

PETROLEUM WATCH

CALIFORNIA ENERGY COMMISSION

INSIDE

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PETROLEUM NEWS

- ### REFINING NEWS
- PBF Torrance:** On January 20, an emergency flaring event took place.
 - Valero Wilmington:** On January 25 through February 1, the refinery experienced flaring due to planned maintenance.
 - Chevron El Segundo:** On January 30, an emergency flaring event took place.
 - Chevron Richmond:** On February 10, a flaring event took place due to a process upset in one of the units, prompting precautionary evacuations of less than 100 people.

GASOLINE RETAIL PRICES BY BRAND

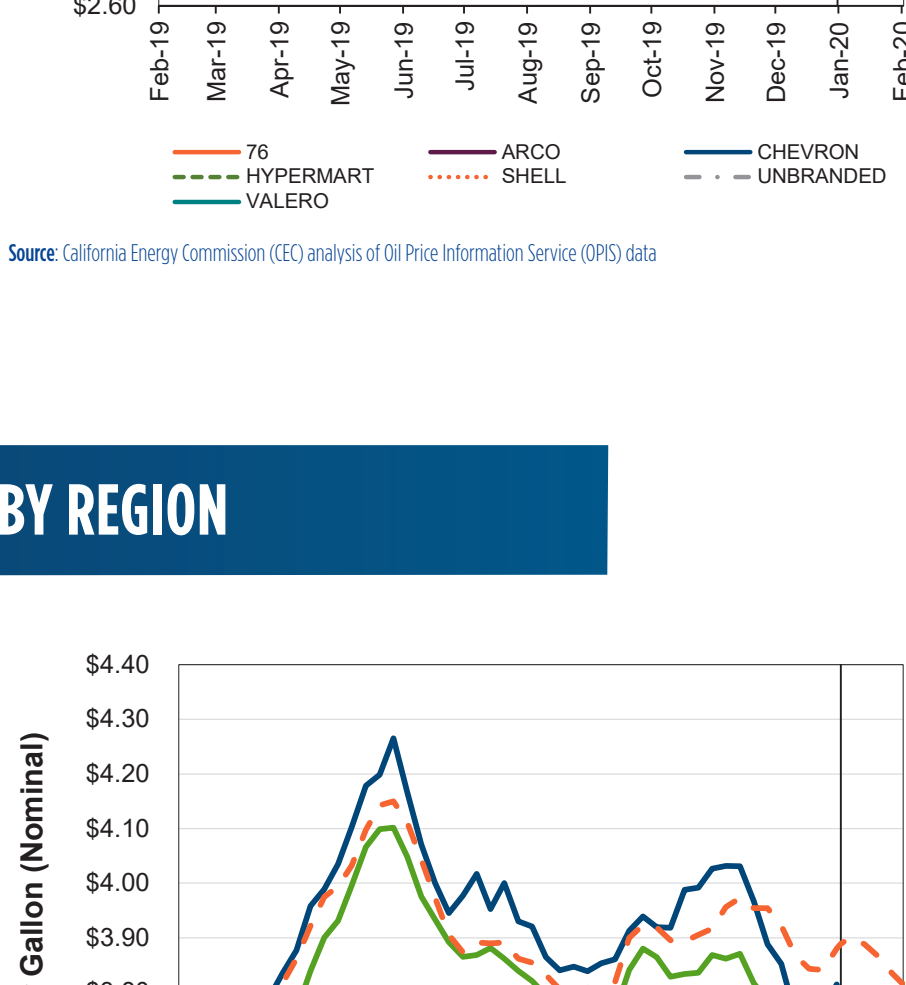
January 2020 vs. 2019

(Percentage Change)

76	8% higher
ARCO	8% higher
Chevron	7% higher
Hypermart	8% higher
Shell	8% higher
Unbranded	8% higher
Valero	8% higher

January 2020 Averages

76	\$3.63
ARCO	\$3.28
Chevron	\$3.71
Hypermart	\$3.19
Shell	\$3.68
Unbranded	\$3.40
Valero	\$3.51



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

DIESEL RETAIL PRICES BY REGION

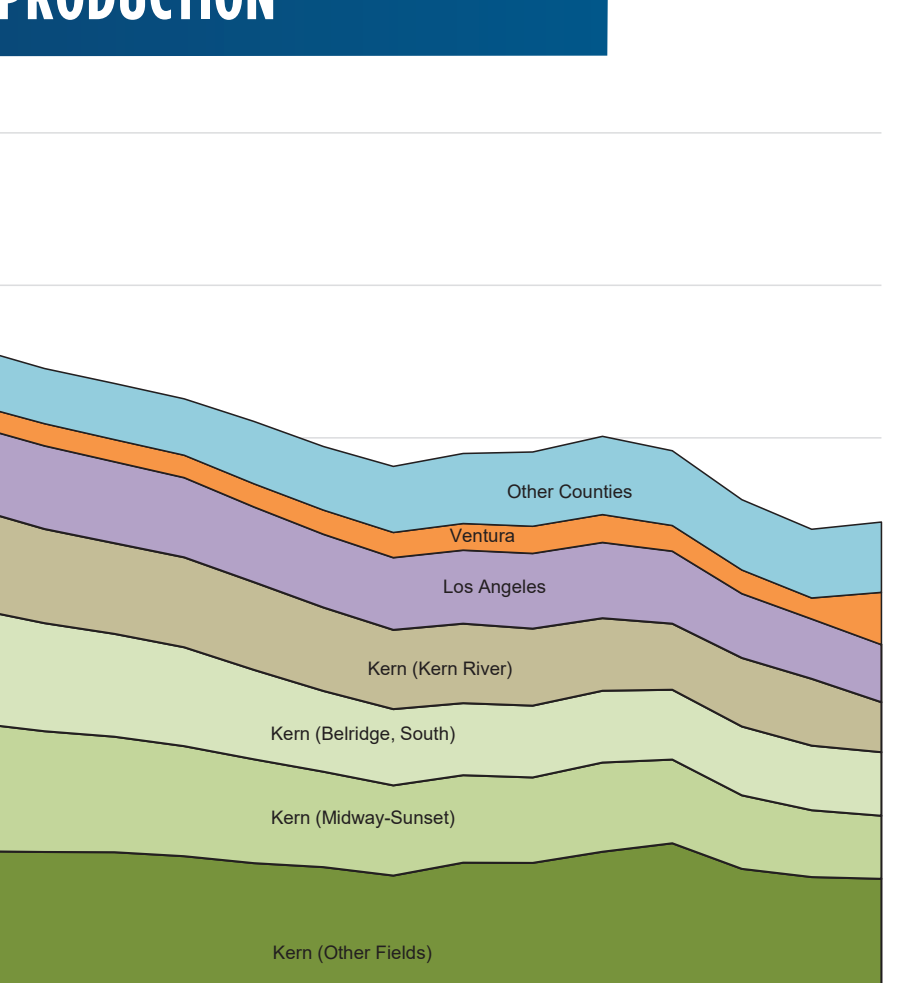
January 2020 vs. 2019

(Percentage Change)

Northern CA	3% higher
Central CA	2% lower
Southern CA	3% higher

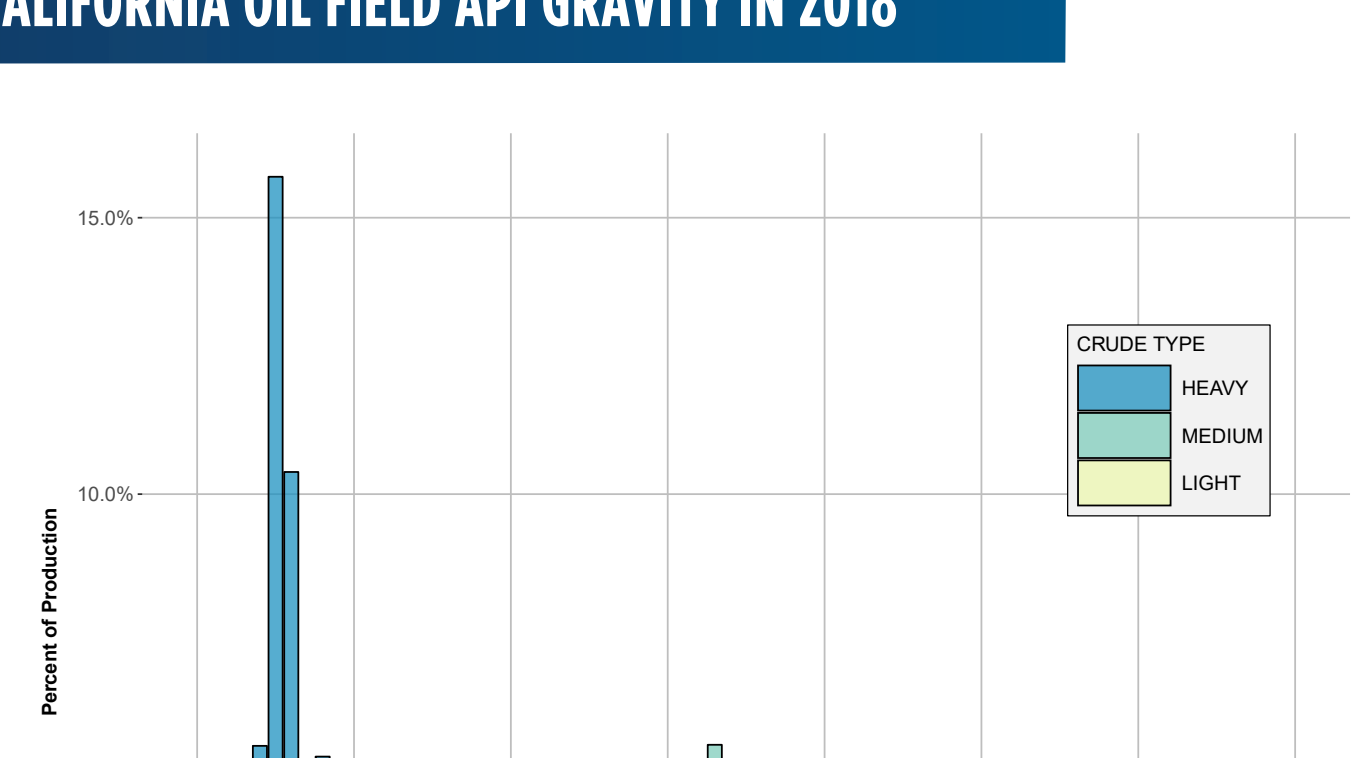
January 2020 Averages

Northern CA	\$3.77
Central CA	\$3.67
Southern CA	\$3.88



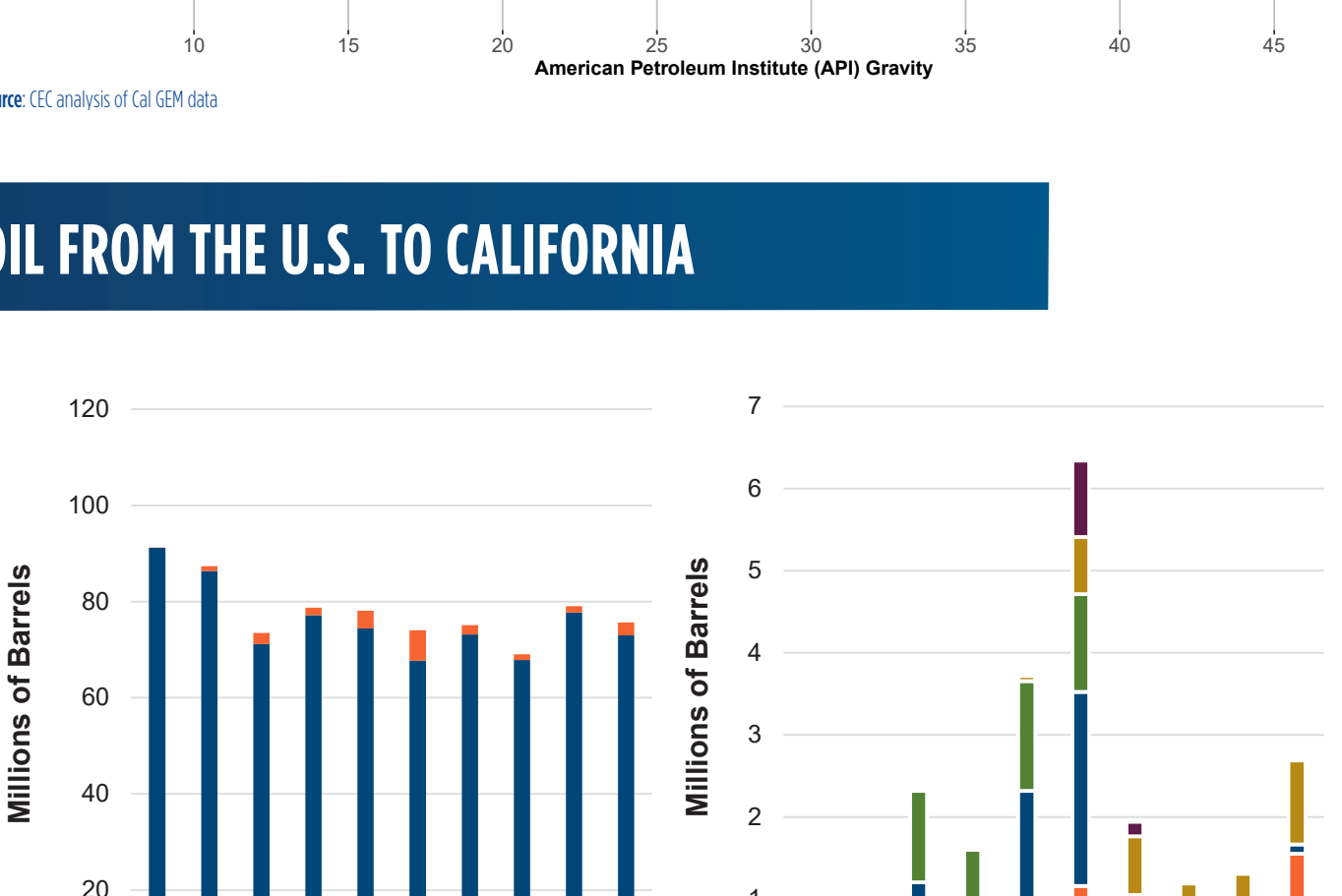
Source: CEC analysis of OPIS data

CALIFORNIA OIL FIELD PRODUCTION



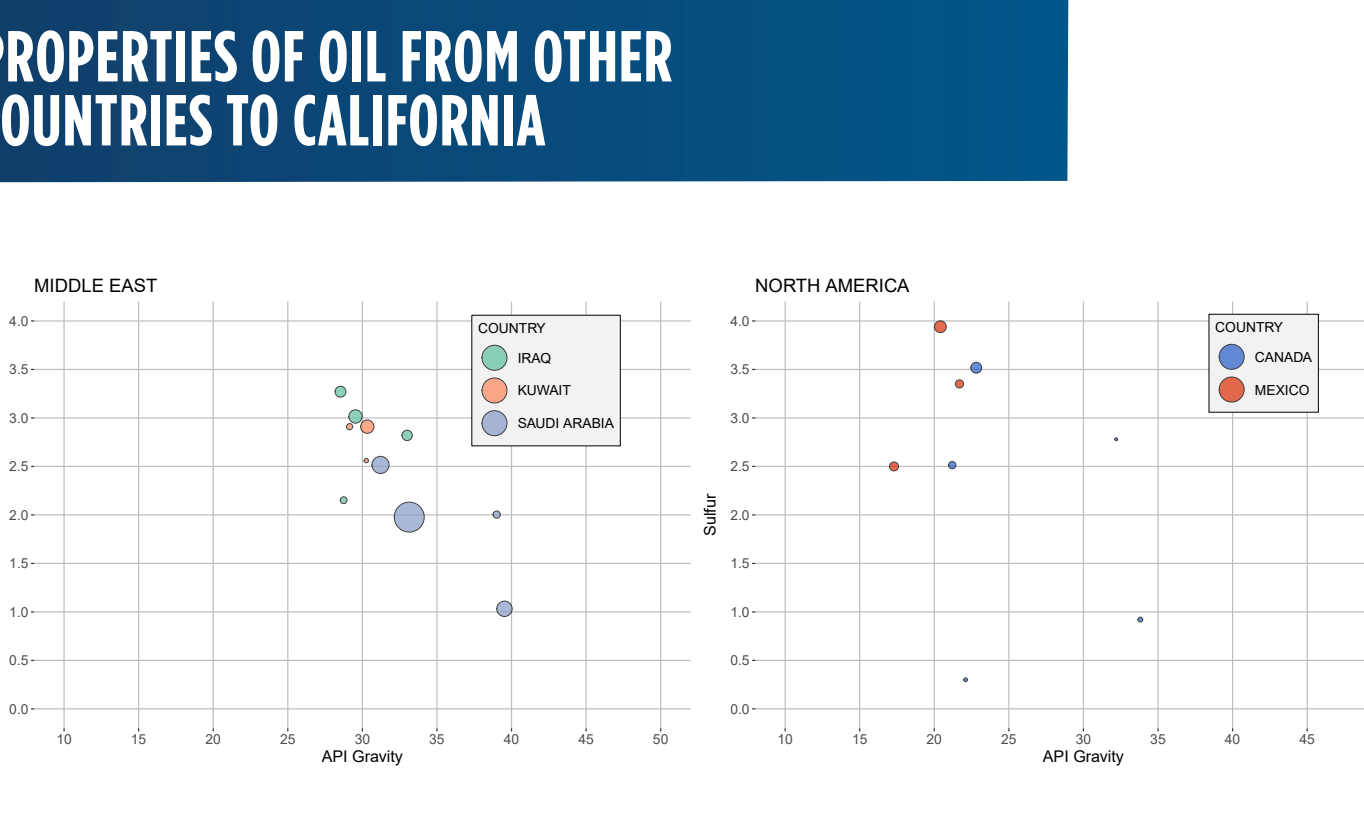
Source: CEC analysis of California Geological Energy Management Division (Cal GEM) data

CALIFORNIA OIL FIELD API GRAVITY IN 2018



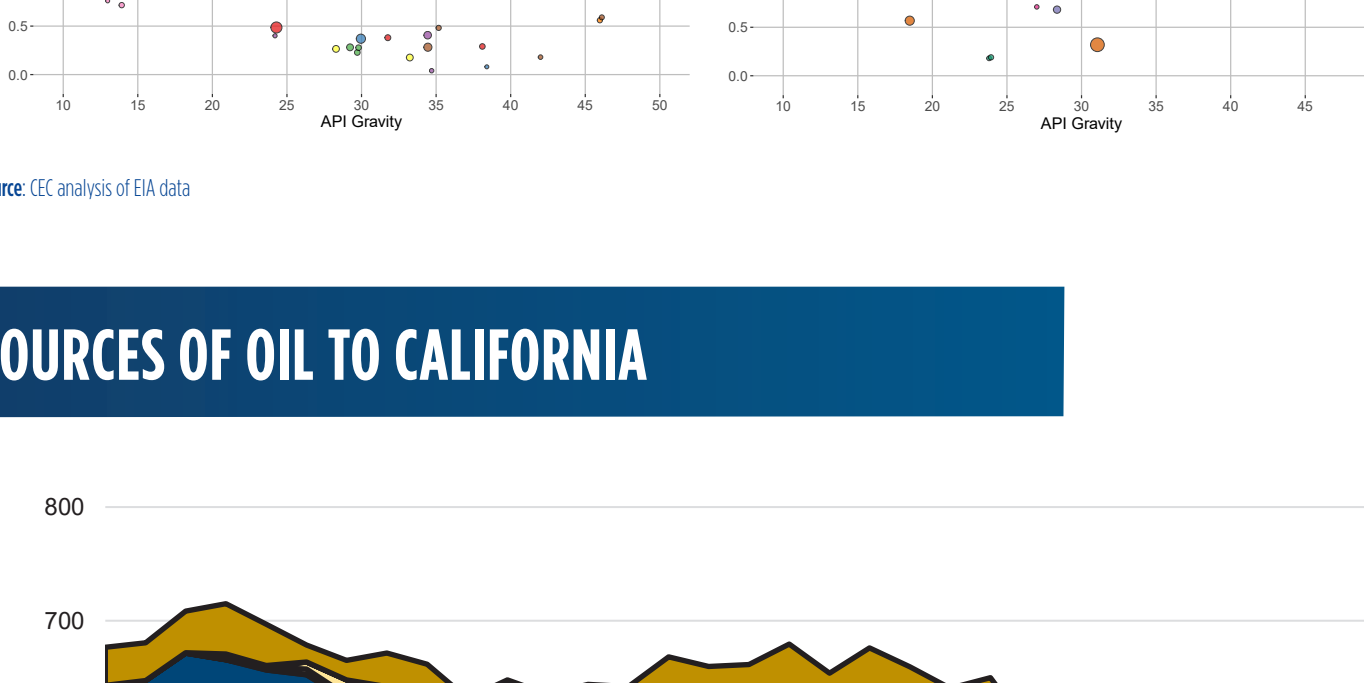
Source: CEC analysis of Cal GEM data

OIL FROM THE U.S. TO CALIFORNIA



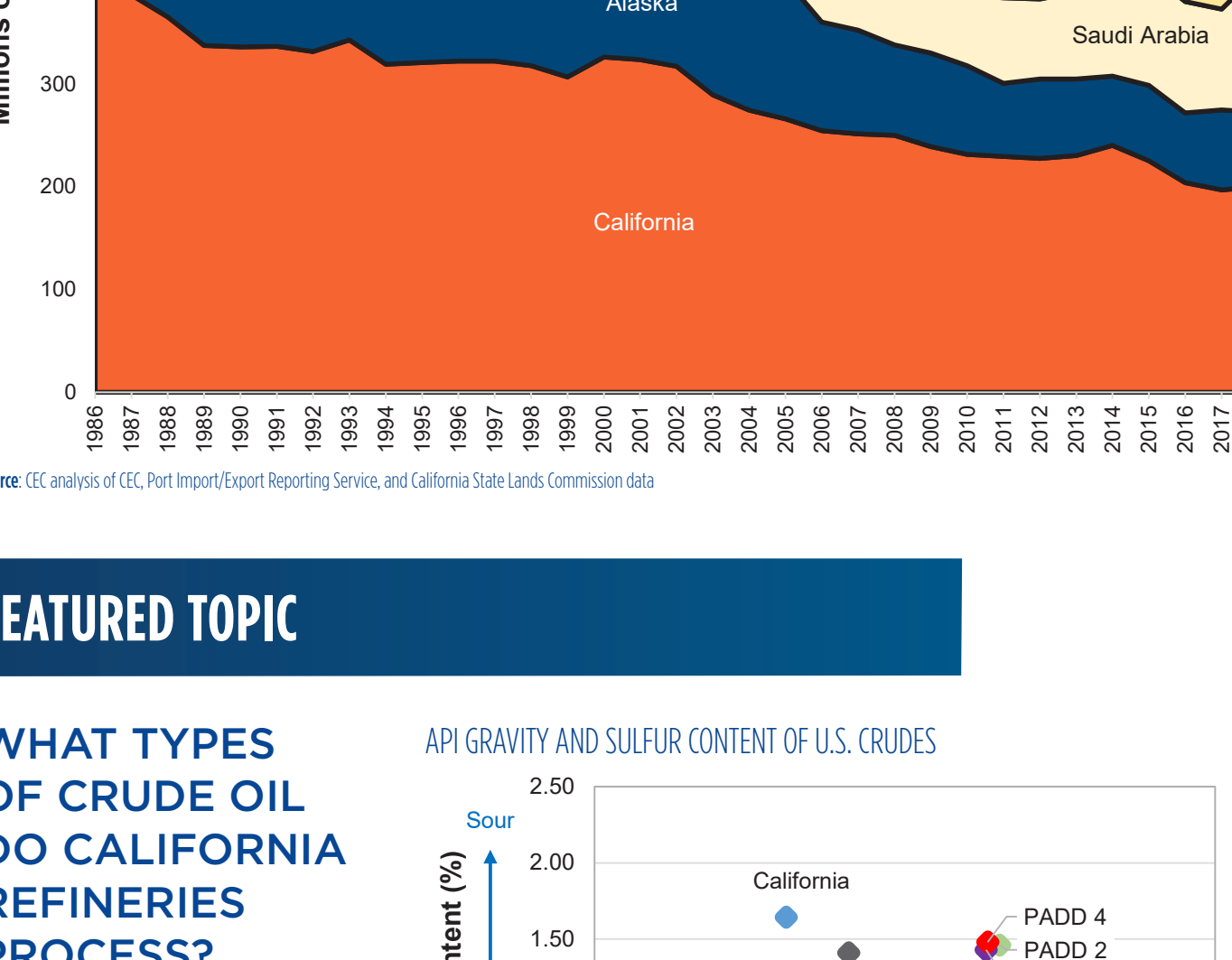
Source: CEC analysis of CEC and Energy Information Administration (EIA) data

PROPERTIES OF OIL FROM OTHER COUNTRIES TO CALIFORNIA



Source: CEC analysis of EIA data

SOURCES OF OIL TO CALIFORNIA



Source: CEC analysis of CEC, Port Import/Export Reporting Service, and California State Lands Commission data

FEATURED TOPIC

WHAT TYPES OF CRUDE OIL DO CALIFORNIA REFINERIES PROCESS?

WHAT IS CRUDE OIL?

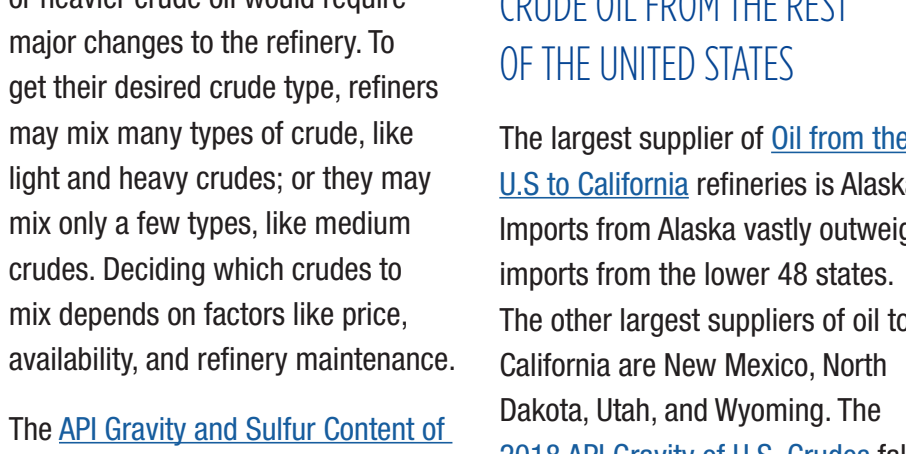
Crude oil, or petroleum, is composed of hydrocarbons and other organic materials found in the Earth's crust. Crude oil is refined primarily to provide energy through transportation fuels, such as gasoline and diesel, and to produce petrochemicals used to create products such as plastics and pharmaceuticals. The chemical makeup of crude oil varies depending on the location of extraction. The petroleum industry measures the quality of crude oil using the following properties: specific gravity, sulfur content, acid content, nitrogen, viscosity, pour point, mercaptan, hydrogen sulfide, metals, and organic chlorides.¹

The most widely reported crude properties are specific gravity and sulfur content. Specific gravity measures the density of a substance compared to water. The petroleum industry uses the American Petroleum Institute (API) gravity scale, which sets the density of water at 10 degrees. A refinery will use API gravity to categorize crude oil as light (more than 31.1 degrees), medium (22.3 to 31.1 degrees), heavy (10 to less than 22.3 degrees), or extra heavy (less than 10 degrees).² Crude that is on the heavier, more viscous side of the API gravity scale is denser. Extracting a heavy crude (with for example an API gravity of 12) from the ground is like trying to drink a milkshake through a thin straw.

Sulfur content of crude oil is measured by the percentage of sulfur within crude. Higher sulfur content in crude oil is undesirable because transportation fuels have a sulfur content limit due to the formation of harmful sulfur oxides when sulfur burns. Also, because sulfur is corrosive, crude oil that has high sulfur content is more damaging to refinery equipment and pipelines. Crude oil is considered sweet if sulfur content is 0.5 percent or less, and sour if sulfur content is more than 0.5 percent.³

The properties of crude oil are used to help determine its market value. Crude oil that is light and sweet is usually more expensive than crude that is heavy and sour. A reason for this is that light sweet crudes are less energy-intensive to refine than heavy sour crude. Refiners mix many types of crude oil from both foreign and domestic sources to achieve their desired crude profile.

API GRAVITY AND SULFUR CONTENT OF U.S. CRUDES



Source: CEC analysis of CEC and EIA data

or heavier crude oil would require major changes to the refinery. To get their desired crude type, refiners may mix many types of crude, like light and heavy crudes; or they may mix only a few types, like medium crudes. Deciding which crudes to mix depends on factors like price, availability, and refinery maintenance.

The [API Gravity and Sulfur Content of U.S. Crudes](#) chart displays properties of crudes used by California refineries compared to the properties of crudes used in other [Petroleum Administration for Defense Districts \(PADDs\)](#). PADDs are geographic aggregations: PADD 1 is the East Coast, PADD 2 is the Midwest, PADD 3 is the Gulf Coast, PADD 4 is the Rocky Mountains, and PADD 5 is the West Coast. On average, California crude inputs are heavier and sourer than inputs in the rest of the United States. In 2018, crude inputs to California refineries had an average API gravity of 26.18 and an average sulfur content of 1.64 percent.

SOURCES OF CRUDE OIL TO CALIFORNIA REFINERIES

In 2018, California refineries received 31.1 percent of their crude from California, 11.4 percent from Alaska, and 57.5 percent from foreign sources. [Sources of Oil to California](#) displays the top suppliers of crude. The top three foreign sources are Saudi Arabia, Ecuador, and Iraq. Foreign sources of crude are increasing because California and Alaska oil fields are aging. As the oil fields become older and depleted, extracting crude oil becomes more difficult. Foreign imports supplement declining domestic sources.

CALIFORNIA'S CRUDE OIL

California crude oil production in 2018 breaks down into the following API gravity categories: 68 percent of crude oil is heavy, 24 percent is medium, and the remaining 8 percent is light. [California Oil Field API Gravity in 2018](#) shows the distribution of API gravity for California crudes. [California Oil Field Production](#) breaks down production by county and region. Kern County produces the most in California, with 65.7 percent of total oil in 2018 originating from Kern oil fields. The top three producing oil fields in Kern County are Midway-Sunset (12 percent), Belridge-South (12 percent), and Kern River (9.5 percent). Together, the three fields extract about as much oil as the rest of the producing counties combined.

CRUDE OIL FROM THE REST OF THE UNITED STATES

The largest supplier of [Oil from the U.S. to California](#) refineries is Alaska. Imports from Alaska vastly outweigh imports from the lower 48 states. The other largest suppliers of oil to California are New Mexico, North Dakota, Utah, and Wyoming.

2018 API GRAVITY OF U.S. CRUDES

State	Average API
Alaska	32
New Mexico	43
North Dakota	44
Utah	39
Wyoming	39.5

Source: CEC analysis of CEC and ExxonMobil data

CRUDE OIL FROM OTHER COUNTRIES

There are many reasons why California refineries import different types of crude oil, but all are rooted in meeting refinery needs. [Properties of Oil from Other Countries to California](#) shows the major crude supplying countries by color and import volumes are represented by the size of the circle. In 2018, California refineries imported foreign oil from three major regions: Middle East, South America, and North America. The largest supplier of light crude to California is Saudi Arabia, with 134.8 million barrels. Other large suppliers from the Middle East are Iraq (29.8 million barrels) and Kuwait (22.5 million barrels), which are also light crude sources. All crude oil coming out of the Middle East is sour, having a sulfur content greater than 0.5 percent.

As production in California oil fields has declined, California refineries have filled their need for heavy crude oil by increasing imports from South America. The largest supplier of crude oil from the region is Ecuador (51.8 million barrels), primarily supplying heavy crude. The next largest supplier is Colombia with an API gravity of 18 to 28 degrees. Brazil is the final major supplier in the region, providing 17.6 million barrels as two distinct crudes, a heavy crude (15 to 18 API) and a medium crude (26 to 31 API). Crude from North America consists of small quantities from Canada (10.9 million barrels) and Mexico (15 million barrels) with the majority of crude oil being heavy and with sulfur content around 2 percent. Refiners source the remaining crude from Africa, Asia, Europe, and Oceania, which ranges in crude properties.

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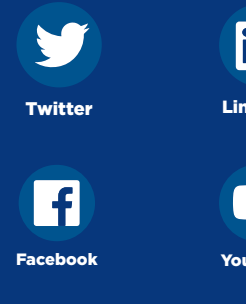
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