



PETROLEUM WATCH

California Energy Commission

December 2017

Recent Petroleum News

Hot Topic Supplement (page 11)

Petroleum Watch continues to look at changes in California's gasoline markets. Gasoline spot market and retail prices have been separating slowly since mid-2014. The analysis details show how large this spread has grown, and which regions and retail brands are following this pattern.

Prices

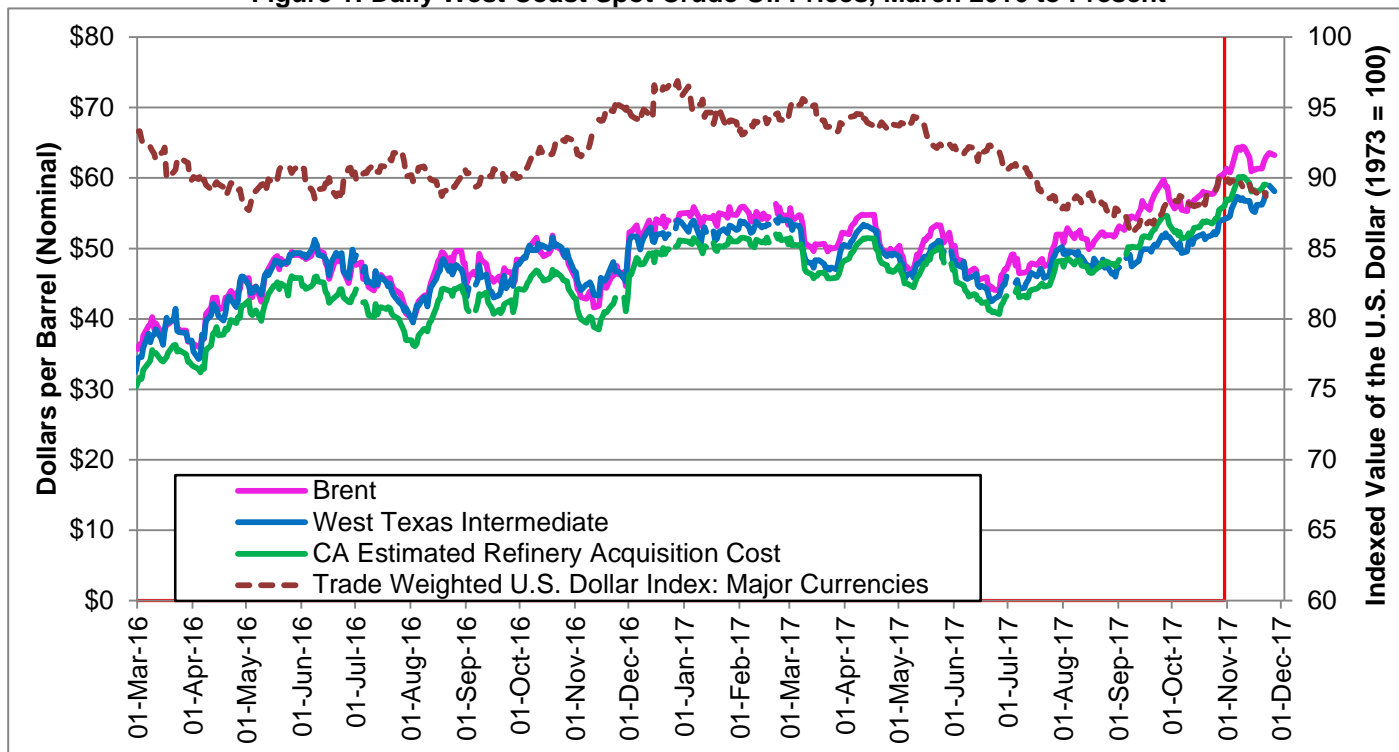
- **Crude Oil Prices:** Brent and West Texas Intermediate crude prices closed at \$63.25 and \$58.10, respectively, on November 27 (**page 2**).
- **California Retail Gasoline Prices:** On the week of November 27, prices reached \$3.20, an increase of \$0.13 since the end of October. Through November, California prices averaged \$0.68 higher than the national average (**page 4**).
- **California Retail Diesel Prices:** On the week of November 27, prices reached \$3.60, an increase of \$0.41 from the end of October. Through November, California prices averaged \$0.68 higher than the national average (**page 5**).

Refining News

- **Andeavor Golden Eagle Refinery:** On October 20, Golden Eagle began planned maintenance on its 30,000 barrel per day (bpd) distillate hydrocracker unit. This maintenance was completed on November 20.
- **Chevron Richmond Refinery:** On November 4, Chevron completed unplanned maintenance on its 40,000 bpd reformer unit that was started on October 30.
- **PBF Torrance Refinery:** On November 21, PBF Torrance had a power outage at its 155,000 bpd refinery. All units were restarted promptly except for a lone atmospheric distillation unit. This maintenance was completed on November 29.
- **Phillips 66 Wilmington Refinery:** On November 6, Phillips 66 completed planned maintenance of a gas oil hydrotreater unit that began on October 30.

Crude Oil Prices

Figure 1: Daily West Coast Spot Crude Oil Prices, March 2016 to Present



Source: U.S. Energy Information Administration (EIA), Oil Price Information Service (OPIS), and Federal Reserve Bank of St. Louis.
 Note: Red lines on all graphs indicate end of previous *Petroleum Watch* data. Areas to the right indicate new data since last month.

Crude oil prices continued to increase in November (**Figure 1**). Brent began November at \$60.98, increased to \$64.49 on November 9, and finished at \$63.25 on November 27, a 9 percent increase compared to October. West Texas Intermediate (WTI) started November at \$54.32, reached to \$57.88 on November 22, and finished at \$58.1 on November 27, a 10 percent increase compared to last month. The California Estimated Refiner Acquisition Cost (CA-RAC)¹ reached a monthly high at \$60.22 on November 9 and finished at \$58.1 on November 27, a 10 percent increase over October.

The difference between WTI and Brent crude oil continues to grow. The spread averaged \$5.93 in October and increased to \$6.04 in November. On November 9, the Brent and WTI crude oil spread was \$7.33, the highest since September. The increasing spread between WTI and Brent is similar to the situation in December 2015 before the U.S. lifted a ban on crude oil exports. Since October, rumors of Organization of Petroleum Exporting Countries’ (OPEC) extension of supply cuts past March 2018 has tightened the market, keeping the Brent prices up. U.S. producers are keeping prices low through record increases in crude output in 2017 (**page 3**). OPEC members came to a final supply cut agreement on November 30, making increasing Brent crude prices likely for 2018.

<u>Crude Oil Prices</u>	
<u>November 2017 vs 2016</u>	
(Percent Change)	
Brent	40% higher
WTI	24% higher
CA-RAC	44% higher
<u>November 2017 Averages</u>	
Brent	\$62.57
WTI	\$56.49
CA-RAC	\$58.77
<u>November 27, 2017</u>	
Brent	\$63.25
WTI	\$58.10
CA-RAC	\$59.56

¹ California estimated refiner acquisition cost (CA-RAC) is a weighted average of the prices of California (San Joaquin Valley) crude, Alaskan crude, and foreign crude.

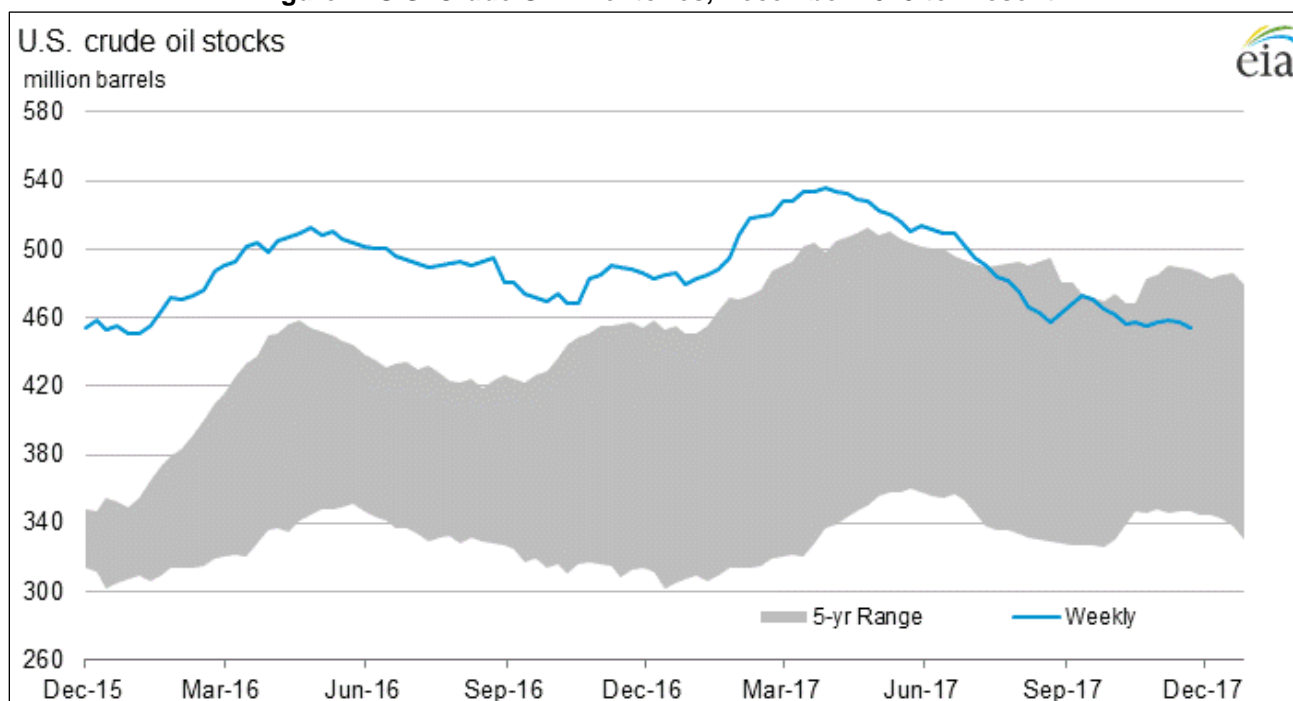
Crude Oil Production and Storage

Monthly crude oil production and refinery input levels increased, while crude inventories and imports decreased since November's *Petroleum Watch* (**Figure 2**).

- U.S. crude oil production for November was estimated at 9.65 million barrel per day (bpd), 410,000 bpd higher than October's monthly average of 9.24 million bpd. This is a 650,000 bpd increase from a year ago when production levels were 8.69 million bpd.
- Crude oil imports decreased by 80,000 bpd to 7.62 million bpd in November. Compared to import levels from November 2016, this is a decrease of 140,000 bpd.
- U.S. crude oil refinery inputs increased by 760,000 bpd since October's *Petroleum Watch*, finishing November at an average 16.7 million bpd. Refinery inputs are 540,000 bpd higher than year-ago levels.
- Crude oil inventories in the U.S. decreased by 1.2 million barrels during November to 453.7 million barrels. Current inventories are 34.4 million barrels lower than one year ago.

Crude oil inventories are at the lowest level seen since February 2016. Yet U.S. crude oil production is at historical highs, offsetting lower levels of imported crude and keeping refinery inputs at historical highs. All indicators, with the exception of crude oil imports, point to rising demand for products and crude oil. These demand indicators and OPEC's November 30 announcement of extending supply cuts indicate that prices could rise in 2018 (**page 2**).

Figure 2: U.S. Crude Oil Inventories, December 2015 to Present



Source: U.S. EIA

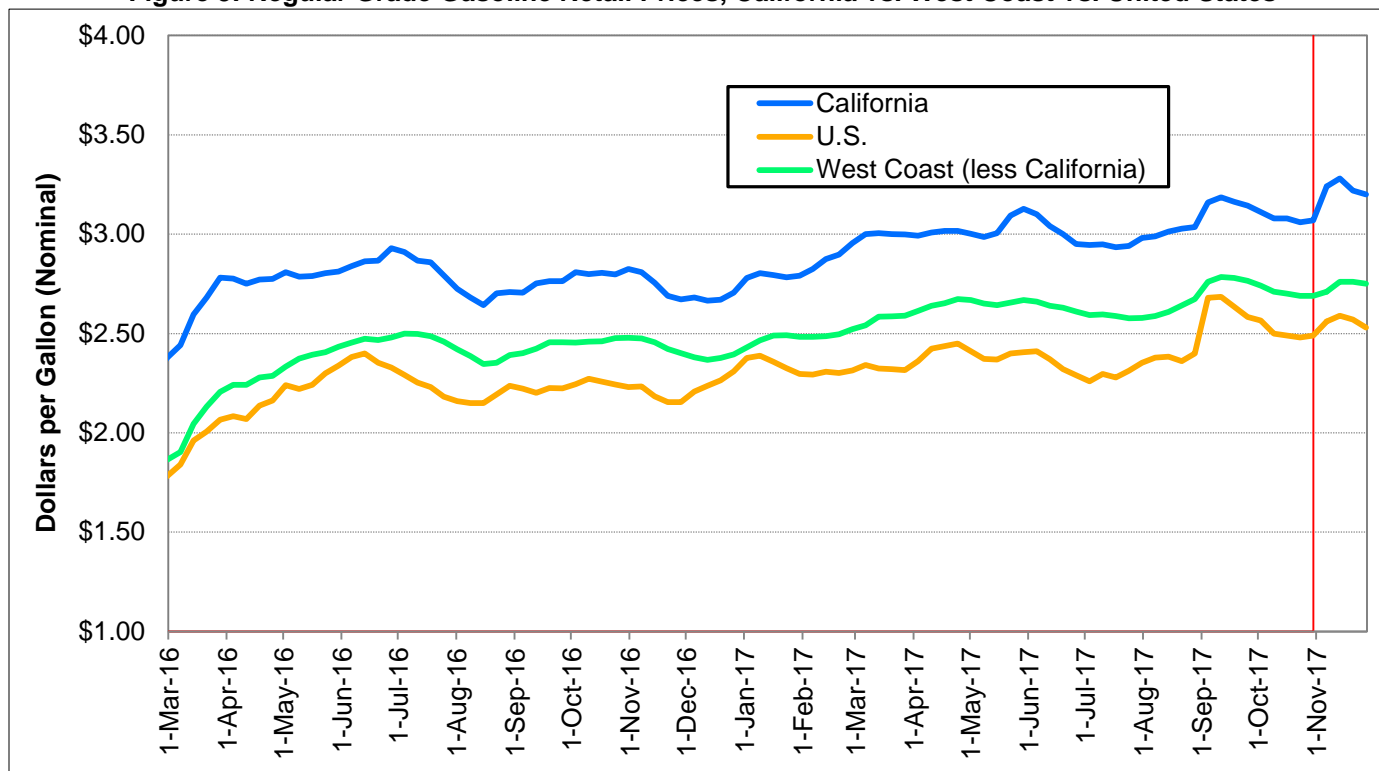
According to OPEC's November *Monthly Oil Market Report*, total October OPEC production decreased by 150,900 bpd to 32.6 million bpd. OPEC's crude estimate for the rest of 2017 is 33 million bpd. OPEC increased its 2018 supply forecast by 0.46 million bpd to 33.4 million bpd.²

² OPEC November *Monthly Oil Market Report*, page i, page 56:

http://www.opec.org/opec_web/static_files_project/media/downloads/publications/OPEC%20MOMR%20November%202017.pdf.

Gasoline and Diesel Retail Prices

Figure 3: Regular Grade Gasoline Retail Prices, California vs. West Coast vs. United States



Source: U.S. EIA

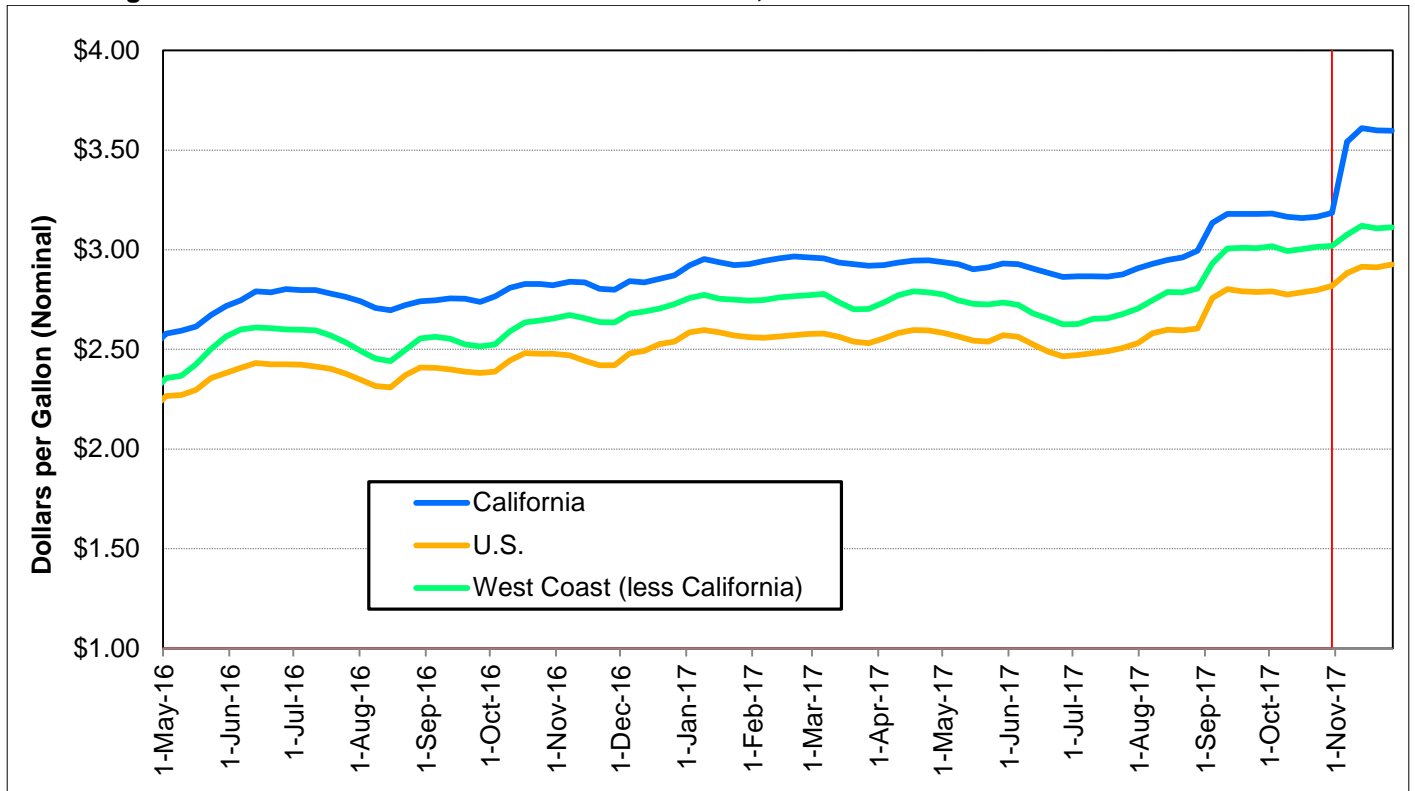
Gasoline retail prices increased the first two weeks of November before decreasing by the end of the month (**Figure 3**). Gasoline prices across the U.S. reached their highest point on November 13 with California reaching \$3.28 a gallon, a price not seen since September 2015. Prices tapered off gradually with California losing \$0.08 and dropping to \$3.20 the week of November 27. On average, gasoline prices across the U.S. increased with California, the U.S., and the West Coast (less CA) averaging \$3.24, \$2.56, and \$2.75 (**sidebar**).

Retail gasoline prices in November were affected by two major factors, a large increase in the tax rate and increasing crude oil costs. California experienced the largest increase in gasoline prices due to Senate Bill 1 (Beall, Chapter 5, Statutes of 2017), which added a one-time increase of \$0.12 per gallon to the state excise tax, raising it from \$0.297 to \$0.417. This accounts for 4 percentage points of the 18 percent rise in average gasoline retail prices in California compared to last year. The average U.S. price was close behind with a 17 percent increase. The West Coast (less CA) increased 13 percent (**sidebar**).

Across the United States, all retail prices increased in concert with the price of crude oil. California was no exception. Brent and WTI saw double digit percentage increases in prices compared to this time last year (**page 2, sidebar**). If these trends continue, we could see an uncharacteristic increase in gasoline retail prices from December through the early part of 2018.

Gasoline Prices	
November 2017 vs 2016	
(Percent Change)	
California	18% higher
U.S.	17% higher
West Coast	13% higher
November 2017 Averages	
California	\$3.24
U.S.	\$2.56
West Coast	\$2.75
Week of November 27,	
2017	
California	\$3.20
U.S.	\$2.53
West Coast	\$2.75

Figure 4: No. 2 Diesel Ultra-Low-Sulfur Retail Prices, California vs. West Coast vs. United States



Source: U.S. EIA

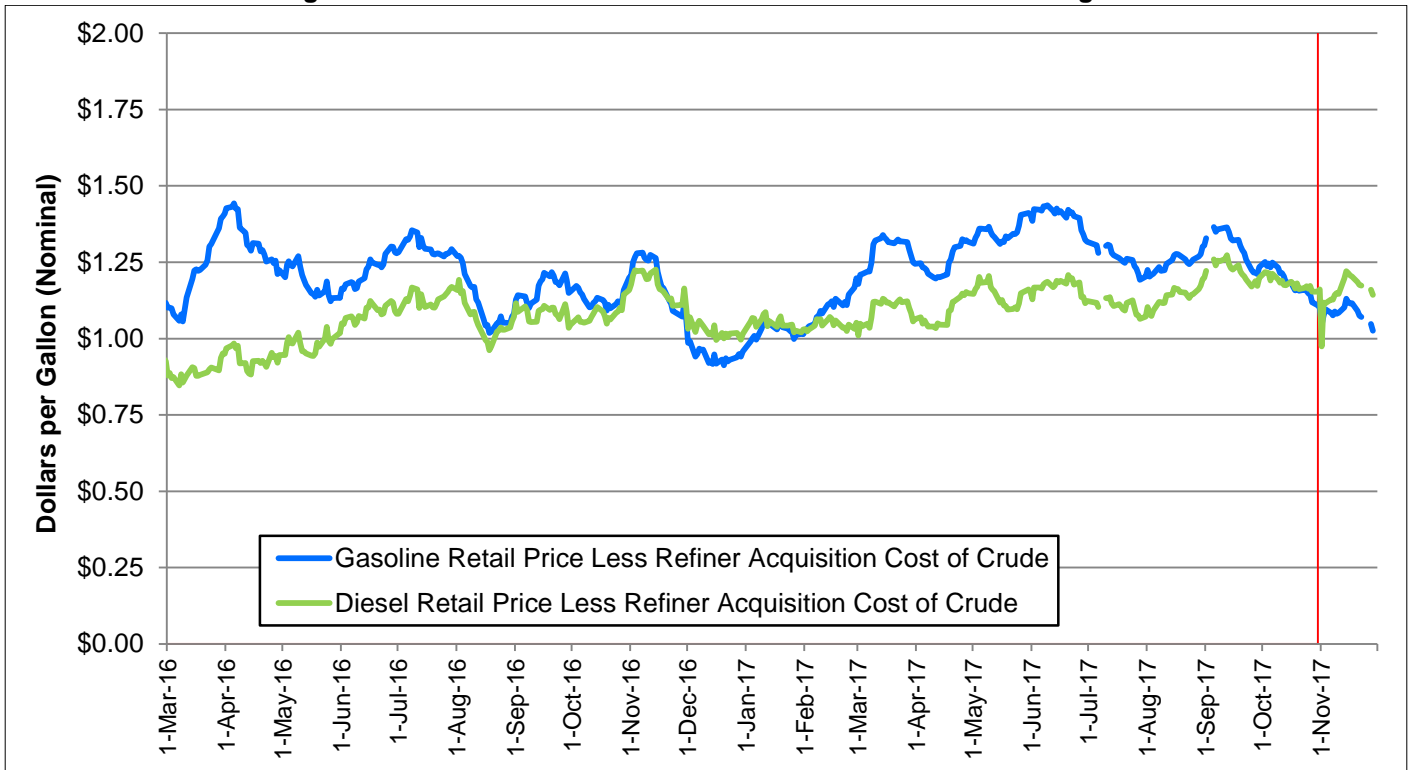
California retail diesel prices underwent large increases in November and set records for weekly increases. California diesel prices increased \$0.35, from \$3.19 on October 30 to \$3.54 on November 6, the highest weekly price increase between consecutive weeks since 1995. Before the November 6 increase, May 26, 2008, saw a one-week increase of \$0.29 that set an all-time high price of \$5.03 per gallon of diesel.

The California diesel retail price had the most noticeable price increase of all regions during November due to the diesel sales and use tax rate increasing from 1.75 percent to 5.75 percent, and the excise tax rate increasing from \$0.16 a gallon to \$0.36 a gallon. However, all diesel prices in the U.S. increased following a 5 percent increase in WTI crude oil prices (**page 2**). WTI prices increased \$2.98 a barrel, \$0.07 a gallon, during the first week of November while U.S. and West Coast (less CA) diesel retail prices increased \$0.06 each, and \$0.04 the week after.

The U.S. monthly average diesel price increased \$0.11 from \$2.79 for October to \$2.91 for November and drove prices to a new annual high of \$2.93 on November 27 (**Figure 4**). The California-less-U.S. price difference averaged \$0.37 all year, but nearly doubled to \$0.68, increasing \$0.31 after the sales and excise tax hike. Meanwhile, the California to West Coast price difference doubled from \$0.16 to \$0.48 for October and November, respectively.

<u>Diesel Prices</u>	
November 2017 vs 2016	
(Percent Change)	
California	27% higher
U.S.	19% higher
West Coast	17% higher
November 2017 Averages	
California	\$3.59
U.S.	\$2.91
West Coast	\$3.10
Week of November 27, 2017	
California	\$3.60
U.S.	\$2.93
West Coast	\$3.11

Figure 5: CA-RAC to Ex-Tax California Gasoline and Diesel Margins



Source: U.S. EIA and OPIS

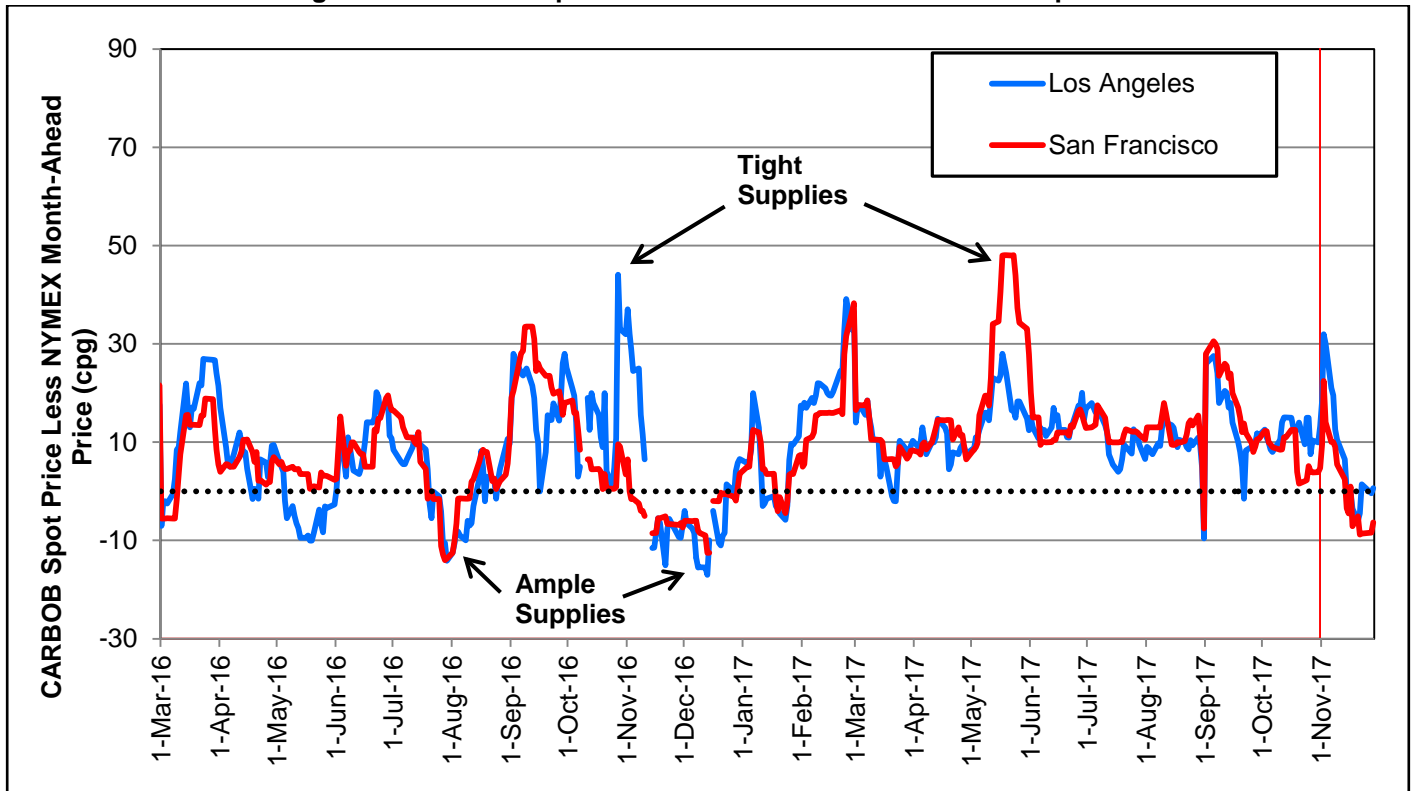
CA-RAC-to-ex-tax retail gasoline and diesel margins had a brief increase mid-November before falling below levels reported in the previous *Petroleum Watch* (Figure 5). The gasoline margin began November 1 at \$1.04 before a steady increase to \$1.13 on November 14. The diesel margin began October at \$1.22 and remained steady until October 11 before falling slowly to \$1.03 on November 28. Retail gasoline prices increased \$0.13 in November and retail diesel prices increased \$0.41 due to changes in taxes for both fuels (page 4). Crude oil prices (CA-RAC) increased \$0.10 cents per gallon. Margins fell, despite retail price increases—excise and sales tax hikes accounted for most of the rise in retail prices—and crude prices outpaced California fuel retail prices.

In the previous *Petroleum Watch*, it was proposed that margins show a general cyclic or seasonal pattern, widening in the spring and narrowing by midsummer. If this pattern holds for 2017, then margins should continue to shrink before rebounding by March 2018. Gasoline margins are 9 percent lower than November 2016 values and diesel margins are 2 percent lower, holding to the seasonal pattern.

As these margins fall, it is clear that most of the rise in retail prices can be attributed to increased crude oil prices and the recent Senate Bill 1 (Beall, Chapter 5, Statutes of 2017) tax hike. As consumers adjust to the tax hike, the margins are expected to stay consistent, even with crude oil price increases.

<u>Crude to Retail Margins</u>	
November 2017 vs 2016	
(Percent Change)	
Gasoline	9% lower
Diesel	2% lower
November 2017 Averages	
Gasoline	\$1.08
Diesel	\$1.15
November 28, 2017	
Gasoline	\$1.03
Diesel	\$1.14

Figure 6: California Spot Gasoline to NYMEX Futures Price Spread



Source: U.S. EIA and OPIS

After spending most of September and October in the \$0.15 to \$0.10 range, both the Los Angeles (LA) and San Francisco (SF) gasoline spot market differential to New York Mercantile Exchange (NYMEX) spot price spiked on November 2 to \$0.32 and \$0.23, respectively. These spikes correspond to low gasoline production and inventory numbers seen in Energy Commission *Weekly Fuels Watch* information for that week (**Figure 8**).³ After a rise in statewide gasoline production and inventory, the two differentials returned to previous levels and continued to decrease into a negative differential relationship with the NYMEX by the middle of the month, with the SF-less-NYMEX differential remaining there.

November 2017 differentials were \$0.04 and \$0.06 higher than November 2016 differentials (**sidebar**). November 2017 was higher than 2016 mainly due to the inflated differentials seen between November 1 and November 7. Without those values, the LA-less-NYMEX differential only averaged \$0.01 and the SF-less-NYMEX differential averaged -\$0.03 for November. That is a \$0.07 and \$0.05 swing in monthly averages, respectively, due to the early month spike. This pattern also appears to have occurred in 2016, although the spike in the differential occurred earlier in the latter half of October 2016.

Gasoline Spot-Futures Spread

November 2017 vs 2016

Los Angeles 4¢ higher
San Francisco 6¢ higher

November 2017 Averages

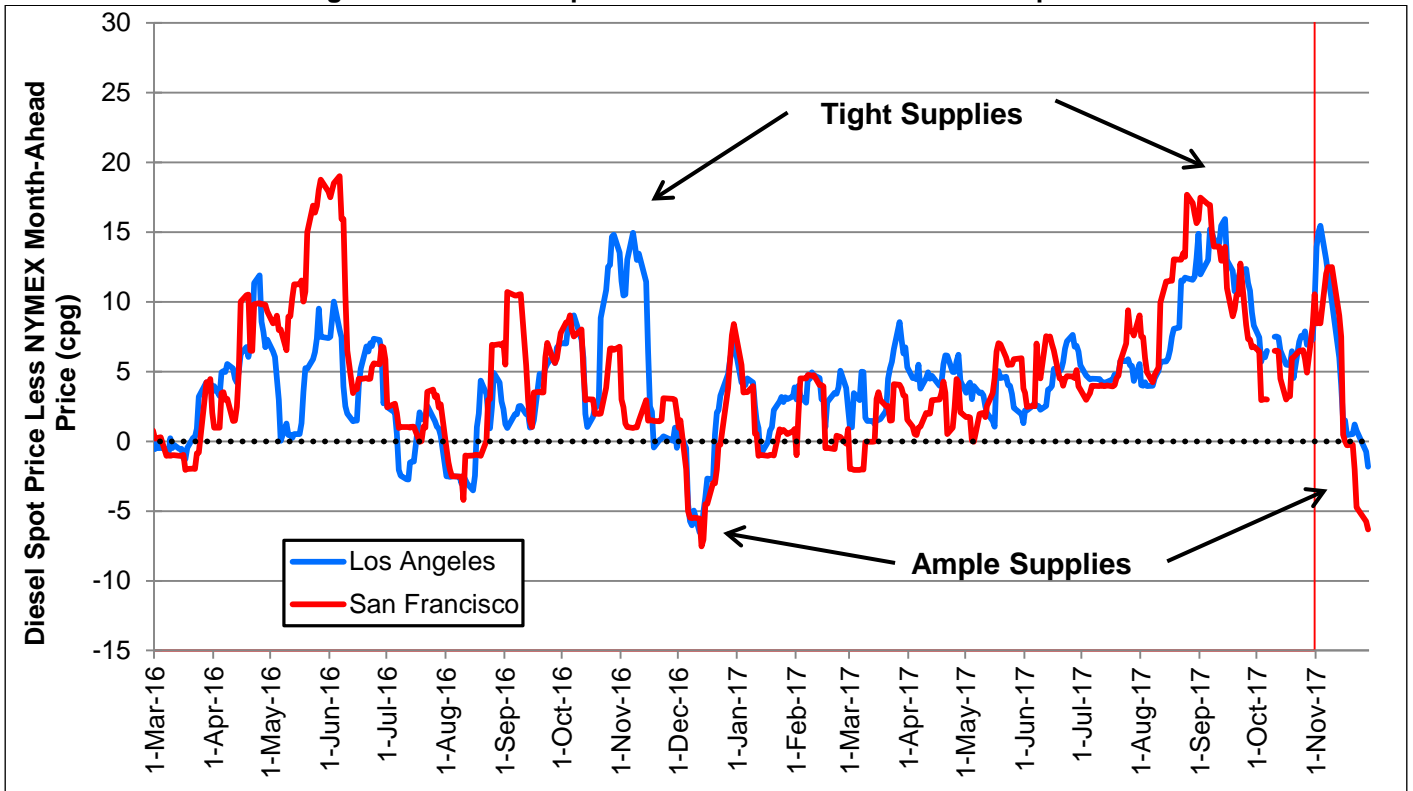
Los Angeles 8¢
San Francisco 2¢

November 28, 2017

Los Angeles 1¢
San Francisco 6¢

³ Weekly Fuels Watch: http://www.energy.ca.gov/almanac/petroleum_data/fuels_watch/

Figure 7: California Spot Diesel to NYMEX Futures Price Spread



Source: U.S. EIA and OPIS

The LA-less-NYMEX diesel differential increased after the previous *Petroleum Watch*, from \$0.10 on October 31 to \$0.15 on November 3. This increase did not last long when the LA spread plunged \$0.14 twelve days later to \$0.01 on November 15. The LA spread continued to decrease for the rest of the month to end November 28 at -\$0.02 (Figure 9).

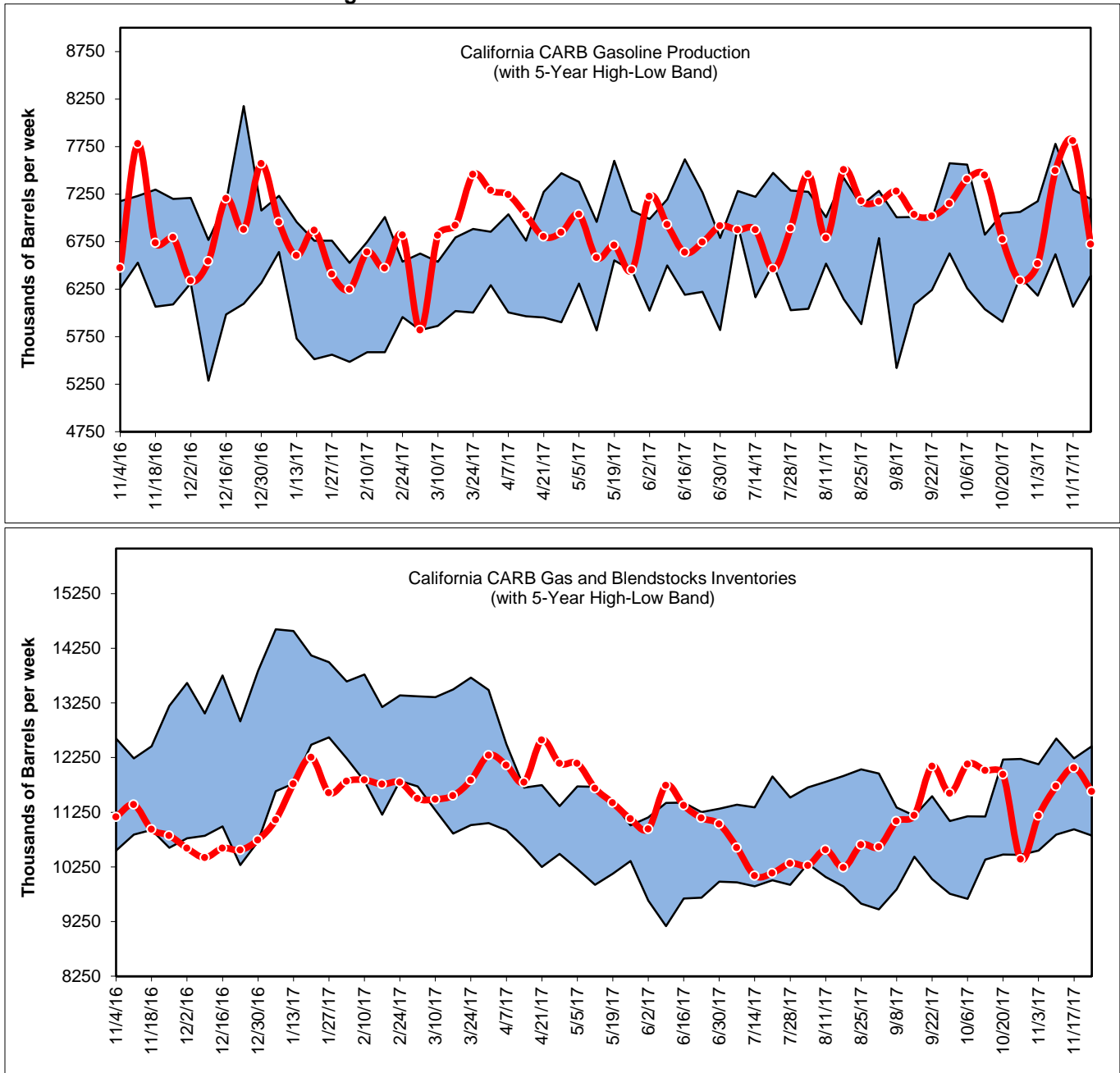
The SF-less-NYMEX diesel differential had a similar pattern to the LA differential. SF-less-NYMEX spreads increased \$0.04 from \$0.08 on November 1 to \$0.12 on November 9 and then decreased for the remainder of the month. The SF diesel spread decreased a total of \$0.18 to end the month at -\$0.06 on November 28, which marks the lowest spread since hitting -\$0.08 on December 13, 2016.

The negative spread in LA and SF less-NYMEX diesel differential is not a rare occurrence at this time of the year (Figure 9). It seems unlikely for California spot diesel to cost less than the NYMEX future price when looking at a two-year span; however, California diesel spreads have decreased each November to a negative spread for December as far back as 2008.

<u>Diesel Spot-Futures Spread</u>	
November 2017 vs 2016	
Los Angeles	0¢ even
San Francisco	2¢ higher
November 2017 Averages	
Los Angeles	6¢
San Francisco	4¢
November 28, 2017	
Los Angeles	-2¢
San Francisco	-6¢

California Gasoline and Diesel Production and Inventories

Figure 8: Gasoline Production and Inventories

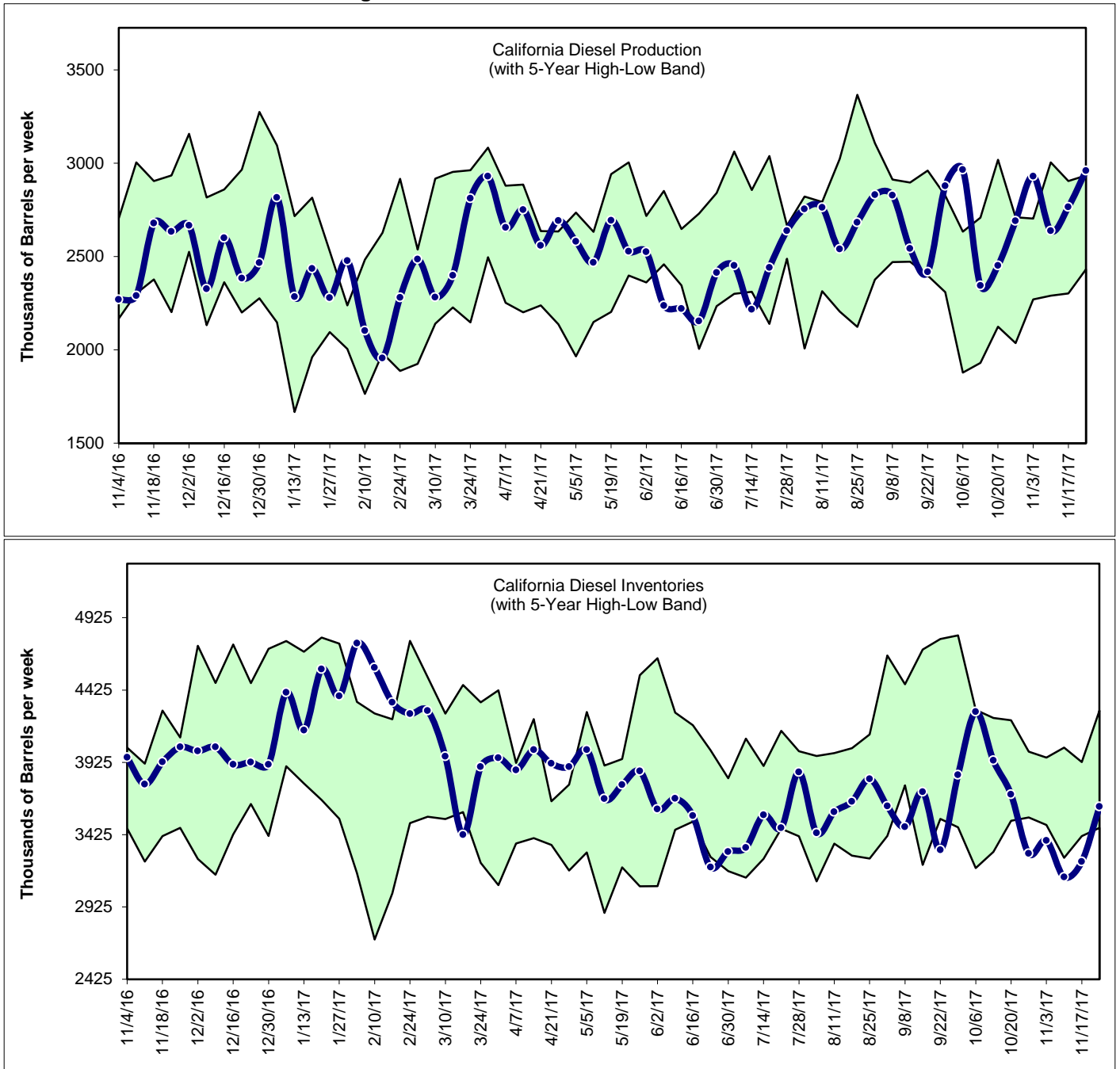


Source: PIIRA data

California gasoline production experienced large swings in November. On November 3, production hit 6.5 million barrels per week (bpw), the lowest levels since March, followed by 7.8 million bpw on November 17—the highest production rate since November of last year. California gasoline production averaged 7.1 million bpw, which is an increase of 190,000 barrels over last year.

California gasoline and blendstock inventories increased three straight weeks in November, reaching a monthly peak of 12.0 million barrels on November 17. Inventory levels decreased to 11.6 million barrels on November 24 but, overall, California added a healthy amount of gasoline and blendstocks to its inventories. California inventory increased 1.2 million barrels since October and 573,000 barrels from this time last year.

Figure 9: Diesel Production and Inventories



Source: PIIRA data

California diesel production remained strong and reached levels above the five-year band in November. On November 3 and November 24, California diesel production reached levels above the five-year band, producing 2.9 million bpw both weeks. California diesel production averaged 2.8 million bpw in November, which is an average increase of 355,000 bpw from last year.

California diesel inventories remained below the five-year band for most of November. There was a slight rise in levels on November 3, with levels hitting a year low of 3.1 million barrels by November 10. Inventory climbed back to 3.6 million barrels on November 24, just inside the five-year band. California ended November with 234,000 more barrels of diesel, which is down 412,000 barrels over last year.

Hot Topic Supplement – Spot Markets and California Gasoline Retail Prices

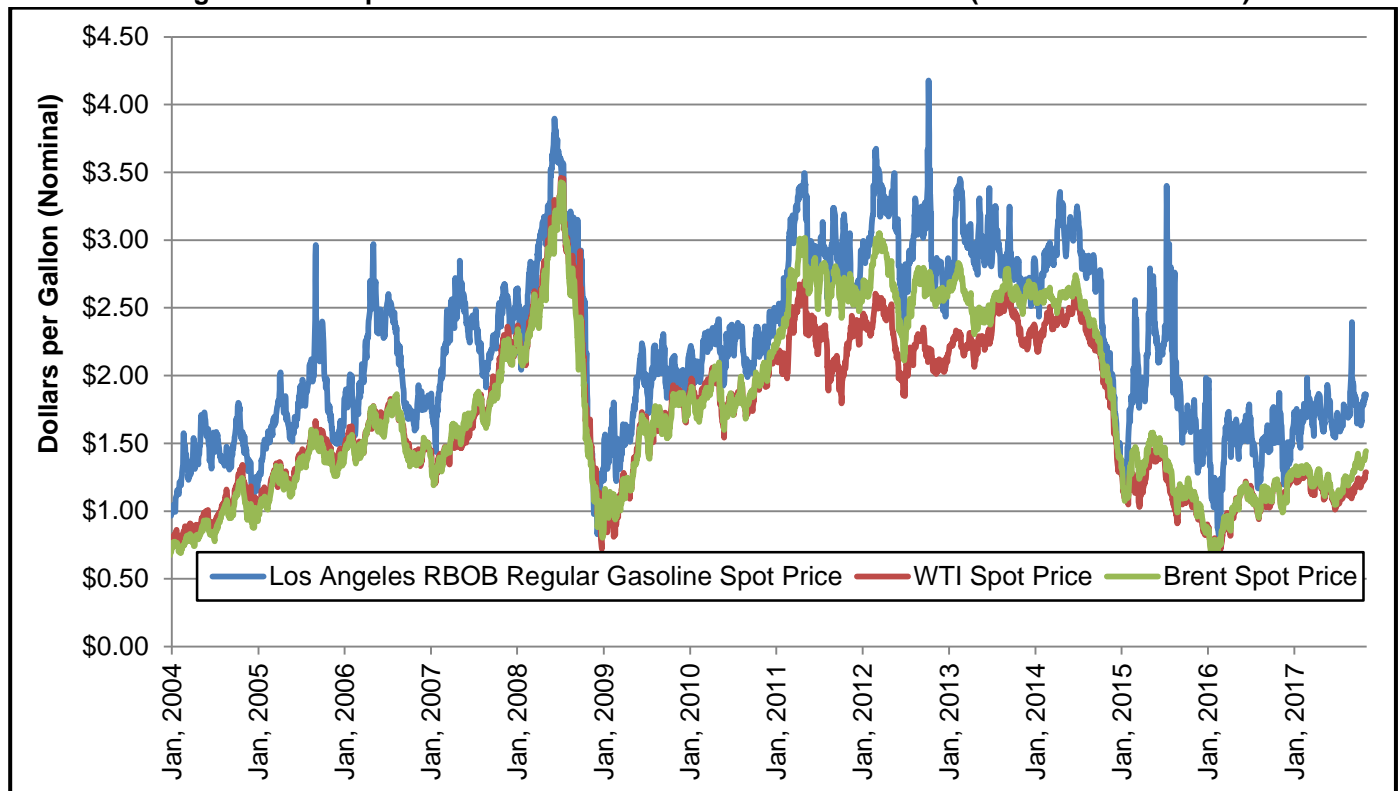
Gasoline importers, producers, and marketers trade gasoline among themselves in the “gasoline spot market.” INVESTOPEDIA defines a spot market as:

The spot is a market for financial instruments such as commodities and securities which are traded immediately or on the spot. In spot markets, spot trades are made with spot prices. Unlike the futures market, orders made in the spot market are settled instantly. Spot markets can be organized markets or exchanges or over-the-counter (OTC) markets.⁴

In California, there are two spot markets for gasoline, one in Los Angeles (LA) and one in San Francisco (SF), matching the two refinery and logistics hubs in California for gasoline. The differential of these two markets in comparison to the New York Mercantile Exchange (NYMEX) gasoline spot price is reported every month in *Petroleum Watch* (**Figure 6**). These markets are inaccessible to the regular citizen due to a minimum transfer volume of at least 10,000 barrels (420,000 gallons) and near immediate delivery of product being required to complete the transaction (typical transaction is 25,000 barrels). These markets can serve as a proxy for the wholesale price of California gasoline, as these prices represent the price of gasoline that competitors are willing to trade homogenous and *miscible* product (no additive packages).

The EIA has a record of daily LA spot market prices dating back to March 2003. **Figure 10** displays that information with the addition of daily WTI and the Brent crude oil spot prices. As seen in **Figure 10**, long term movements in the LA spot market gasoline price (a year or more) are explained largely by long-term movements in crude oil prices.

Figure 10: LA Spot Market Gasoline Price and Crude Oil Prices (Jan 2004 to Oct 2017)



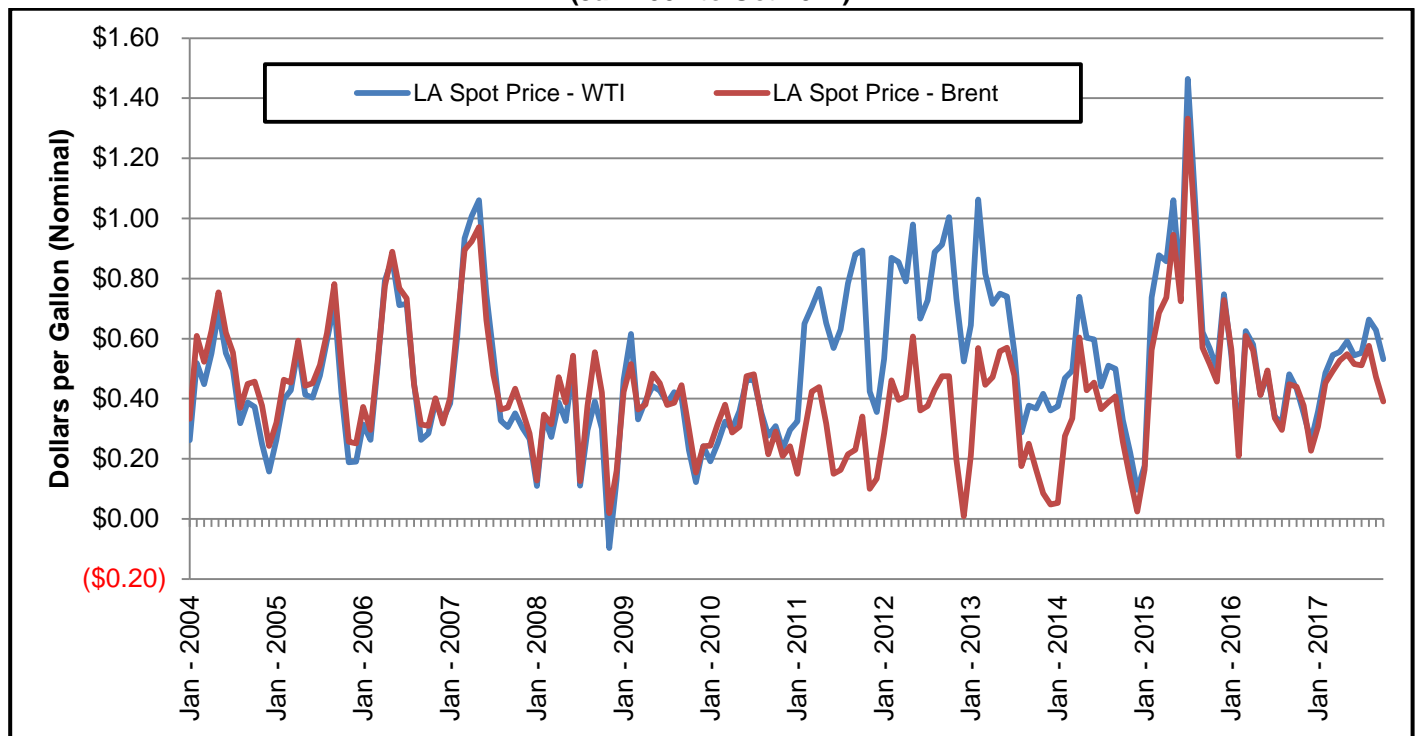
Source: Energy Information Administration

⁴ <http://www.investopedia.com/terms/s/spotmarket.asp>

There can be deviations from those movements. Prior to 2008, noticeable seasonal separations occur between these prices. After 2008, these seasonal separations lessened, and between 2011 and 2014 were replaced by a consistent separation between the WTI and the LA spot market gasoline price. This was caused by excess supply of crude oil from emerging shale oil production entering the Cushing, Oklahoma, area (the gathering spot for WTI crude oil) that pushed the price of WTI down in relation to the world market. In late 2014, WTI and Brent crude oil prices came back together, as more pipeline and transport capabilities were added in Cushing. In addition, during this period California gasoline instituted a 10 percent ethanol standard in gasoline, which helped increase gasoline supply.

Figure 11 shows the differential between LA spot market gasoline prices and the two crude oil spot prices. From January 2004 to October 2017, the Brent spot price has been the better proxy for international crude oil prices as it was unaffected by the local supply issues affecting WTI. Over this period, the average difference between the Brent and the LA spot price was \$0.42 and, with the exception of 2015 and regular seasonal rises prior to 2008, it has stayed roughly at that level over the full period.

Figure 11: LA Spot Market Gasoline Price Differential to Crude Oil Prices (Jan 2004 to Oct 2017)



Source: Energy Information Administration

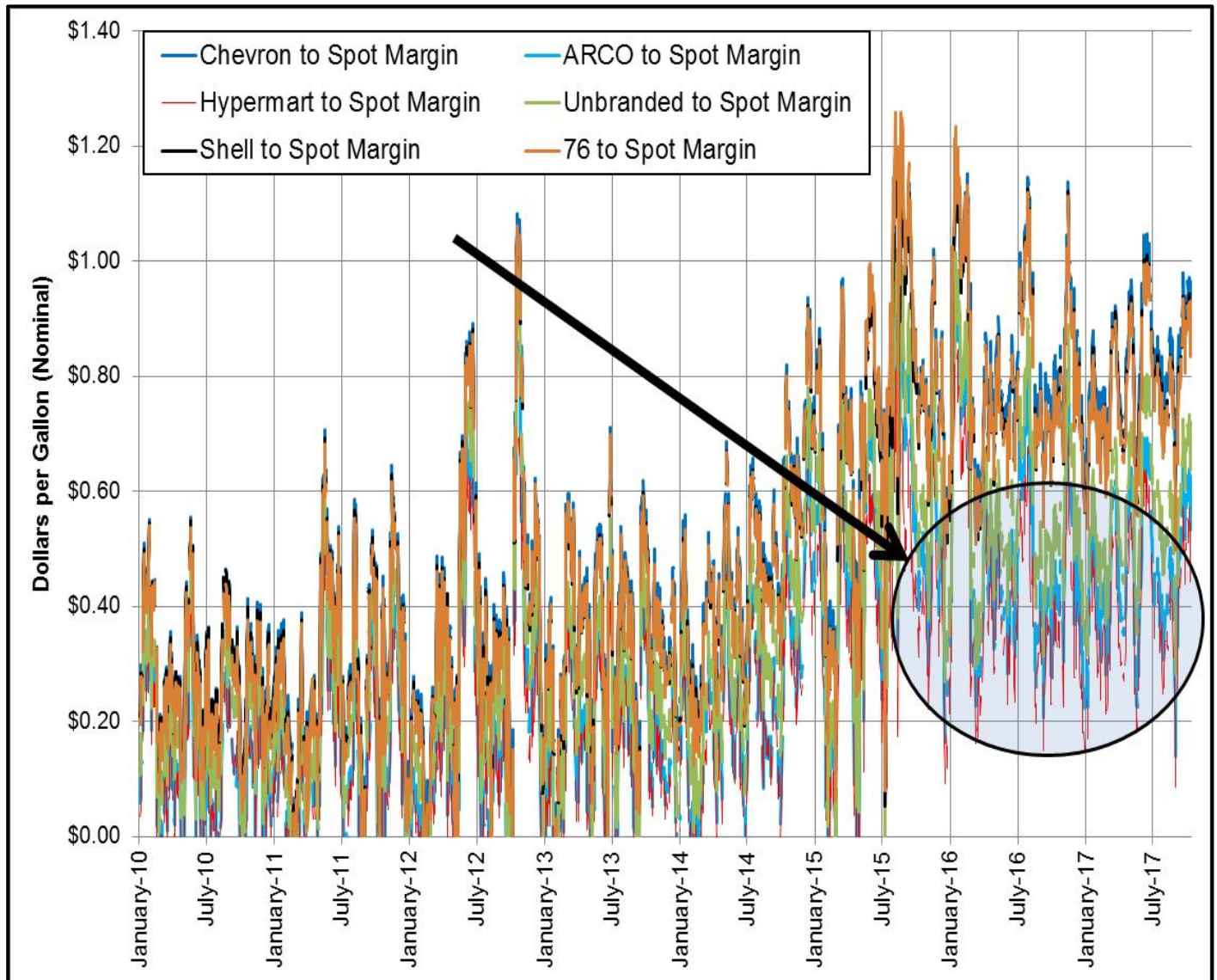
The Energy Commission defines the difference between the price of crude oil and the price of gasoline at the terminal or “rack” level to be the “refiner margin,”⁵ as the rack price reflects the costs involved in bringing gasoline to the local market. The crude-to-spot-gasoline differential can be viewed as a similar margin, in that it should reflect the price at which local refiners are willing to purchase gasoline versus producing more of it themselves. The cost of shipping the product to a California rack location is not included in the spot price.

While the refiner to wholesale price differences appear to be mostly steady, the wholesale to retail relationship deserves the same attention. Using the same Oil Price Information Service (OPIS) retail gasoline price information by brand that was displayed in the November *Petroleum Watch*, **Figure 12** displays the differential between the average California gasoline spot price for both the LA and SF markets, and the average retail price of gasoline for California by

⁵ Energy Commission staff publish refiner margin information at: http://www.energy.ca.gov/almanac/transportation_data/gasoline/margins/

brand with federal, state, and local taxes removed. A noticeable upward shift in all differentials seems to be occurring from 2014 forward. Looking closer shows that not all differentials have shifted by the same amount (see circled area). These differentials are the same “low price” gasoline retailers (ARCO, hypermarkets, and unbranded retailers) that were commented on in the November *Petroleum Watch*.

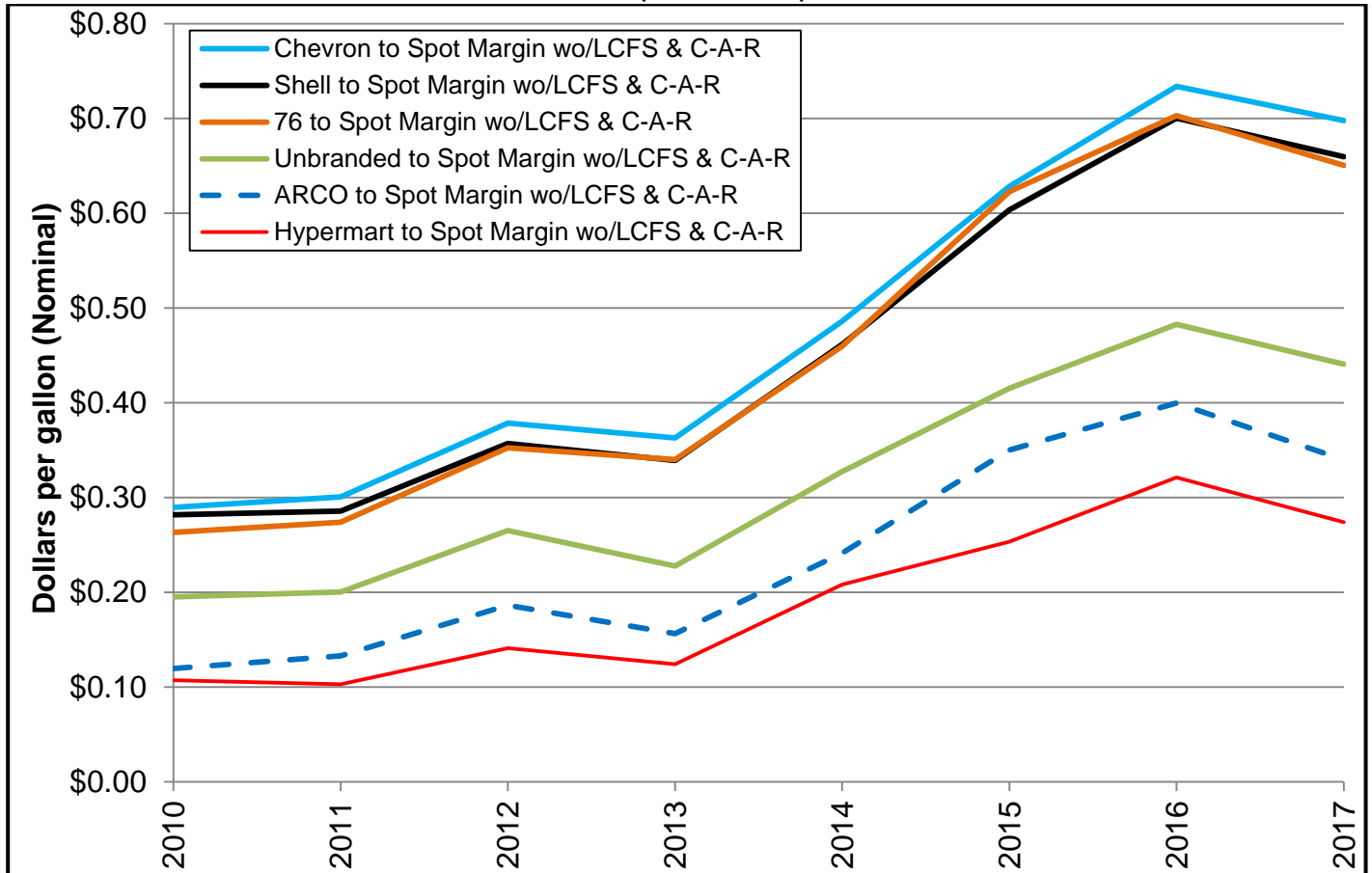
Figure 12: LA Spot Market Gasoline to Retail Gasoline Price Differential by Brand (Jan 2010 to Oct 2017)



Source: Oil Price Information Service

Averaging the differentials seen in **Figure 12** by year shows the general pattern of the rise in this differential more clearly. **Figure 13** displays those annualized differentials with the removal of estimated costs of compliance for Low Carbon Fuel Standard (LCFS) and Cap-and-Trade, often referred to as Cap-at-the-Rack (C-A-R). In this figure, the difference between the LA spot market gasoline price and the retail gasoline price of higher priced retailers in California (such as 76, Chevron, and Shell), has been growing noticeably since 2012. Starting in 2010 and 2011, those retailers had an average differential to the spot of \$0.30. In 2012 and 2013, it grew to about \$0.35, before rising sharply to roughly \$0.70 in 2016. In the January 2017 to October 2017 calculation displayed for 2017 in **Figure 13**, the differential decreased to roughly \$0.65, which is still a doubling of the differential since 2011.

Figure 13: LA Spot Market Gasoline Differential to Retail Gasoline Prices by Brand without LCFS and C-A-R Costs (2010 to 2017)



Source: Oil Price Information Service

Like the higher priced brands, the “low price” gasoline retailers have also shown an increase. While on percentage terms the increase in the hypermart to spot differential has tripled from roughly \$0.10 to over \$0.30; in absolute terms that increase was \$0.20 (\$0.15 lower than the \$0.35 increase for the higher brands). The trend is the same for ARCO, with a 150 percent increase from 2011 to 2016, going from roughly \$0.15 in 2011 to \$0.40 in 2016 but the absolute change was less than the higher priced brands at \$0.25. All differentials are down in 2017, with the hypermart to spot differential falling to \$0.27 and the ARCO to spot differential falling to \$0.34.

In conclusion, there appears to a pattern of steadily increasing differentials between wholesale prices and retail prices. This information matches data provided to the Petroleum Market Advisory Committee on November 29, 2016, that showed the “retailer margin” (the rack to retail differential) increasing over the 2010 to 2016 period.⁶ It is unclear what the direct cause of these increases is but all retail brands presented appear to have raised their prices in relation to wholesale costs. High-price brand retailers have increased this differential more in absolute terms, increasing the differential to highs of \$0.35 to \$0.40 by 2016 and 2017 compared to 2011. Lower-priced brands have also increased their retail differential to the spot market by roughly \$0.20 over the same period. Without further research it is unclear whether these increases are the result of profit seeking or the cost of doing business. Analyses of margins and differentials only show where price increases occur along the supply chain, but reveal little about why the increases are occurring.

⁶ See *California's Gasoline Prices 2010 to 2016* presentation found on the Petroleum Market Advisory website at: http://www.energy.ca.gov/assessments/petroleum_market/