
California Refiners Hostage to Climate Science

High-margin habit the state wants to stamp out.

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Data Sources for This Publication

EIA

CME Group

California Energy Commission

Alaska Department of Revenue

To discover more about the data sources used, [click here](#).

Shrinking Market

California refiners are under siege. Making gasoline in the Golden State is like smoking. Everyone knows it's bad and ought to be banned, but until motorists kick the driving habit or switch to alternative fuels, refining needs to be restricted to minimize its impact on health and the climate. As a result, the 12 transport fuel refineries left in California struggle under a growing fog of state regulation, making it difficult to expand their business or even modernize their plants. Despite these constraints, refiners operate among the most sophisticated fleet of refineries in the world and produce high-specification fuels from a slate of heavy crude. They are rewarded with robust refining margins today but face a future with shrinking market share.

This note provides highlights of our latest refinery outlook for California. For a full version of the outlook please contact commodity-research@morningstar.com

California Refineries

Thirty-five years ago, in 1982, California had 40 operating refineries with 2.6 million barrels/day or mmb/d capacity, according to the California Energy Commission. Today, California has 12 refineries producing transport fuels (shown in Exhibit 1) with a total capacity of 1.86 mmb/d that ran at an average 86% throughput in 2016 according to the Energy Information Administration. These refineries are in three separate regions. The smallest is the 26 mb/d Kern Oil plant in Bakersfield, California, close to California's domestic onshore crude production in the center of the state. The others are in either the Los Angeles/Long Beach region or San Francisco Bay. Of the 12 refineries, 10 have coking units used to process heavy oil, with a total of 417 mb/d capacity. Only Kern Oil and Chevron Richmond do not have cokers.

Exhibit 3 California Refineries by Capacity

Location/Name	Owner	Capacity b/d
San Francisco		
Richmond	Chevron	245,000
Golden Eagle	Andeavor	166,000
Martinez	Shell	156,000
Benicia	Valero	145,000
Rodeo	Phillips 66	120,000
Los Angeles / Long Beach		
El Segundo	Chevron	269,000
Carson	Andeavor (formerly Tesoro)	263,000
Torrance	PBF Energy	151,000
Wilmington	Phillips 66	139,000
Wilmington	Andeavor	95,000
Wilmington	Valero	85,000
Bakersfield	Kern Oil	26,000
	Total	1,860,000

Source: EIA, Morningstar

Regulatory Burden

Present and future opportunities for refiners in the Golden State are constrained by regulatory policies spearheaded by the California Air Resource Board. CARB pursues an anti-fossil-fuel agenda to reduce emissions from existing hydrocarbon use and to eliminate carbon-based fuels altogether by pushing alternative renewable fuels and electric cars.

Unique Low-Emission Fuels

CARB mandates the use of reformulated gasoline blendstock for oxygenation with tighter combined requirements for Reid vapor pressure, oxygenate, and sulfur levels than those in any other state. CARB also defines unique diesel specifications.

Low Carbon Fuel Standard

California's Low Carbon Fuel Standard, administered by CARB, is a market-based cap-and-trade initiative to lower greenhouse gas emissions from petroleum-based transport fuels. The program seeks to gradually reduce the carbon intensity, or CI of transport fuels and subsidizes low-carbon and renewable alternatives. The LCFS transfers funds from refiners to alternative fuel providers using a credit and debit system. The impact is to reduce demand for petroleum fuels and increase the use of alternatives, slowly squeezing refiners' market share. In July 2017, the California State Legislature passed a bill extending LCFS cap-and-trade legislation through 2030.

Other Regulations

Statewide regulations continue to make life difficult for California refiners. For example, new rules are currently being considered to restrict hydrofluoric acid, which is used in alkylation units at the PBF

Torrance and Valero Wilmington refineries. Without these alkylation units, refineries cannot produce CARB gasoline.

In addition to statewide rules, California refiners must navigate a variety of local regulations that complicate upgrading, expansion, and/or rationalization of refinery processes. For example, the Bay Area Air Quality Management District has proposed individual refinery GHG limits, scheduled to go into effect Jan. 1, 2018, that will penalize existing refineries in San Francisco. A lengthy permitting process is common for any changes to refinery configuration.

Regulatory Consequences

All these regulations make refining in California somewhat akin to smoking cigarettes: still legal, but generally considered antisocial with few redeeming features—a nasty habit the state would like to stamp out.

Feedstock Supply

California refineries get most of their crude from one of three sources: California production; Alaskan North Slope production, or ANS; and imports. In 2016, 34.1% came from California (including lesser amounts from other domestic sources) and 11.4% from Alaska, while 54.5% was imported. Access to shale supplies has been restricted to limited quantities, shipped in by rail from the Rockies and West Texas (an average of 3 mb/d in 2016) because no pipelines deliver crude to California from outside the state. Given declining California and ANS crude production, imported crude volumes have increased by 13% since 2010 to an average 867 mb/d in 2016 (according to EIA). Most imports are supplied from the Middle East, Ecuador, and Colombia.

Shrinking Demand

California's sophisticated refineries output an average 60% gasoline, 20% diesel and 16% jet fuel according to 2016 CEC data. Diesel demand for transportation is lower in California than other regions of the U.S. Jet kero demand is higher because of the substantial number of military bases and the West Coast position as an aviation hub for the Pacific. The CEC's long-term forecast for 2017-30 projects a sustained 17% drop in gasoline demand from 978 mb/d in 2016 to 815 mb/d in 2030 due to the LCFS impact. Demand for diesel and jet fuel over the same period is expected to be relatively flat.

Refineries in Washington State and the Rockies meet some California demand, and California refineries also supply parts of Arizona and Nevada by pipeline. Exports into and out of California are limited because of the unique CARB specifications.

Price Premiums

California wholesale gasoline is generally priced at a premium to other U.S. regions. Premiums for diesel are not as pronounced as for gasoline. On average between January 2013 and June 2017, Los Angeles gasoline premiums over Gulf Coast equivalents were \$0.17/gallon and diesel premiums \$0.07/gallon. During 2015 and into early 2016, after a fire at the Torrance, California, refinery - owned at the time by

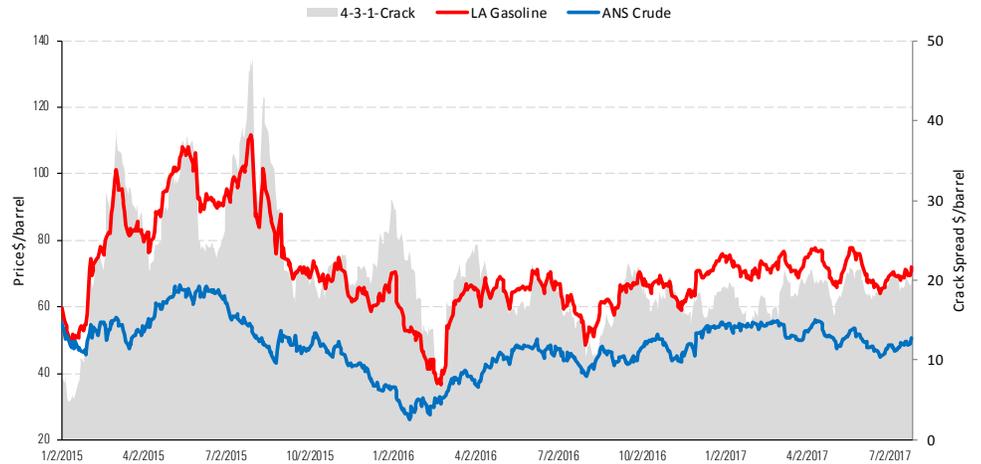
ExxonMobil – gasoline premiums over the Gulf Coast increased by an average \$0.33/gallon, with prices spiking to an average \$0.49 /gallon premium in May 2015.

Refining Margins

Higher wholesale prices for gasoline and diesel translate into higher refining margins that represent one of a few bright spots for California refiners.

Our outlook reviews several combinations of crude and refined product yield and compares the results with margins at the Gulf Coast. We looked first at a typical 4:3:1 crack spread for Los Angeles refiners processing ANS crude and producing three barrels of gasoline and one barrel of diesel for every four barrels of crude feedstock. The crack spread averaged \$15.86/barrel in 2014, jumped by nearly \$10/barrel in 2015, retreated to an average \$17.80/barrel in 2016, and performed a little better in 2017 through July at an average \$18.66/barrel. The chart in Exhibit 2 shows how the crack spread (shaded grey area, right axis) tracks gasoline prices (red line, left axis). The blue line against the left axis represents ANS crude.

Exhibit 2 Los Angeles 4:3:1 Crack Spread and Underlying Prices



Source: CME Group, Alaska Department of Revenue, Morningstar

Winners and Losers

It's hard to conceive of a winning strategy for California refineries, other than survival, for the next 20 years. Constrained by regulations to produce unique products and under increasing financial pressure to encourage renewable alternatives, the plants are literally living on borrowed time. Attempts to update aging infrastructure or to secure a wider supply of fuels are frustrated by lengthy permitting processes.

If California refinery owners can keep their plants running, especially when others experience unplanned outages, then margins are very good compared with Gulf Coast equivalents. However, with little incentive for expansion, these margins have no obvious upside. ■■■

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