December 2020

PETROLEUM WATCH

CALIFORNIA ENERGY COMMISSION

INSIDE

REFINERY NEWS

- **Chevron Richmond:**
On November 2, the refinery suffered a power outage that caused an upset to a process unit resulting in significant flaring (Cal OES, Reuters).

- **Chevron El Segundo:**
On November 16, the refinery experienced an equipment malfunction at one of its process units that resulted in emergency flaring (South Cost AQMD, Patch).

CALIFORNIA GASOLINE RETAIL PRICES BY BRAND

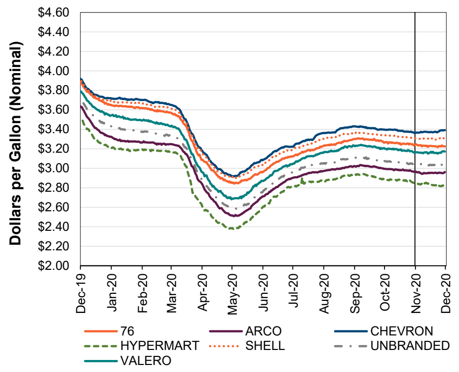
November 2020 vs. 2019

(Percentage Change)

76	20% lower
ARCO	22% lower
Chevron	18% lower
Hypermart	23% lower
Shell	19% lower
Unbranded	21% lower
Valero	20% lower

November 2020 Averages

76	$3.23
ARCO	$2.95
Chevron	$3.38
Hypermart	$2.83
Shell	$3.30
Unbranded	$3.04
Valero	$3.16



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

CALIFORNIA DIESEL RETAIL PRICES BY REGION

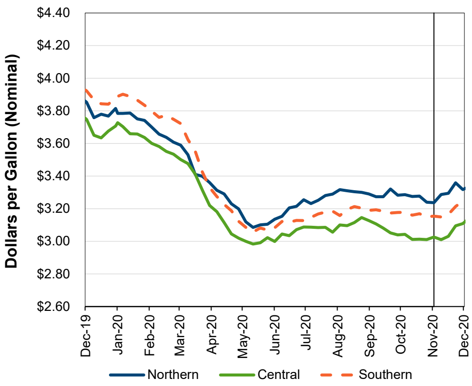
November 2020 vs. 2019

(Percentage Change)

Northern CA	17% lower
Central CA	21% lower
Southern CA	20% lower

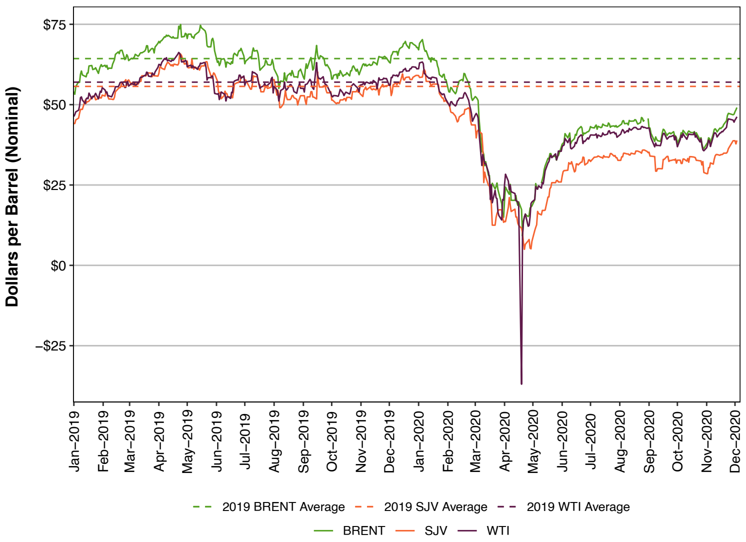
November 2020 Averages

Northern CA	$3.30
Central CA	$3.04
Southern CA	$3.18



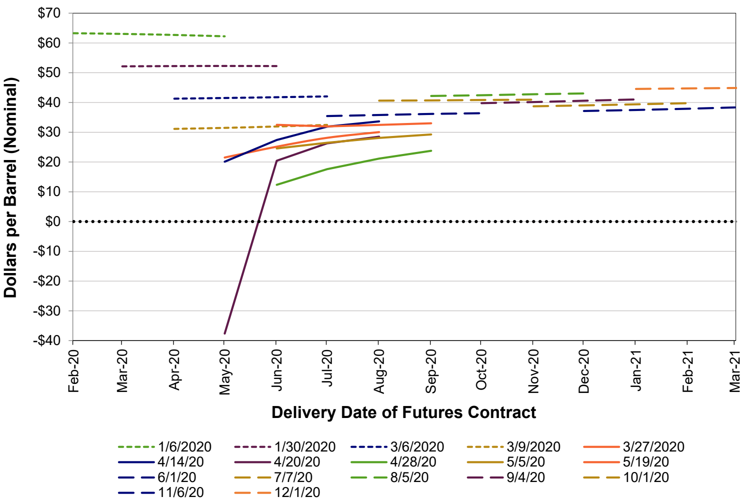
Source: CEC analysis of OPIS data

BRENT AND WEST TEXAS INTERMEDIATE (WTI) CRUDE PRICES



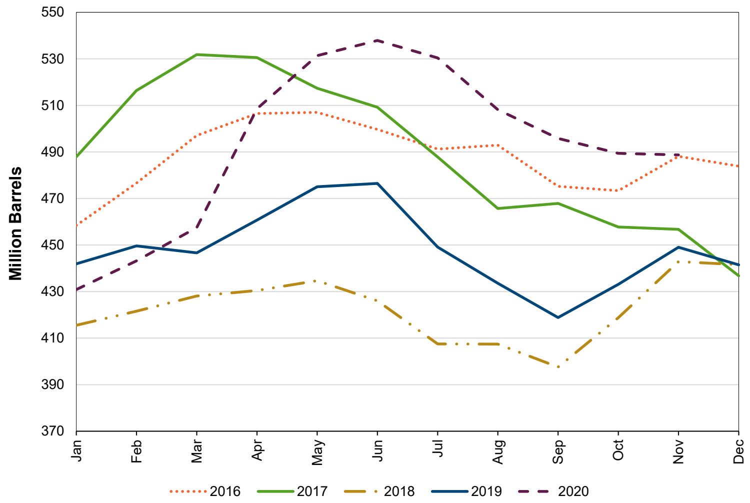
Notes: WTI refers to West Texas Intermediate and SJV refers to San Joaquin Valley.
Source: CEC analysis of CEC and U.S. Energy Information Administration (EIA) data

FUTURES PRICE CURVES



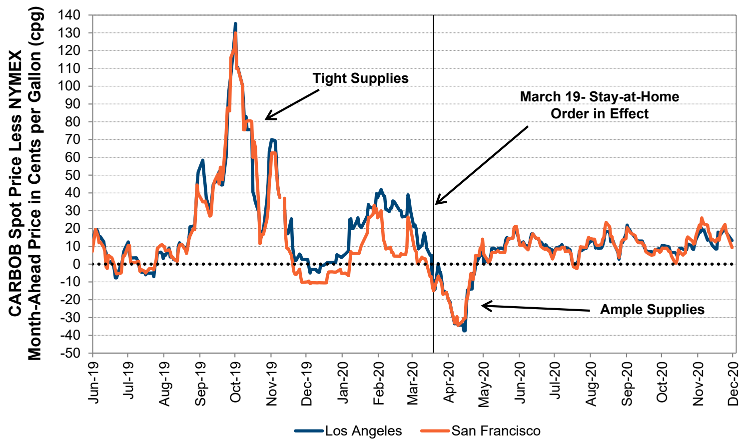
Source: CEC analysis of EIA data

U.S. CRUDE INVENTORIES (WEEKLY)



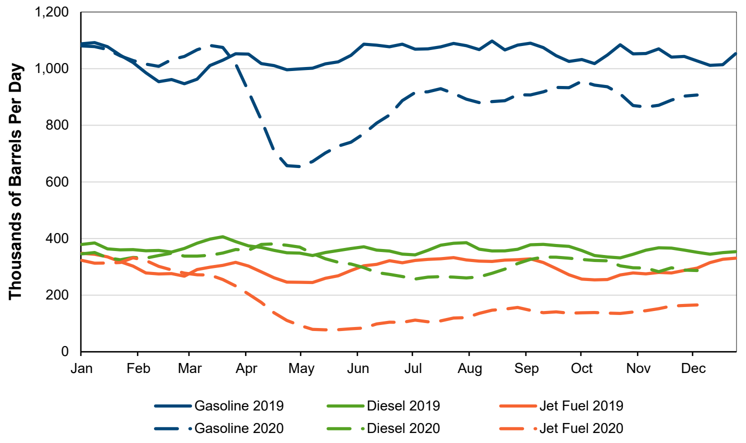
Source: CEC analysis of EIA data

GASOLINE SPOT PRICES LESS NEW YORK MERCANTILE EXCHANGE (NYMEX) FUTURES PRICE



Source: CEC analysis of OPIS data

CALIFORNIA REFINERY PRODUCTION



Notes: Net production is weekly refinery output plus or minus inventory changes. Four week moving averages are used to smooth out weekly volatility of production numbers.
Source: CEC analysis of CEC and EIA data

FEATURED TOPIC

CORONAVIRUS IMPACTS UPDATE

The April 2020 Petroleum Watch featured the effects of COVID-19 on all sectors of the transportation fuels market. During that month, the effects of the impact were beginning to surface. The market has adjusted to operating in a COVID-19 environment.

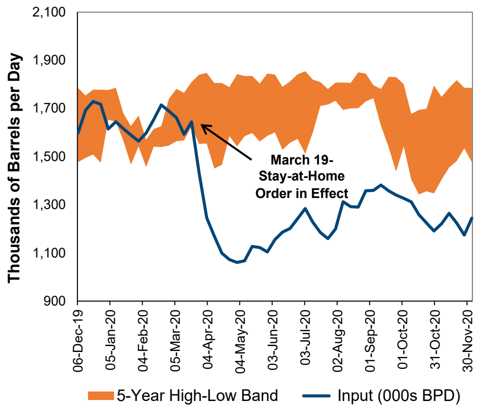
CRUDE OIL UPDATE

Crude Prices

Crude oil prices dropped in March due to significant reduction in global demand for transportation fuels resulting from the closure of schools and businesses. Brent and West Texas Intermediate (WTI) Crude Prices shows the spot price of crude oil from January 2019 through November 2020. The dashed lines mark the average prices in 2019 for each of the different crudes. Prices for each crude have yet to return to their 2019 prices, with Brent averaging $40.56 in 2020, $38.18 for WTI, and $32.20 for San Joaquin Valley (SJV). Brent and SJV benchmarks are the best indicators for California's market since California gets crude oil primarily from oilfields within the state, and imports from Alaska and foreign countries.

The drop in demand and price also led to narrower differences between the crude price benchmarks.
The Brent-WTI differential, which averaged $7.34 in 2019, decreased to an average of $2.38 in 2020. That average differential gets even smaller, at $1.69, when looking at the post-lockdown dates (after March 18). The WTI-SJV differential had the opposite effect, averaging a difference of $1.32 in 2019 and widening to an average difference of $5.98 in 2020. WTI crude has many customers throughout the United States while SJV crude is bought mostly by California refineries. The growing differential suggests there is a greater disparity between supply and demand in California than the rest of the nation.

CALIFORNIA REFINERIES CRUDE OIL INPUT



Source: CEC analysis of CEC and EIA data

onward. These maintain the slight $1.00 contango with later curves selling at higher prices reflecting an overall increase in crude demand.

U.S. Crude Inventories

U.S. Crude Inventories (Weekly) shows the past five years inventory levels by week. Each year is on one line to show seasonal changes. Inventories normally peak around the spring season before refiners make large draws for the summer driving season. This April, COVID-19 reduced demand leading to a 5-year peak of 540 million barrels on June 26, 2020. Reduced crude production and increases in fuel demand allowed crude inventories to drop. By November 27, 2020, inventories were at 488 million barrels, which is 41 million barrels (9 percent) more than the same time in the previous three years.

If crude inventories remain high and production does not slow down, expect prices to remain low until demand picks up. OPEC agreed to extend their oil production cuts in the near future, which keeps prices stable. The EIA also expects crude production in the U.S. to stay flat going into 2021.

GASOLINE PRICE UPDATE

July's Petroleum Watch report on refinery activity, inputs have remained relatively constant, averaging 1,337 thousand barrels per day August to September and dropping to an average of 1,244 thousand barrels per day October to November. The average daily crude inputs from July through the first week of December is 1,269 thousand barrels per day. This is down from an average of 1,672 thousand barrels per day in the same time period in 2019. Refiners altered operations in unconventional ways to reduce production and maintain minimum rates.

California Refinery Production Chart highlights the production shift of transportation fuels in 2019 compared to 2020. As California lifted lockdown restrictions in May, demand for gasoline and jet fuel remained low while diesel remained consistent. This is not surprising as California refineries are processing less crude oil, but the ratio of fuels produced shows how refinery operations have adapted. In 2019, the ratio of fuels produced was 61.4 percent gasoline, 21 percent diesel, and 17.7 percent jet fuel. As of December 4, the 2020 ratios are 66.7 percent gasoline, 21.1 percent diesel, and 12.2 percent jet fuel. As a percent of total

WTI went negative for the first time at -$36.98 on April 20, a notable event for crude prices. Producers were paying buyers to take the commodity off their hands due to a shortage of storage. This mostly affected the Texas and Oklahoma regions. Brent and SJV never reached negative prices. WTI prices recovered and remained around the $40 price point after the negative price drop in April, as COVID-19 closures eased through the summer months. Promising results from vaccine trials from Pfizer, Moderna, and others helped move prices upward in November. Increased industrial production in China also boosted crude oil demand as plastics production, for appliances and electronics, increased.

Crude Oil Futures Market

Crude oil futures contracts sell delivery of crude oil for a future month. Futures Price Curves shows the nearest four months of contracts trading on the day shown on the legend. Each line is a futures curve that represents the trading prices for a day. The leftmost dotted line curves are select futures curves before COVID-19 stay-at-home measures. Solid lines show select curves during the initial stay-at-home orders. The dashed line curves are prices from June 2020 and after as stay-at-home orders eased.

The shape of a futures curve indicates the crude oil's relative demand/supply balance over time. If buyers need crude sooner, they buy earlier contracts, raising prices at the near-term part (leftmost) of the curve. When the near-term prices rise above the longer-term prices, the downward sloping shape indicates demand is stronger now relative to later months and is called normal backwardation. The reverse is contango, where demand for later contracts raises prices of the longer-term part (rightmost) of the curve, shifting it to an upwards slope. Contango makes cheap crude oil storage very important because sellers can store crude and sell later contracts for higher prices. The difference between each future month is compared against the rent cost of storage, also called the cost of carry. Sellers deliver the near-term contracts when the cost of carry (rent) becomes more expensive than reducing the contract price.

The dotted lines from January and March show slight normal backwardation with the near-term price $1.00 more than long-term price. The solid lines in Futures Price Curves show how the futures market shifted towards contango when COVID-19 stay-at-home measures were announced. March 27 shows contango with May 2020 priced $8.54 less than August 2020. On later dates, the curve's contango has May as $12.00 less than August. The steepest contango occurred on April 20 when WTI crude oil prices went negative including futures, May 2020 priced at -$37.63, $66.14 less than August at $28.51. By May 19, future curves were in a flat-shaped contango, with June 2020 only $1.02 cheaper than September 2020 delivery. The dashed line curves are daily curves from July

As crude oil prices dropped in March, so did gasoline spot prices. The gasoline spot price is the current price in the marketplace that buyers pay for immediate delivery of a product. In California, San Francisco (SF) and Los Angeles (LA) are the spot delivery points. The New York Mercantile Exchange (NYMEX) futures price is a contract that delivers product in the future at New York Harbor. These markets work together to allow participants to find supplies with less risk of price volatility. The differential price is a common measure that compares California spot prices to the NYMEX futures prices. Subtracting the NYMEX price from the California price produces the differential price, which is the spread. The spread, quoted in cents, shows the current supply and demand of the product relative to a less volatile futures contract of a major market hub like NYMEX. High price spreads signal high demand and/or tight supply. Low or negative price spreads signal low demand and/or ample supply.

Since May, both Los Angeles and San Francisco gasoline less NYMEX spreads have averaged $0.11 each. Gasoline Spot Prices Less New York Mercantile Exchange (NYMEX) Futures Price shows that from May to November, the spread increased from under $0.10 before July to over $0.10 after July. The spread is much lower at $0.12 from September 2020 to November 2020 compared to $0.49 for LA-NYMEX and $0.46 for SF-NYMEX in 2019. As a result, 2020's year-to-date average at $0.11 is $0.15 lower than 2019's average spread at $0.26.

The LA-NYMEX spread increased $0.06 from averaging $0.10 for May to $0.16 for November. SF-NYMEX rose $0.09 in May to $0.18 for November. November spread was the highest year-to-date average for SF-NYMEX. On December 1, both spreads averaged $0.11. Over the past 10 years, December has been the lowest average at $0.05 and even zero cents for LA and SF less NYMEX, respectively.

Compared to the spot market, retail gasoline prices have stayed relatively flat through the last half of 2020 as seen in California Gasoline Retail Prices by Brand. Chevron, Shell, 76, and Valero are still the higher priced California brands when compared to unbranded, Arco, and hypermarts. The statewide average for 2020 is $3.05, 15 percent lower than the 2019 average of $3.60. The 2020 U.S. average for regular gasoline is $2.17, $0.88 lower than in California. More information on retail gasoline prices can be found in June Petroleum Watch.

REFINERY UPDATE

The first refinery production cut effects from COVID-19 demand were reported in April's Petroleum Watch. California's refineries have not yet returned to pre-pandemic operating levels. California Refineries Crude Oil Input shows that input levels have remained below the minimum levels seen in the past five years. Since production, gasoline has increased, jet fuel has decreased, and diesel has remained constant (consistent with uninterrupted diesel demand). Refineries are limited in changing the ratio of products produced even while the pressure from gasoline and jet fuel demand have dropped.

As discussed in the July Petroleum Watch, refineries adjusted their operations daily and shifted jet fuel production towards diesel production. California refineries are optimized to produce gasoline, comprising about half of refinery output. The remaining half is a mix of diesel, jet fuel, and a small percentage of other products. Diesel and jet fuel use many of the same products because refiners are able to significantly decrease jet fuel production to produce more diesel. However, this is only a temporary solution and is untenable in the long term. While California refineries are processing less crude oil, they need to return to their optimal process for refining fuels. This will lead to oversupply of gasoline and jet fuel if demand for those fuels does not recover. The excess fuels will likely be sold to out-of-state and overseas markets.

TAKEAWAYS

Some energy analysts forecasted the decline of oil in the coming decades with advances in energy efficiency and electrification of the transportation sector. However, none could have predicted 2020 would accelerate that decline. After the initial drop in crude oil prices and drop in demand of transportation fuels in March, neither has increased much over the following nine months. Travel advisories, business closures, and remote school and work policies are continuing into 2021. With a second wave of stay-at-home orders in effect in California, COVID-19 continues to put a hold on the economy and consumption of transportation fuels. The decreased demand for fuels has been devastating worldwide for the oil industry with the International Energy Agency (IEA) predicting oil demand might not return to 2019 levels until 2022. BP suggests that oil demand may never fully recover to pre-pandemic levels.

In response to COVID-19, California refineries reduced production, decreasing crude inputs an average of 24 percent per week since March when compared to the same time period in 2019. Even though most refineries altered operations, some refiners decided to idle refineries. Marathon announced plans in August to indefinitely idle 161,500 barrel per day of capacity at the Martinez refinery citing reduced demand in 2020. In October, the company announced plans to convert the refinery into a renewable diesel plant. Phillips 66 announced similar plans to convert their Rodeo facility into a renewable fuels plant, producing renewable diesel, gasoline, and jet fuels from used cooking oils, fats, greases, and soybean oils. While fuel demand will rebound as the economy recovers, this pandemic has changed California's refining capacity for good.

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