annually (or about $112 a month) on motor vehicle fuel. That is approximately $125 a year (or $10 more a month) more than the U.S. average ($1,214). Compared to Texas, where retail gasoline prices are among the lowest in the nation, California drivers spent only $84 more a year on motor vehicle fuel, or $7 more a month.[18]

Even though California average spending compares favorably with national averages, high gas prices impact moderate and low-income families disproportionally, as they spend a larger portion of their income on transportation and gasoline. In 2022, the Bureau of Labor Statistics estimated that transportation costs for the lowest income quintile, those earning less than $25,800 a year, increased by 16 percent, more than all other income brackets, except the highest quintile, $140,000 a year or more.[19] The *2022 National Household Travel Survey*, conducted by the U.S. Department of Transportation, showed that people with family income of less than $35,000 a year drove vehicles with an average age of 14 years, or 4.5 years older than the higher income brackets.

As older vehicles tend to be less fuel-efficient, they add to transportation costs. Moreover, lower-income individuals may have longer commutes.[20] With this combination of lower fuel efficiency and more distant commutes, lower-income Californians are disproportionally impacted by high gas prices.

---

14 231, 92, and 388 per 10,000 residents.

15 U.S. Department of Energy, Electric, Alternative Energy Data Center. "Electric Vehicle Registration by State," https://afdc.energy.gov/data/10962.

16 2021 State Energy Data System, (1960–2021), EIA.

17 State Energy Data System (1960–2021), EIA.

18 In 2023, the average price of regular gasoline in Texas was about $3, while in California, the price was about $4.77.

19 Table 1101. "Quintiles of Income Before Taxes: Annual Expenditure Means, Shares, Standard Errors, and Relative Standard Errors," Consumer Expenditure Surveys, 2022, U.S. Bureau of Labor Statistics, https://www.bls.gov/cex/tables/calendar-year/mean-item-share-average-standard-error/cu-income-quintiles-before-taxes-2022.pdf.

20 Islam, Md Rabiul and Jean-Daniel M. Saphores, "An L.A. Story: The Impact of Housing Costs on Commuting," *Journal of Transport Geography, Volume 98*, 2022, 103266, ISSN 0966-6923, https://doi.org/10.1016/j.jtrangeo.2021.103266.

CHAPTER 3:
Tax Revenue

History of California Taxes on Motor Fuel

California first imposed a gasoline tax more than 100 years ago when voters approved the Motor Vehicle Fuel License Tax Act of 1923, which levied an excise tax of $0.02 per gallon. In 1933, California established a sales tax on tangible goods but exempted gasoline. The Transportation Development Act of 1971 reduced the statewide sales tax by a quarter percent and, at the same time, broadened it to include gasoline.[21] Since 1970, many local jurisdictions across California have also imposed local district taxes on retail sales, including gasoline.[22] The current state taxes on gasoline include a 57.9-cents-per-gallon excise tax, a 2.25 percent statewide sales tax (1.25 percent from the Bradley-Burns Tax,[23] 0.5 percent from the Public Safety Fund, and 0.5 percent from the Local Revenue Fund), a $0.02 per gallon underground storage tank fee, and a 1.3 percent average local district tax.[24] **Figure 13** below highlights some of the major changes to California's gasoline excise and sales taxes between 1923 and today.

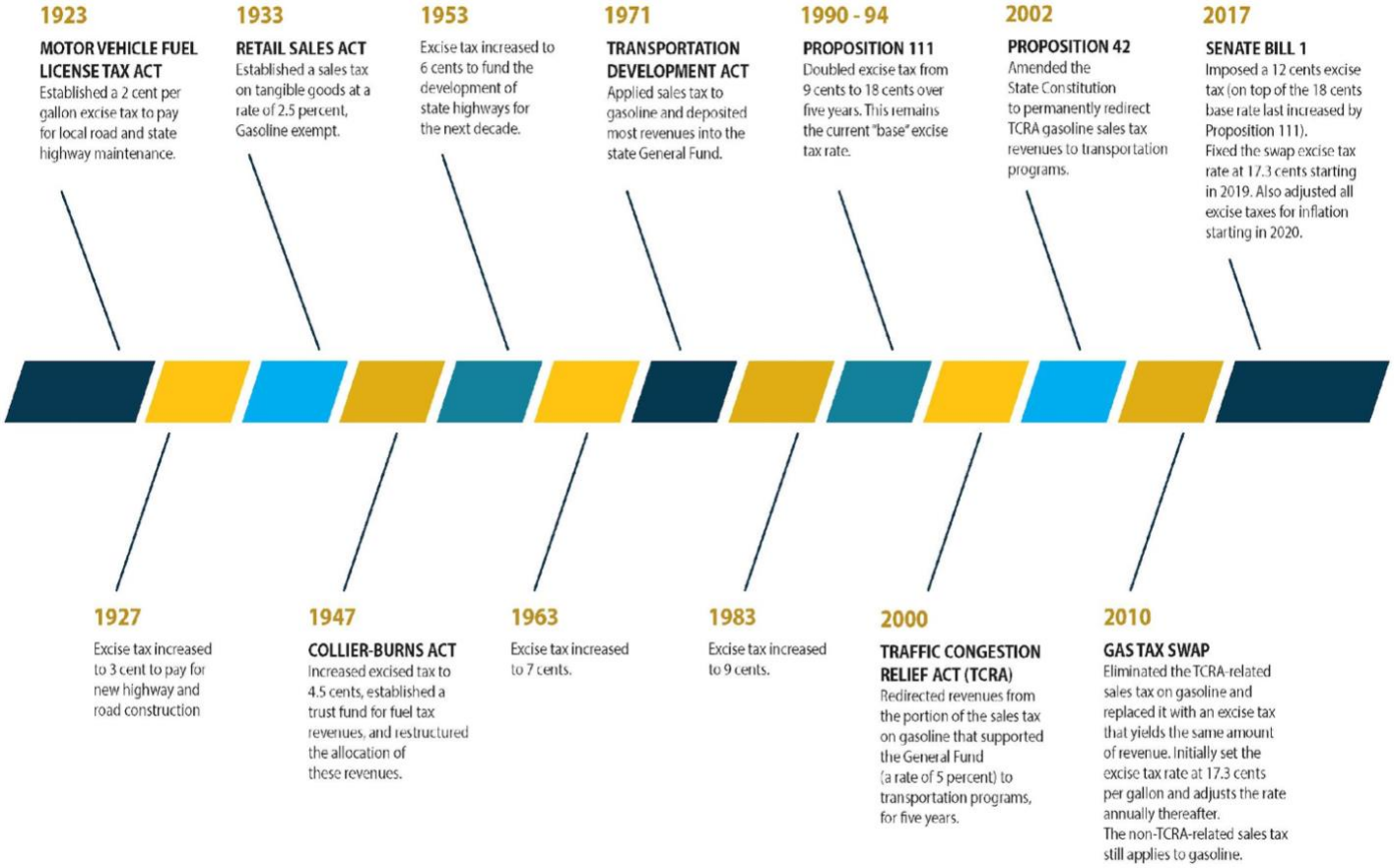
21 California State Senate Archives. January 2012. *A Short History of State Transportation Funding*, https://archive.senate.ca.gov/sites/archive.senate.ca.gov/files/committees/2013-14/stran.senate.ca.gov/sites/stran.senate.ca.gov/files/AShortHistoryofTransportationFinance/index.pdf.

22 California Department of Tax and Fee Administration. "Detailed Description of the Sales & Use Tax Rate," https://www.cdtfa.ca.gov/taxes-and-fees/sut-rates-description.htm.

23 California State Auditor. November 30, 2027. *Bradley-Burns Tax Fact Sheet,* https://www.auditor.ca.gov/pdfs/factsheets/2017-106.pdf.

24 CDTFA calculations as of January 2024.

Figure 13: Major Changes to State Excise and Sales Taxes on Gasoline



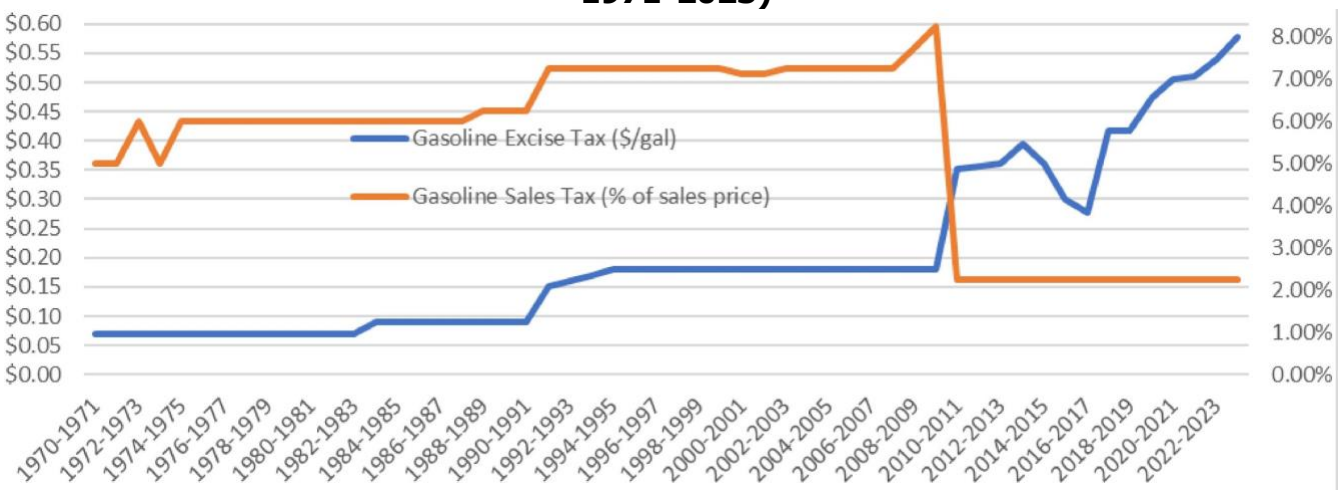
Source: California Legislative Analyst's Office

In 2010, The Fuel Tax Swap[25] eliminated the state portion of sales tax on gasoline (leaving only the local 2.25 percent share of the sales tax), which had been redirected from the general fund to transportation programs and replaced it with an excise tax increase of 17.3 cents per gallon. The swap was intended to be revenue neutral.[26] **Figure 14** shows California's historical tax rates for gasoline and illustrates the impact of the Fuel Tax Swap.

25 Assembly Bill X8-6 (Assembly Budget Committee, Chapter 11) and SB 70 (Committee on Budget and Fiscal Review, Chapter 9)

26 Between July 2011 and November 2017, the Board of Equalization was required to adjust annually the excise tax rate for revenue neutrality as required by the Fuel Tax Swap legislation.

Figure 14: California Gasoline Excise Tax ($) and State Sales Tax (%) Rates (FY 1971-2023)



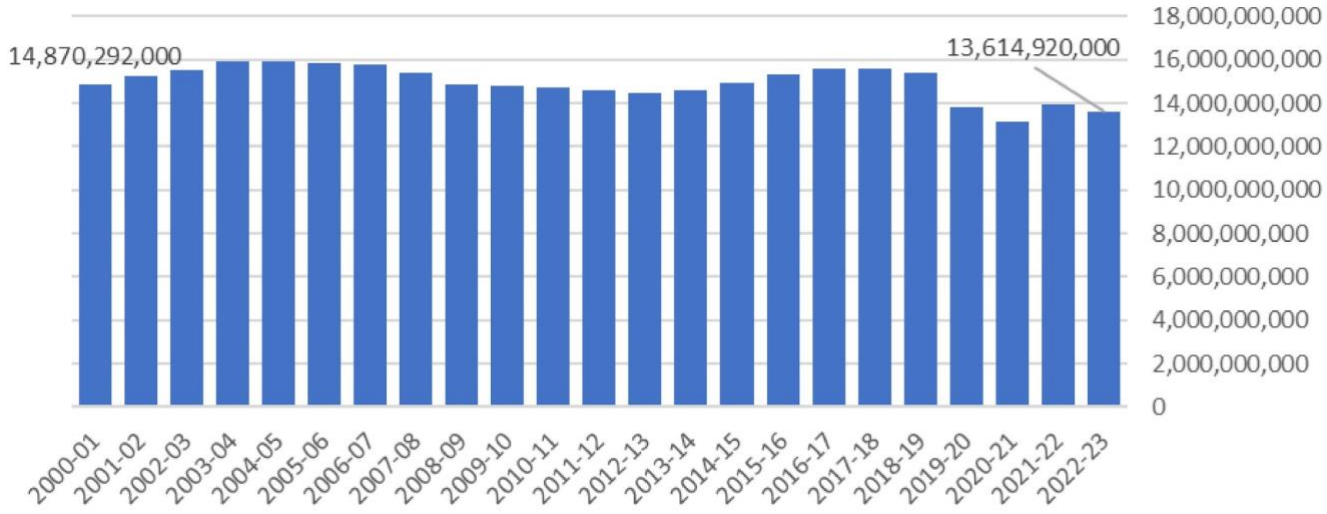
Source: CDTFA

State Revenue from Gasoline Sales

Figure 15 shows the annual total volume of gasoline sold since 2001. **Figure 16** charts the tax receipts from gasoline sales over that same period, with revenue doubling from $4.4 billion in 2000 to $8.8 billion in 2022. Over the last two decades, growing tax revenue from gasoline sales largely reflects the impact of inflation on sales tax receipts and the indexing of excise tax rates to the California Consumer Price Index.[27]

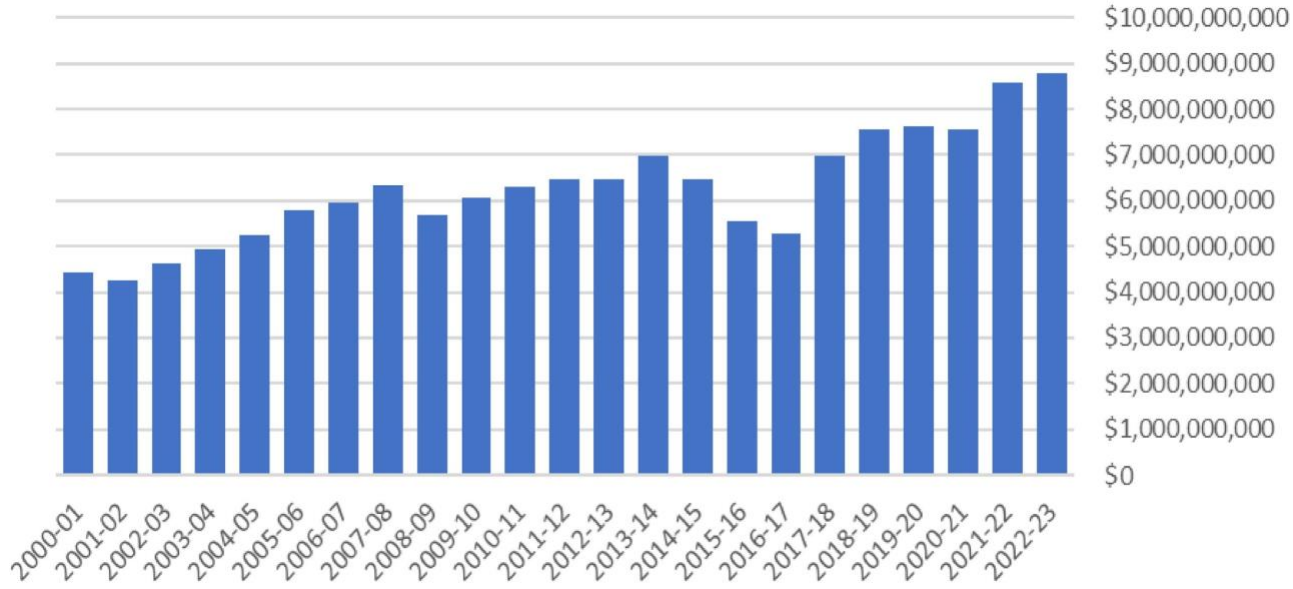
27 Between July 2011 and November 2017, the Board of Equalization was required to annually adjust the excise tax rate for revenue neutrality as required by the Fuel Tax Swap legislation.

Figure 15: Gasoline Volume Sold (FY 2000–2023)



Source: CDTFA

Figure 16: Total Gasoline Revenues (FY 2000–2023)



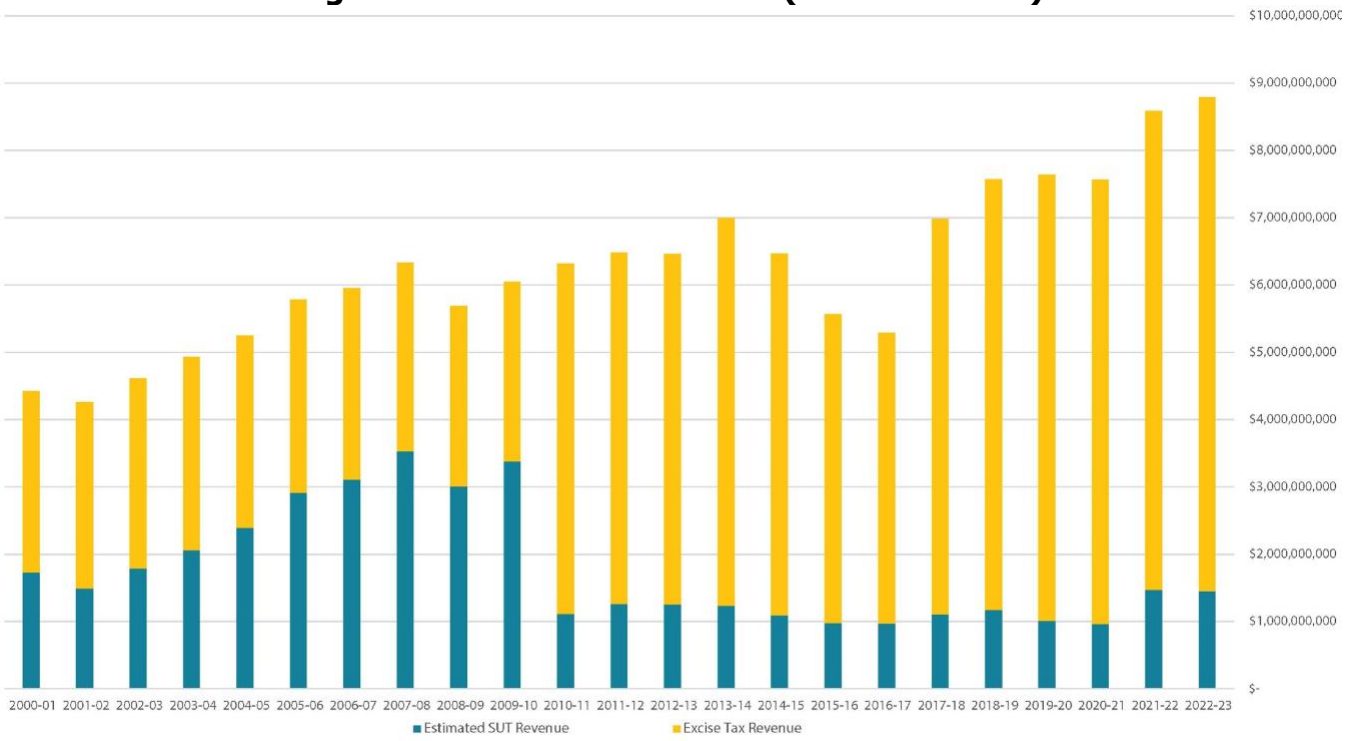
Source: CDTFA

Clearly, gasoline retail prices affect sales tax revenue, as higher retail prices result in higher sales tax revenues, unless the higher prices are offset by lower consumption. Since the Fuel Tax Swap, however, gasoline has been subject only to a lowered sales tax rate of 2.25 percent.[28] As a result, the state revenue impact of the retail price fluctuation has diminished compared to prior years.

In 2017, the Legislature enacted SB 1 (Beall, Chapter 5, Statutes of 2017), increasing the excise tax on gasoline by 12 cents per gallon, from 29.7 cents to 41.7 cents. SB 1 also requires CDTFA to adjust the gasoline excise tax rate annually to reflect any change in the California Consumer Price Index. **Figure 17** displays excise and sales tax revenues from gasoline sales.

28 Gasoline sales are also subject to local district taxes, which vary by jurisdiction. For FY 2022–2023, the average district tax rate was 1.34 percent.

Figure 17: Gasoline Revenues (FY 2000–2023)



Source: CDTFA

As many Californians switch to hybrid and electric vehicles and the state continues its transition to zero-emission vehicles by 2035, excise tax and sales and use tax receipts from the sale of gasoline will decline. In December 2023, the Legislative Analyst's Office published a report estimating that gasoline excise tax revenues will decline by about $5 billion, or 65 percent, over the next 10 years.[29]

29 Legislative Analyst's Office. December 2023. *Assessing California's Climate Policies — Implications for State Transportation Funding and Programs*, https://lao.ca.gov/Publications/Report/4821.

CHAPTER 4:
Refining Margins, Spot Market Transactions, and Retail Prices

CEC has done extensive work on refining margins, and, in recent months, the Division of Petroleum Market Oversight (DPMO) has issued two letters raising concerns about the impact of spot market sales on retail gasoline prices.

As shown in **Figure 11**, the largest component of retail gasoline price is the cost of crude oil, the price of which can be highly impacted by geopolitical events, economic growth, weather, currency markets, and other factors.

Because crude oil is a global commodity with relatively transparent pricing, the agencies' review has focused on price inputs from the refiners to the pump. However, the crude inputs for California-refined gasoline are slightly higher than in other areas of the country, though the overall percentage of the final gasoline cost attributable to crude oil is lower in California. The U.S. Energy Information Administration in November 2023 estimated the average retail gas price nationally was $3.32. Of that, $1.89 or 57 percent, was related to crude oil costs. In California, the average retail price for gasoline was $4.83, with $2.02 or 42 percent related to crude oil costs.

Refining Costs and Margins

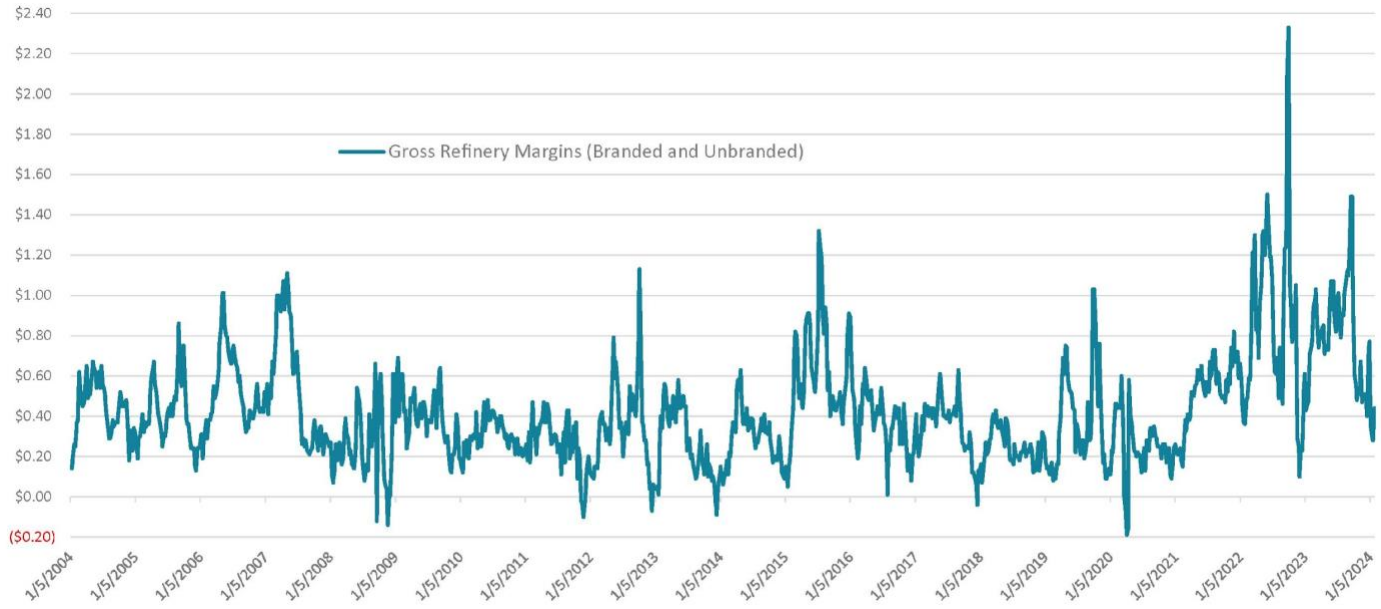
Refining crude in California to meet the CARB specifications for gasoline is more costly than refining crude in the rest of the United States. Refining costs vary based on the type of crude oil used, the equipment necessary, and other required additives in the fuel to meet specifications. CARB has estimated that it costs an additional $0.10 to $0.15 per gallon to produce CARBOB. The federal Department of Energy has reported that, on average, 14 percent of the selling price of gasoline is normally associated with refining costs.[30] Based upon CEC's Estimated Gasoline Price Breakdown and Margins for Calendar Year 2022, refining costs and profits in California averaged 16 percent of the selling price of gasoline.

Because CEC has only recently begun receiving data regarding profitability and the measures are not yet uniform, this report looks instead at the gross gasoline refining margin. This gross gasoline refining margin is the difference between the price a refiner pays for crude oil and the price at which the refiner sells refined gasoline into the market. It includes costs and profits.

As **Figure 18** indicates, the average gross gasoline refining margin for California refiners fluctuates considerably. Between 2004 and 2022, the gross gasoline refining margin was rarely more than $1.00 per gallon and had never exceeded $1.40. Since 2022, however, the gross gasoline refining margin has regularly surpassed $1.00 and was above $1.40 during three price spikes. On October 3, 2022, the gross gasoline refining margin peaked at $2.31.

30 "Gasoline Prices Explained," U.S Department of Energy, https://www.energy.gov/energysaver/gasoline-prices-explained.

Figure 18: California Gross Gasoline Refining Margin (2004–2023)



Source: CDTFA analysis of CEC data

Impacts of Spot Pricing on Retail Prices

Refiners, large wholesalers, and retailers, as well as trading firms, buy and sell large quantities of gasoline, typically tens of thousands of barrels,[31] on the spot market. **Figure 19** shows that the spot market tracks closely with the rack (wholesale) and retail prices of gasoline. Spot market price changes appear almost immediately in rack price spikes and, within days, in retail prices. Even more directly, large retailers will purchase gasoline on the spot market or will have supply contracts with refiners tied directly to a spot price.

31 One barrel of oil or gasoline is equal to 42 gallons.

Figure 19: California Daily Spot, Rack, and Retail Prices of Regular Gasoline (2013–2023)

Source: CDTFA analysis of industry

DPMO has done significant work looking at the impact of the spot market on gasoline pricing at the wholesale and retail levels, issuing two letters to Governor Newsom that highlight the impacts and call for reform.[32] DPMO noted in its January 31, 2024, letter that:

> *"[t]he spot market in California is currently an unregulated, over-the-counter market. Spot market deals are negotiated directly between buyers and sellers or mediated by brokers. California has two spot markets: one for Los Angeles (LA) and one for the San Francisco Bay Area. Other U.S. spot market locations include the Pacific Northwest (Portland), Houston, Chicago, and New York. The LA spot market is more active than the San Francisco market and the LA spot price impacts the largest portion of retail gasoline prices across the state.*
>
> *"Spot market transactions and average prices for the LA market are published by price reporting agencies ("PRAs"). PRAs have an outsized influence on market dynamics through their assessment of current market prices. Buyers and sellers negotiate the contract price for individual deals, but only some of those deals are voluntarily (or selectively) reported to the PRA. The PRA then publishes what it assesses to be the current market price for California gasoline.[33] The Oil Price Information Service*

32 Division of Petroleum Market Oversight letter to the Governor, September 22, 2023. https://www.energy.ca.gov/sites/default/files/2023-09/DPMO_Interim_Update_on_California%E2%80%99s_Gasoline_Market_September_2023_ada.pdf.

33 The most common way that spot contracts are priced is an "exchange of futures for physical" or "EFP" trade, which are contracts that are priced relative to the New York Mercantile Exchange ("NYMEX") futures RBOB contract at the close of a specific day. RBOB — which stands for "reformulated blendstock for oxygenate blending" — is a common benchmark for gas sold in other parts of the United States. In an EFP transaction, the

("OPIS"), a for-profit company, is the industry-leading PRA in California and on the West Coast."[34]

According to DPMO, volatility, illiquidity, and a lack of transparency all contribute to price spikes in the California spot market. Given the impact of these spikes on the prices paid by California drivers, DPMO has suggested several reforms for consideration.

Chapter 5 of this report explains in detail the negative impact of price volatility on the retail price of gasoline. When prices increase rapidly, due perhaps to a single spot market transaction, it may take weeks for retail prices to return to pre-spike levels, even if the wholesale price increase was merely transitory or not reflective of other, unreported spot market transactions. This interplay between price volatility, driven largely by the spot market, and the retail pricing impacts of volatility outlined in Chapter 5 are worth further study.

spot market parties agree to a differential to the NYMEX RBOB price. This differential is the measure of the difference between the LA spot market and the NYMEX. This differential is a key benchmark for observers to determine if the LA market is experiencing supply/demand issues.

34 DPMO Spot Market Reform Letter (politico.com), https://www.politico.com/f/?id=0000018d-6c43-ddbd-adad-ed774eda0000.

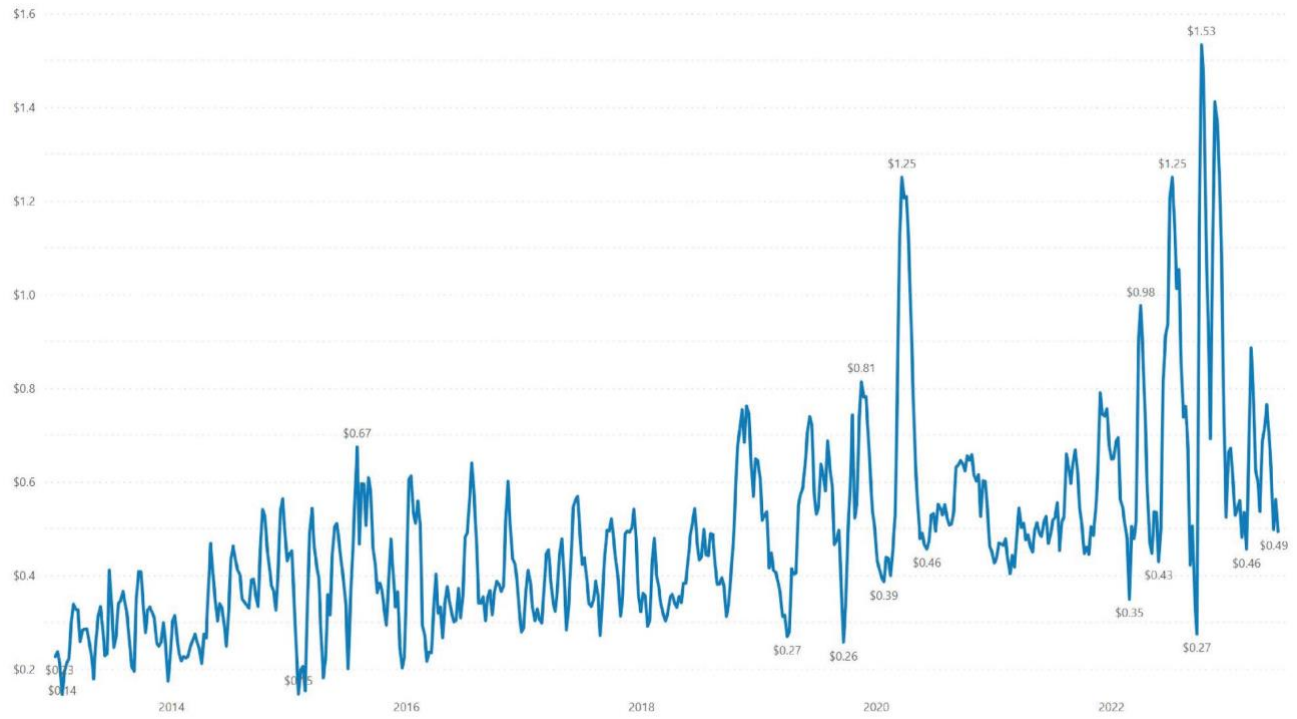
CHAPTER 5:
Retail Market Impact on Gasoline Prices

CEC and CDTFA have looked extensively at the structure of the retail market in California and the degree to which the market structure contributes to higher prices at the pump for consumers. CEC and CDTFA have analyzed millions of data points from more than a decade's worth of pricing information and had extensive dialogue with industry participants. CDTFA has also reviewed hundreds of contracts between refiners and retailers. This study highlights several factors that appear to affect prices and looks at the available data to assess whether theories regarding pricing are supported by the evidence. As CEC and CDTFA continue to gather data and review more information from industry, CEC and CDTFA anticipate providing additional information to policy makers.

Growing Retail Margins Push Prices Higher

One significant factor contributing to the retail price of gasoline is the growing retail margin. As with the refining margin discussed earlier, the retail margin is distinct from, but certainly related to, profit. Without knowing all business costs, it is difficult for CEC and CDTFA to determine the exact profit of a retailer. CEC and CDTFA do, however, have insight into the difference between what a gas station operator pays for gasoline and the price at which they sell that gasoline to consumers. In recent years, this margin is higher than it has been historically, both in nominal dollars and as a percentage of the retail price. **Figure 20** below summarizes retail margins from 2013 to 2023.

Figure 20: Margin Average for All Gasoline Grades



Source: CDTFA analysis of industry data

Retail margins increased significantly in 2015 and have never reverted to pre-2015 levels. As **Table 3** demonstrates, the retail margin as a percentage of retail price for the branded gasolines increased between 200 percent to more than 400 percent from 2013 to 2023. Unbranded stations and hypermarts saw their margin percentages increase roughly 200 percent over the same period.

The 2015 skyrocketing in retailer margins coincided with the Torrance refinery fire, which reduced the state's gasoline supply unexpectedly and sent gas prices soaring. In that instance, retailers' wholesale costs for gasoline increased significantly, though their margins increased even more than their costs. Those margins have remained elevated now for almost a decade.

Table 3: Branded Retail Price and Margin

	CHEVRON			SHELL			76			ARCO		
Year	Retail Price	Retail Margin	Retail Margin as % of Price	Retail Price	Retail Margin	Retail Margin as % of Price	Retail Price	Retail Margin	Retail Margin as % of Price	Retail Price	Retail Margin	Retail Margin as % of Price
2013	$4.06	$0.30	7.40%	$4.04	$0.28	7%	$4.04	$0.27	6.70%	$3.87	$0.11	3%
2014	$3.93	$0.37	9.40%	$3.91	$0.35	9%	$3.90	$0.33	8.50%	$3.69	$0.14	4%
2015	$3.40	$0.48	14.10%	$3.38	$0.46	14%	$3.38	$0.47	13.90%	$3.15	$0.23	7%
2016	$2.98	$0.54	18.10%	$2.95	$0.51	17%	$2.93	$0.50	17.10%	$2.67	$0.23	9%
2017	$3.26	$0.55	16.90%	$3.25	$0.52	16%	$3.21	$0.49	15.30%	$2.94	$0.21	7%
2018	$3.82	$0.60	15.70%	$3.81	$0.56	15%	$3.76	$0.53	14.10%	$3.50	$0.25	7%
2019	$4.00	$0.70	17.50%	$3.98	$0.67	17%	$3.91	$0.62	15.90%	$3.67	$0.35	10%
2020	$3.50	$0.81	23.10%	$3.48	$0.76	22%	$3.38	$0.70	20.70%	$3.11	$0.43	14%
2021	$4.51	$0.76	16.80%	$4.48	$0.69	15%	$4.39	$0.63	14.40%	$4.12	$0.38	9%
2022	$5.87	$1.07	18.20%	$5.84	$1.00	17%	$5.71	$0.90	15.80%	$5.48	$0.67	12%
2023	$5.13	$0.96	18.70%	$5.10	$0.91	18%	$4.95	$0.81	16.40%	$4.68	$0.58	12%

Source: Analysis of OPIS data done by CEC's Transportation Fuels Data and Analysis Unit, CDTFA calculated retail margins as percent of price

***The data derived from CDTFA's review of transactions occurring in 2022 between refiners and retailers are consistent with the retail margin information reported by CEC.**

Table 4: Unbranded and Hypermart Retail Price and Margin

Year	UNBRANDED Retail Price	UNBRANDED Retail Margin	UNBRANDED Retail Margin as % of Price	HYPERMART Retail Price	HYPERMART Retail Margin	HYPERMART Retail Margin as % of Price
2013	$3.92	$0.23	6%	$3.84	$0.13	3%
2014	$3.77	$0.32	8%	$3.68	$0.21	6%
2015	$3.19	$0.42	13%	$3.11	$0.27	9%
2016	$2.74	$0.41	15%	$2.61	$0.27	10%
2017	$3.03	$0.41	14%	$2.89	$0.26	9%
2018	$3.57	$0.45	13%	$3.45	$0.29	8%
2019	$3.75	$0.53	14%	$3.60	$0.37	10%
2020	$3.17	$0.61	19%	$3.02	$0.43	14%
2021	$4.10	$0.52	13%	$4.04	$0.33	8%
2022	$5.45	$0.70	13%	$5.28	$0.45	9%
2023	$4.65	$0.66	14%	$4.52	$0.42	9%

Source: Analysis of OPIS data done by CEC's Transportation Fuels Data and Analysis Unit, CDTFA calculated retail margins as percentage of price

*The data derived from CDTFA's review of transactions occurring in 2022 between refiners and retailers are consistent with the retail margin information reported by CEC.

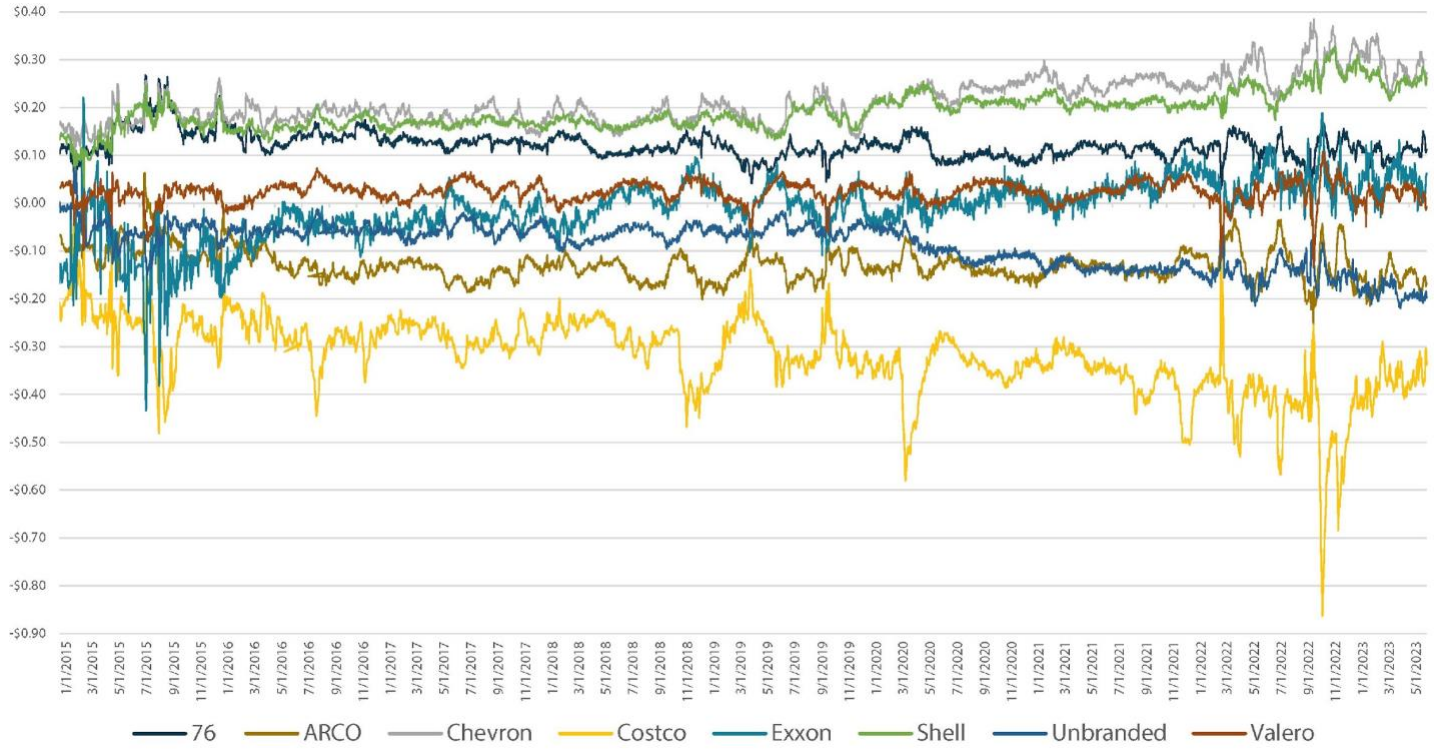
Gasoline Prices and Retail Margins by Brand

The price disparity between the most expensive and least expensive gasolines has widened in recent years. Branded gasoline such as Chevron, Shell, and 76 have become increasingly expensive relative to unbranded and hypermart gasoline.[35] In 2013, the difference between the average Chevron and hypermart prices was $0.22 per gallon. By 2023, the difference had grown almost threefold to $0.61.

Figure 21 demonstrates the brands appear to be priced at retail in relation to one another. Even though the gasoline sold by the various brands are essentially interchangeable, particularly if one looks at the fuels with additives beyond the minimum requirement, some brands are consistently more expensive than others. The branded prices typically increase and decrease together, with each brand holding its place in the pricing structure relative to the other brands as shown in **Table 4**. Looking at prices statewide, Chevron is typically the most expensive, followed by Shell, 76, ARCO, unbranded, and hypermart.

35 In the July 2021 issue of *Petroleum Watch*, available at https://www.energy.ca.gov/sites/default/files/2021-07/2021-07_Petroleum_Watch.pdf.

Figure 21: Difference from Average Retail Price



Source: CDTFA analysis of industry data

Table 5: Retail Prices

Year	Brand					
	CHEVRON	SHELL	76	ARCO	UNBRANDED	HYPERMART
	Retail Price	Retail Price	Retail Price	Retail Price	Retail Price	Retail Price
2013	$4.06	$4.04	$4.04	$3.87	$3.92	$3.84
2014	$3.93	$3.91	$3.90	$3.69	$3.77	$3.68
2015	$3.40	$3.38	$3.38	$3.15	$3.19	$3.11
2016	$2.98	$2.95	$2.93	$2.67	$2.74	$2.61
2017	$3.26	$3.25	$3.21	$2.94	$3.03	$2.89
2018	$3.82	$3.81	$3.76	$3.50	$3.57	$3.45
2019	$4.00	$3.98	$3.91	$3.67	$3.75	$3.60
2020	$3.50	$3.48	$3.38	$3.11	$3.17	$3.02
2021	$4.51	$4.48	$4.39	$4.12	$4.10	$4.04
2022	$5.87	$5.84	$5.71	$5.48	$5.45	$5.28
2023	$5.13	$5.10	$4.95	$4.68	$4.65	$4.52

Source: CDTFA analysis of industry data

At roughly the same time that California retail margins were increasing, the difference between higher- and lower- priced brands of gasoline also began increasing.[36] **Table 3** shows the amount by which different brands have increased the retail margins of their gasoline in recent years. On average, retail margins for higher-priced gasoline retailers in the state are nearly double the retail margins of lower-priced retailers, as explained below.

These price increases have occurred without significant changes in the overall market share of these brands at the retail level, shown in **Figure 8**. In a competitive marketplace, when one retailer increases prices, consumers generally buy more product from lower-priced retailers. However, higher-priced brands such as 76, Chevron, and Shell have increased their margins to roughly $0.40 more than their competitors with only a slight decrease in market share, as shown in **Figure 22**.

The price differential between branded and hypermart gasoline prices is starker. Since 2015, CEC has been tracking a widening gap between the prices of gasoline in California. As reported in the July 2021 issue of *Petroleum Watch*,[37] CEC has noticed that gasoline brands such as Chevron, Shell, and 76 have become increasingly expensive relative to unbranded and hypermart sales. While there has always been a gap between higher- and lower-priced gasolines, this difference has increased over the past decade.

One might expect that the growing market share of hypermart and unbranded retailers would be reflected in more competition in the market, lowered prices, and declining margins for other retailers. The data do not reflect such an effect.

One interesting trend in recent years is the marked price shift by ARCO stations in the state. ARCO was long one of the state's largest lower-cost gasoline retailers. As **Table 3** shows, ARCO's average retail price was generally lower than the average unbranded retail price until 2021. Since then, however, ARCO's retail price has settled above the average unbranded price.[38]

ARCO's retailer margin, the difference between what the stations pay for gasoline and what they charge customers for gasoline, increased from 3 percent to 12 percent between 2013 and 2023. In dollar terms, that is an increase from $0.11 per gallon in 2013 to $0.58 in 2023. On average, ARCO's percentage margin is still lower than all but the state's hypermarts. Further study is required to determine how this shift in pricing strategy may be affecting the broader market.

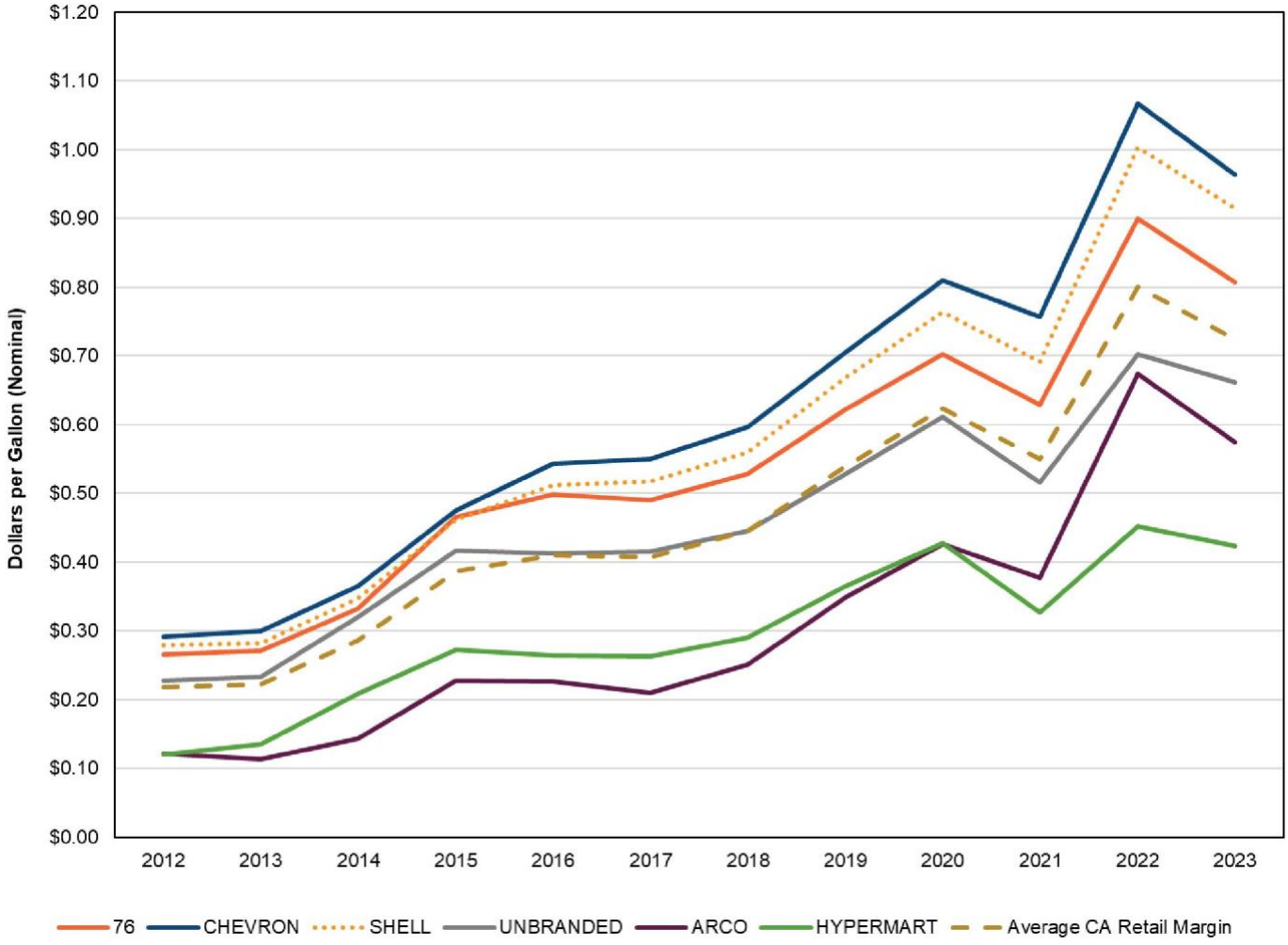
---

36 Because the relationships between wholesale and refinery operations are steady, the average California wholesale price is used here as a proxy to determine retail margins by brand.

37 California Energy Commission. July 2021. *Petroleum Watch,* https://www.energy.ca.gov/sites/default/files/2021-07/2021-07_Petroleum_Watch.pdf.

38 In 2012, BP announced that the sale of its Southern California refining and marketing assets, including ownership of the ARCO brand in Southern California, to Tesoro. The Office of the California Attorney General, together with CEC, reviewed the sale. In a May 2013 letter, the Attorney General announced that the sale could go forward provided, in part, that Tesoro commit to maintain ARCO as a low-cost brand. Five years later, however, Tesoro sold the former BP assets to Marathon.

Figure 22: California Annual Average Retail Margin by Brand (2012–2023, Nominal)



Source: CEC analysis of OPIS data

***Hypermarts include outlets like Costco and Safeway.**

The Relationship Between Brand and Price

The data clearly show large price differences between branded and unbranded gasoline, as well as between the various brands of gasoline. While consumer preference for a particular brand of gasoline may be driven by loyalty programs, station convenience, minimart offerings, or other factors, it also appears that many consumers believe that the quality of branded gasoline, or of a particular brand of gasoline, is superior to other fuel options.

As explained earlier, all gasoline sold in California must meet the specifications set by the California Air Resources Board. The fuel itself, within the various grades, is essentially interchangeable, regardless of the company that refined the fuel.

The fuel sold under one brand name is frequently produced by a different refiner. While refiners may have some proprietary distribution channels that keep the fuel produced by a single refiner separate from other fuels, that is generally not the case. Indeed, distribution terminals receive transportation fuels via petroleum product pipelines from several suppliers. That gasoline is then typically commingled in the same storage tanks for like types of fuel. Thus, gasoline delivered to a branded service station may not have originated from the refinery associated with that station's brand but is probably a mixture of various gasolines

from more than one refining facility. Furthermore, refiners may swap fuel with other refiners, so the gasoline branded with a refiner's name may, in fact, contain no fuel refined by the refiner under whose brand the gasoline is sold at retail.

The difference between branded retail station gasolines is the type of proprietary additive packages used when the gasoline is loaded into a tanker truck before delivery to a service station. All gasoline sold in California is required to contain an additive that meets detergent and deposit control minimum standards set by the California Air Resources Board. The major branded gasoline offerings and some unbranded gasoline sold at retail in California contain proprietary additives.

When filling up at a nonproprietary rack, all fuel is drawn from common tanks. The truck driver will input which brand of gasoline is to be delivered, and the rack equipment will inject a small amount of additive into the tank of the truck along with the gasoline. The cost to add these proprietary cleaners to the gasoline may be less than a penny per gallon, yet the branded fuel is then sold at retail for up to $0.60 more than the same gasoline without the additive.

Some retailers, such as Costco, may blend additives at the station rather than in the truck.

Price Variation Between Nearby Stations Selling the Same Brand Appears to Be the Result of Retailer Margin

In 2023, CDTFA received 2022 data from several California refiners for all sales to more than 500 retail gas stations throughout the state. Among other things, the data included the date refiners sold the gasoline to retailers, volume sold, the price of sale (how much the retailer paid); transportation costs, tax amounts, and additional costs such as those related to California's Cap-and-Trade Program and Low Carbon Fuel Standard requirements.

This detailed, station-specific wholesale data allowed CDTFA to analyze costs, volume delivered, and sales for specific gas stations. First, the gross retail margins in the CDTFA data generally tracked those reported by CEC and other third-party sources, allowing a broader market study without relying solely on refiner invoice data.[39] Second, the data show how much of the price difference between like-branded stations in the same community is the result of differing wholesale pricing.

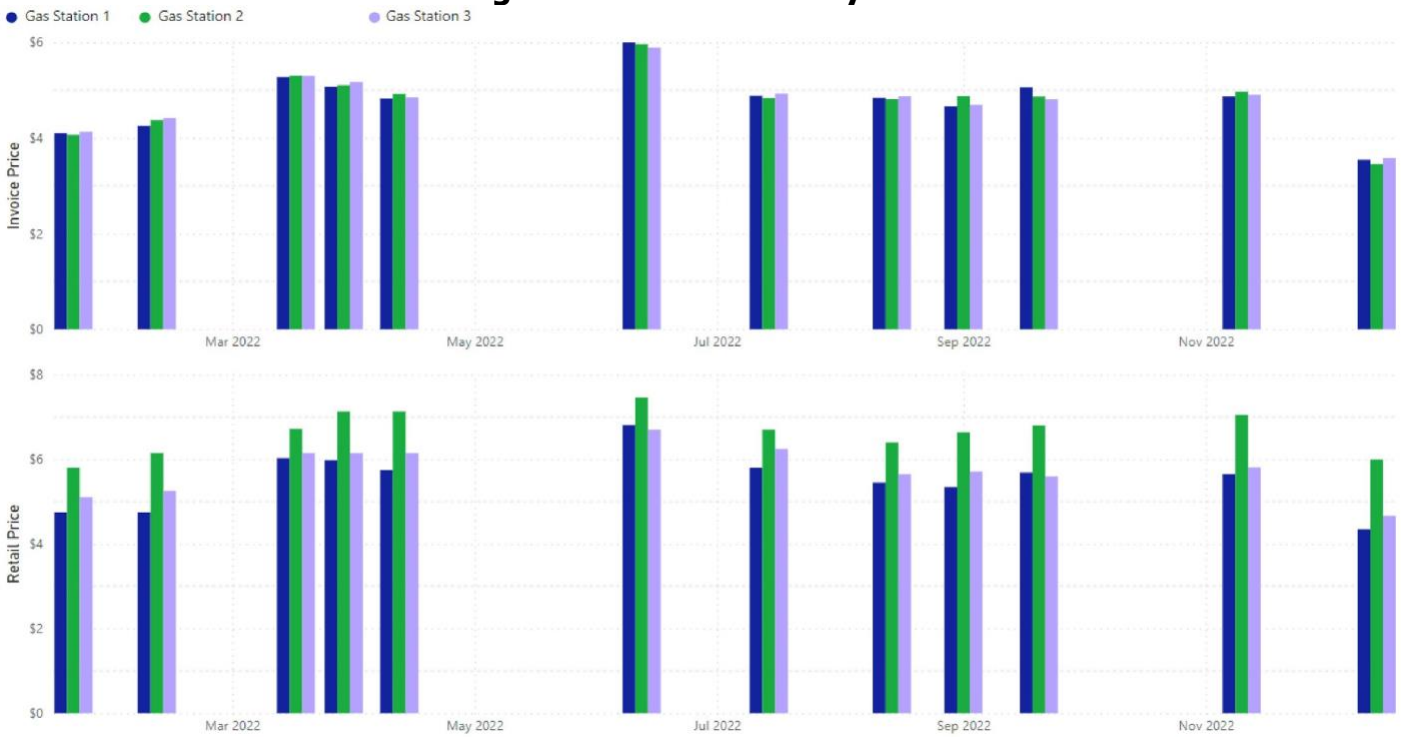
After selecting a sample of gas stations near one another selling the same brand of gasoline and purchasing the same gasoline type on the same day, CDTFA compared both the purchase (wholesale) price and selling (retail) price. CDTFA performed the analysis in Southern California, the Bay Area, and the Sacramento region.

CDTFA found that price paid by a retailer to the refiner was essentially the same as, or very close to, the price paid by competitors selling the same brand of fuel in the same vicinity. However, the retail prices for these same gas stations varied considerably. For instance, on August 14, 2022, three gas stations in San Francisco selling the same brand of gas purchased fuel from the same refiner for almost the same price: $4.84, $4.81, and $4.87 a gallon. The first station sold its gasoline for $5.45 per gallon, the second for $6.40, and the third for $5.65. To capture any delayed impact, CDTFA tracked the price over the next few days and did not see any significant change in retail price. **Figure 23** below shows the gasoline

39 Gross retail margins are after all federal and state taxes and fees, as well as GHG and LCFS. CDTFA also added the remaining 20 percent of sales taxes and local taxes when calculated the gross retail margins for 2022.

purchase price for three gas stations and the respective selling prices. The same analysis for various gas stations and brands in Southern California, the Bay Area, and Sacramento region yields similar results.

Figure 23: SF Case Study



Source: CDTFA analysis of industry and refinery data

Wholesale Price Volatility and Impact on Retail Price

Many studies of gasoline prices have mentioned that gasoline retail prices go "up like a rocket and down like a feather." As part of the agencies' review, CDTFA has looked at the data to gain clearer insight into the retail price impact of wholesale price volatility.

When the wholesale price of gasoline rapidly increases, prices at the pump obviously rise. However, California retail prices appear to increase more slowly than wholesale prices. When wholesale prices go up, retail margins decrease by an average of $0.17 and remain below the pre-price-increase baseline for an average of five days. In other words, it takes retailers an average of five days to adjust their retail prices to reflect fully the increased wholesale prices.

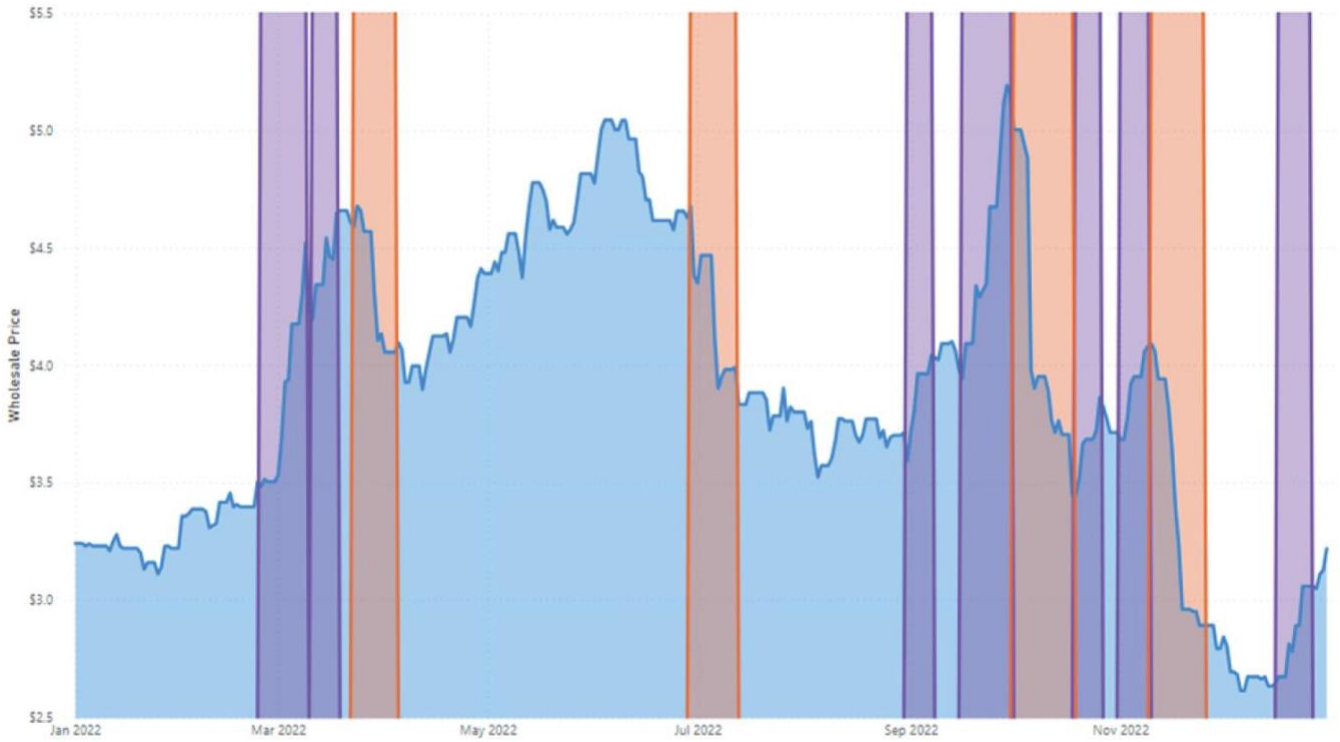
However, when the wholesale price of gasoline rapidly decreases, retail margins increase by an average of $0.24 and remain high for an average of 34 days.[40] On average, it takes

40 This analysis is based on industry daily estimates of retail and wholesale regular unleaded gasoline prices for 10,222 gas stations that operated in California between 2011 and 2022. Over the study period, industry data provides 30.9 million date/station observations. Where daily prices are missing for a given station, CDTFA assumes that the retail and wholesale prices for the missing day are unchanged from the most recent available day for that station. This method delivers a final dataset of 33.7 million data/station observations. In addition to prices, industry data provide an indication of whether the station was branded or unbranded. Industry retail price estimates are generated from a proprietary process that takes inputs including customer observations and retailer reports. Wholesale price estimates are specific to each station/date and are based on location, rack prices, station brand, and other factors.

retailers more than a month to reflect sharply lower wholesale costs in their retail prices. These high margins clearly inflate consumer prices above the expected economically competitive price and more than compensate the retailer for any lost margin in the immediate aftermath of the wholesale increase.

Figure 24 shows upward and downward rapid wholesale price changes for a representative retailer. Upward rapid wholesale price changes are shown in purple, downward rapid wholesale price changes are shown in orange.

Figure 24: Upward and Downward Rapid Wholesale Price Changes for a Representative Retailer

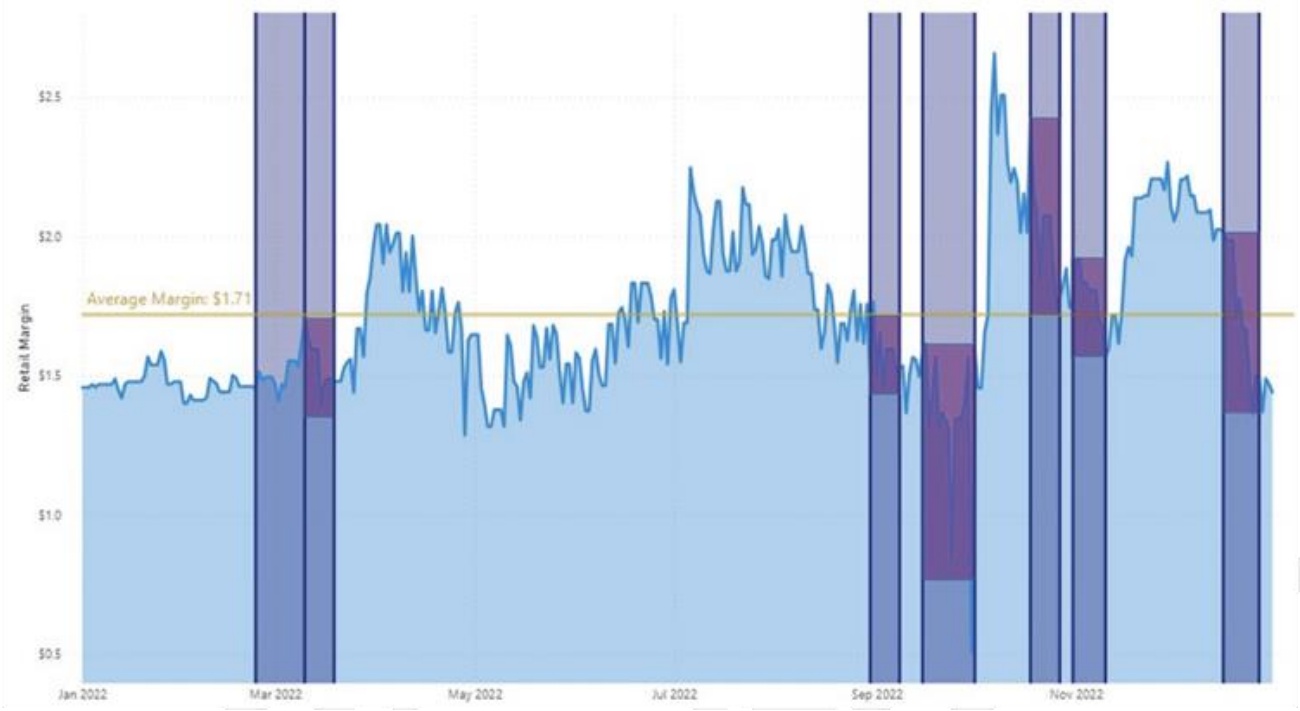


Source: CDTFA analysis of industry and refinery data

Between 2011 and 2022, the 10,222 stations in the sample experienced 474,798 wholesale price shocks over 11 years, for an average of about 46 events per station. About 55 percent are upward price shifts, and roughly 45 percent are downward. CDTFA can evaluate the relationship between retail margins and wholesale price changes by comparing margins during and after wholesale shifts to the margin immediately preceding the shifts. **Figure 25** illustrates the relationship between rapid upward wholesale price changes (in purple) and retail margins. Relative to the day before an upward price change, margins are an average of $0.17 lower during upward price changes.

CDTFA defines rapid wholesale price change as a change in station level wholesale price of 10 percent or more within seven days. If a date satisfies the definitions of both an upward and downward rapid wholesale price change it is labeled an upward wholesale price change. In addition, the seven days before rapid wholesale price changes are classified as rapid wholesale prices changes in the same direction as change. Figure 24 shows the upward and downward wholesale price shocks for a representative retailer in 2022.

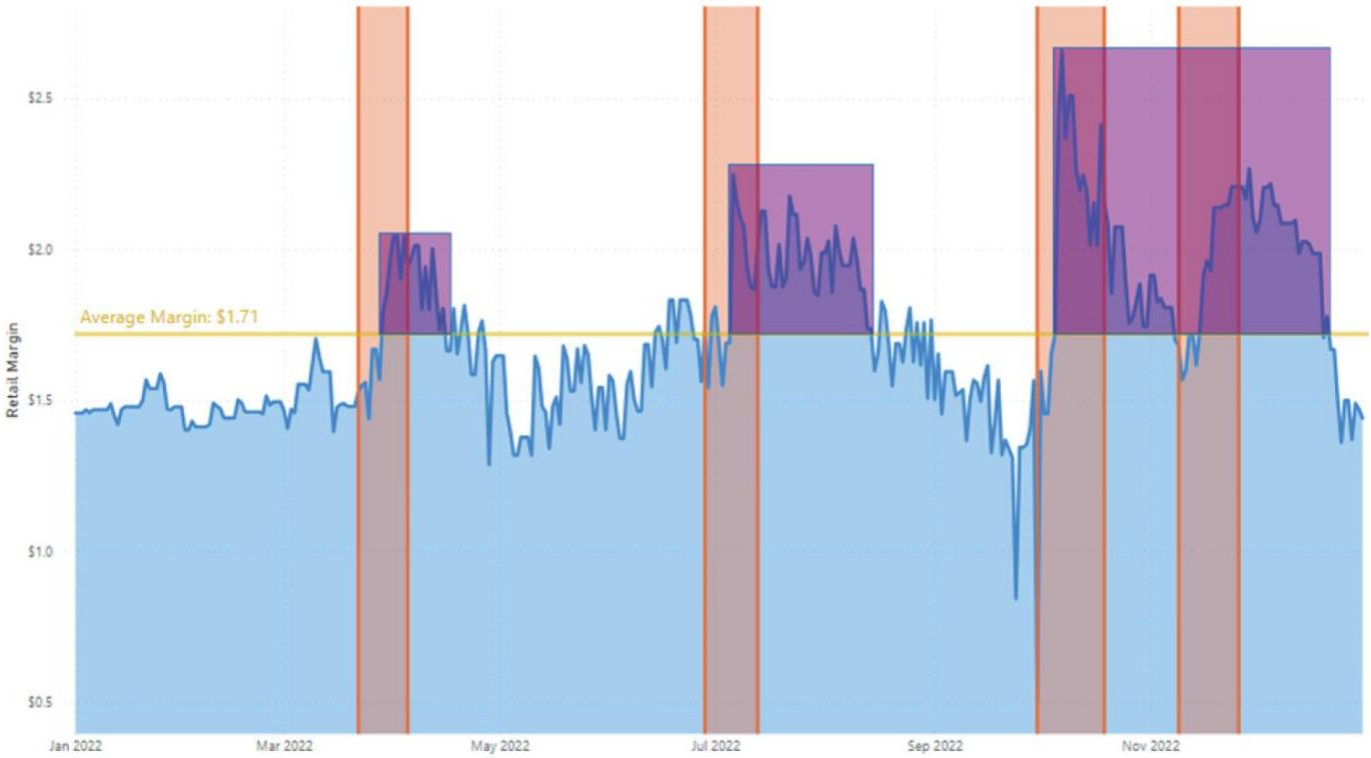
Figure 25: Margins Typically Decrease During Upward Wholesale Price Moves



Source: CDTFA analysis of industry and refinery data

On average, retail margins increase by about $0.24 during downward rapid wholesale price changes relative to the margin on the day before the price decrease. **Figure 26** illustrates the relationship between downward price moves and retail margins. Not only are above-average retail margins correlated with rapid downward wholesale price changes, those high margins tend to persist long after wholesale prices decrease. Following a downward wholesale price change, it takes an average of 34 days for retail margins to revert to the level before the wholesale price decrease. Following an upward wholesale price change, it takes only five days for the retail margins to revert.

Figure 26: Above-Average Retail Margins Are Associated With Downward Wholesale Price Moves



Source: CDTFA analysis of industry and refinery data

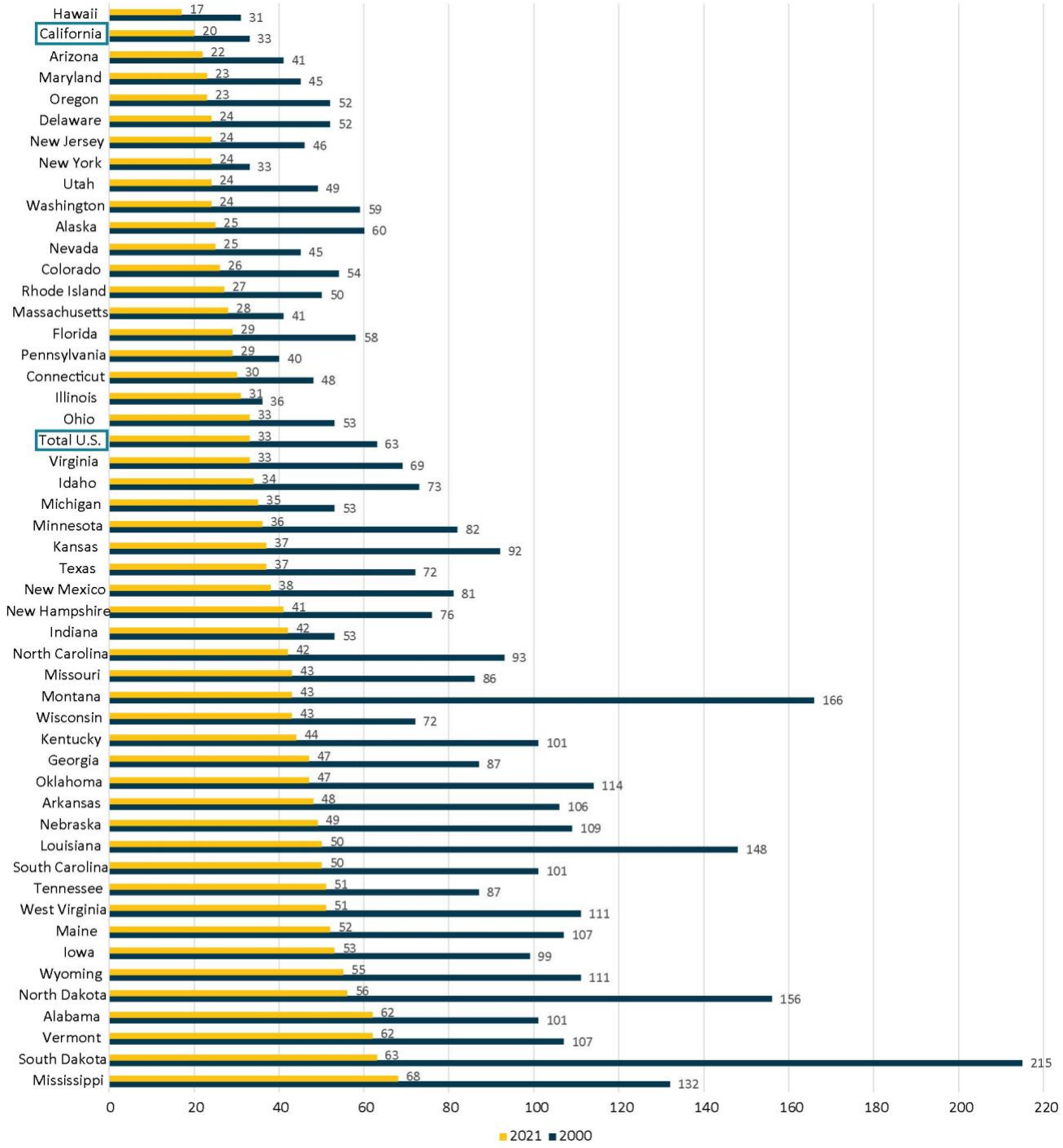
Figure 26 Above-average retail margins (purple) are associated with downward wholesale price moves (orange). High margins tend to persist after the wholesale price change.

These sustained increases in retail prices amplify the impact of the spot market volatility identified by DPMO. CDTFA will continue to study the interplay between these two dynamics and provide additional information in subsequent reports.

Local Competition and Retail Gasoline Prices

A fundamental question is the extent to which local competition among retail fuel outlets impacts prices that California drivers pay for gasoline. Statewide, the total number of gasoline stations in California has remained relatively level at roughly 10,000 over the last decade. On a per capita basis, California had about 20 gas stations per 100,000 residents in 2022, while the U.S. average is closer to 33 stations. California's per capita rate is lower than any state other than Hawaii. The graph below shows the number of stations per 100,000 residents by state.

Figure 27: Gas Stations per 100K Residents 2021 vs. 2000



Source: EIA, National Petroleum News, & U.S. Census Bureau

Economic theory predicts that new gas stations will enter the retail market when retail margins are high. These new stations will undercut existing stations on price, resulting in shrinking margins, lower prices, and increased consumer welfare. Furthermore, gas stations should have less market power than those that are farther apart, and studies have shown that a gas

station in the immediate proximity has some impact on price.[41] However, as noted above, the total number of gas stations in California has held roughly constant while retail margins have soared. Regulatory barriers to entry and the state's transition away from gasoline-powered vehicles clearly impact the feasibility of new market entrants. Furthermore, retail gasoline markets are often geographically small; gas stations might only compete with stations that are very near, allowing stations to exercise market power within their local market.

While the precise price impact of nearby stations is an area requiring further study, a preliminary analysis of 2022 data indicates that, on average, stations with no competitors within one-half mile price their gas 2.6 cents higher than those with a nearby branded station and 4.6 cents higher than those with a nearby unbranded station. Each additional nearby station is correlated with a further 0.7 cent price decrease if branded and a 1.9 cent decrease if unbranded. While these estimates do not necessarily indicate a causal relationship and the exact magnitude differs from estimates provided in other analyses, they do suggest that additional retail competition would reduce consumer prices.

Station count and location must be viewed in conjunction with ownership and control information. California does not have sufficient visibility into this important factor in assessing competition at the retail level. While CEC collects information each year on its A15, the data appear unreliable and imprecise. While retail stations may technically be owned by distinct corporate entities, they may, in fact, be controlled in large part by common owners, including by refiners. The current data collection is not designed to identify the extent to which the retail market in California has grown increasingly concentrated in recent years. The issue is not simply the relationship of retailers to refiners. If, as it appears, a handful of retailers, some controlled by enormous private equity firms, control a large and growing share of the California retail gasoline market, the competitive landscape is altered. Fewer owners, each controlling more stations and a larger volume of sales, may diminish competition. Ownership concentration statewide and in local markets is an area for further research.

In addition to the competitiveness issues outlined above, a substantial portion of California gasoline retailers have begun using sophisticated pricing software to maximize profits. Indeed, the agencies' review indicates that many in the industry are using the same analytics platform. These pricing services, which can be integrated into stations to automatically adjust pricing at the pump and on any signage, claim to use artificial intelligence to maximize profitability. Upstream sellers may also be using these systems to determine pricing.

The use of these software systems and their impact on prices is a key area for further study as CDTFA proceeds.

41 *Antitrust Division* | *Price-Response Asymmetry and Spatial Differentiation In Local Retail Gasoline Markets .* Gautier, Erwan, and Ronan Le Saout. "The dynamics of gasoline prices: Evidence from daily French micro data." *Journal of Money, Credit and Banking 47,* no. 6 (2015): 1063-1089. https://www.justice.gov/atr/price-response-asymmetry-and-spatial-differentiation-local-retail-gasoline-markets.

Dealer Tank Wagon

One clear distinction between California and the rest of the United States is the heavy reliance on Dealer Tank Wagon (DTW)[42] in California. DTW is a delivered wholesale price for gasoline, typically as part of a multiyear contract between a supplier and a gasoline retailer. DTWs account for roughly two percent of all U.S. fuel sales outside California. In California, the percentage has fluctuated between 35 percent and 46 percent over the past 10 years, according to EIA data.

The full impact of the heavy reliance on DTW is an area for additional research. The exact relationship between DTW price and branded rack price remains unclear, as price information provided as part of this study does not align exactly with the regular price reporting that refiners provide to CEC. While these reporting differences appear relatively minor, it is important to reconcile the numbers and standardize the data given the importance of DTW in the California market. What is not in question, however, is the price premium for branded fuel at the wholesale level, which is reflected in the higher prices that California drivers pay for branded fuel at the pump. With the DTW market share so much larger in California than in other markets, further study is required to assess the interplay between this market structure and the ability to maintain such significant price premiums for branded gasoline, both at the wholesale and retail levels.

DTW contracts can range from 10 to 30 years, though it appears from the CDTFA's review that 10 to 15 years is most common. For the duration of the contract, a retailer agrees to buy all its gasoline from the refiner and sell only the refiner's branded product.[43]

Given that gas prices fluctuate, and the contracts run for a decade or more, it is perhaps unsurprising that the contracts lack specific pricing. In other supply contracts for large volume sellers, such as the hypermarts, the prices are pegged to some broader industry benchmark, such as an OPIS-reported price. In the DTW context, however, the station operator agrees to buy all fuel from a refiner at whatever price the refiner charges.

As part of the DTW relationship, retailers may receive various payments and loans from refiners.[44] These include brand conversion incentives, designed for gas stations to rebrand themselves. Brand conversions appear to be forgiven for most refiners if all the terms of the DTW contract are met. If the contract is terminated early, however, retailers are required to pay back all or part of the incentive payment.

Many retailers also receive capital improvement incentives connected to their DTW contracts. These incentives are used to upgrade equipment or retail infrastructure. They could be used to remodel a minimart, for example, or add a car wash. As with brand conversion incentives, if the contract terms are met, the amounts are typically forgiven. If the contract terms are not met, the retailer is required to repay some or all the capital improvement incentives, depending upon the time remaining on the contract. The data suggest that retailers who have received large incentive payments may pay slightly more per gallon, generally $0.02 to $0.03, than retailers who have not received incentives from the refiners.

---

42 California Code of Regulations, Title 20, Division 2, Chapter 3, Article 3, Section 1363.2: "Dealer Tank Wagon (DTW)" means a delivered wholesale price for gasoline transported by tanker truck to a retail fuel outlet.

43 Hypermarts and other large retailers generally purchase from multiple refiners.

44 Refiners include related entities that may be incorporated as another entity.

Many DTW contracts reviewed included minimum and maximum fuel purchase volumes, though the intervals of these requirements varied. For example, a contract is written for a 100 percent volume; the purchaser agrees to purchase no less than 90 percent of that figure and no more than 110 percent. In some instances, if a retailer fails to meet the minimum requirement, they are penalized in amounts that vary from $0.01 to $0.05 per gallon. In other contracts, if a retailer fails to meet minimum requirements, the refiner could see this as a breach of the contract, triggering repayment of certain incentives or cancellation of the agreement. Some DTW contracts also include maximum fuel purchases. Given that the contracts typically do not bind the refiners to actually supply any specific quantity of gasoline, it is unclear what purpose the maximum volume amounts serve.

Exiting a DTW contract can be very costly for a retailer. In addition to having to repay any incentive that was given, the retailer must pay an amount, generally around $0.03, for each unpurchased gallon of gasoline remaining under the contract.

APPENDIX A: Glossary

Term	Definition
Branded Fuel	Fuel sold under a major brand name that contains proprietary additives to the fuel.
California Air Resources Board (CARB)	The "clean air agency" in California government. CARB's main goals include attaining and maintaining healthy air quality, protecting the public from exposure to toxic air contaminants, and providing innovative approaches for complying with air pollution rules and regulations.
California Department of Tax and Fee Administration (CDTFA)	CDTFA administers California's sales and use, fuel, tobacco, alcohol, and cannabis taxes, as well as a variety of other taxes and fees that fund specific state programs. CDTFA administered programs collect more than $90 billion annually, which, in turn, supports local essential services such as transportation, public safety and health, libraries, schools, social services, and natural resource management programs through the distribution of tax dollars going directly to local communities. Tax programs administered by the CDTFA are concentrated in two general areas — sales and use, and special taxes and fees.
California Energy Commission (CEC)	The state agency established by the Warren-Alquist State Energy Resources Conservation and Development Act in 1974 (Public Resources Code, Sections 25000 et seq.) responsible for energy policy. The Energy Commission's seven major areas of responsibilities are: • Forecasting statewide energy demand • Licensing of power plants and transmission lines sufficient to meet those needs • Promoting energy conservation and efficiency measures • Promoting the development of renewable energy • Promoting the transition to clean transportation fuels

	• Investing in energy innovation • Planning for and supporting the state's response to energy emergencies Funding for the Commission's activities comes from the Energy Resources Program Account, Federal Petroleum Violation Escrow Account, and other sources.
California Estimated Refinery Acquisition Cost (CA-RAC)	A weighted average of the prices of California (San Joaquin Valley) crude, Alaskan crude, and foreign crude.
Hypermart	A station that is company-owned or -operated by a supermarket or wholesale chain store that sells its own fuel at the same location.
Oil Price Information Service (OPIS)	A company that provides crude oil and petroleum pricing data.
Petroleum Administration for Defense Districts (PADDs)	PADDs are geographic aggregations of the 50 states and the District of Columbia into five districts: PADD 1 is the East Coast, PADD 2 the Midwest, PADD 3 the Gulf Coast, PADD 4 the Rocky Mountain Region, and PADD 5 the West Coast. The PADDs help users of EIA's petroleum data assess regional petroleum product supplies. The PADDs also allow data users to analyze patterns of crude oil and petroleum product movements throughout the nation.
Petroleum Industry Information Reporting Act of 1980 (PIIRA)	Legislation enacted in 1980, enables a complete response to possible shortages of fuel or other disruptions. The information also helps develop and administer energy policies in the interest of the state's economy and the public's well-being.
Product slate	The various refined petroleum products that make up a refinery's output.
Reid Vapor Pressure (RVP)	An indirect measure of the rate at which petroleum liquids evaporate. It is the absolute vapor pressure of a crude oil, or of single or

	mixed liquid petroleum products, as measured by the Reid.
Unbranded fuel	Fuel being sold at a station that is not affiliated with a brand. This fuel will most likely not contain any proprietary additives but will be CARB specification gasoline.
United States Energy Information Administration (EIA)	An independent agency within the U.S. Department of Energy that develops surveys, collects energy data, and analyzes and models energy issues. The agency must meet the requests of Congress, other elements within the Department of Energy, Federal Energy Regulatory Commission, the Executive Branch, its own independent needs, and assist the public, or other interest groups, without taking a policy position. See more information about EIA at *http://www.eia.gov/about/*
Utilization Rate	The utilization rate represents the rate at which crude oil is being processed. Utilization rates are calculated by dividing volume of crude inputs by crude refining capacity.