



PETROLEUM WATCH

California Energy Commission

January 2018

Recent Petroleum News

Hot Topic Supplement (page 11)

Petroleum Watch continues to look at changes in California's gasoline markets. These supplemental articles have detailed the rising price level in California's wholesale markets and retail markets. This January supplement focuses on comparing California's wholesale and retail gasoline markets to other major regional markets in New York and Texas.

Prices

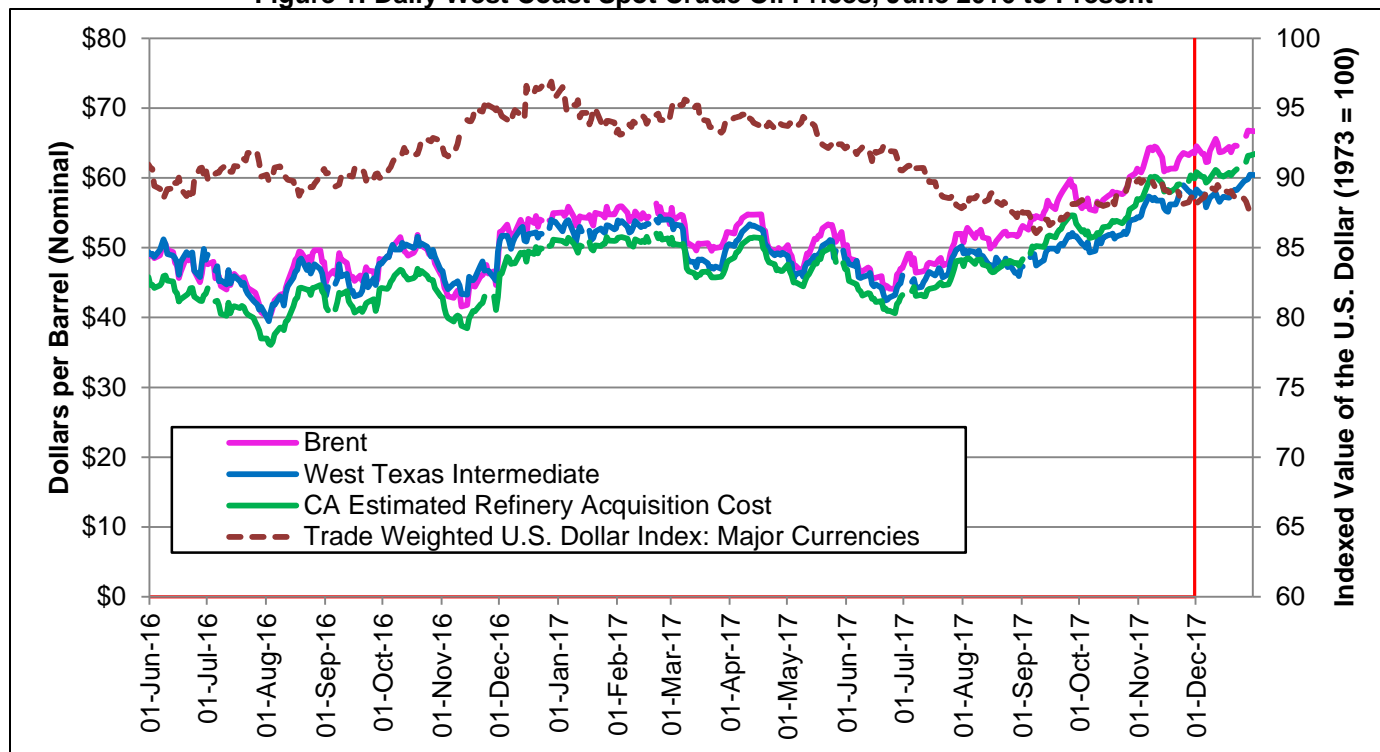
- **Crude Oil Prices:** Brent and West Texas Intermediate (WTI) crude prices closed at \$66.73 and \$60.46, respectively, on December 29 (**page 2**).
- **California Retail Gasoline Prices:** On January 1, prices reached \$3.15, a decrease of \$0.05 since the end of November. Through December, California prices averaged \$0.65 higher than the national average (**page 4**).
- **California Retail Diesel Prices:** On January 1, prices reached \$3.59, a decrease of \$0.01 from the end of November. Through November, California prices averaged \$0.65 higher than the national average (**page 5**).

Refining News

- **Andeavor Carson Refinery:** On December 4, 2017, a 104,000 barrel per day (bpd) fluid catalytic cracking unit at the 261,000 bpd refinery was shut down for unplanned maintenance. Maintenance was completed December 9, 2017.
- **Andeavor Golden Eagle Refinery:** On December 2, 2017, a 30,000 bpd hydrocracking unit at the 167,000 bpd refinery east of Martinez was shut down for unplanned maintenance. Maintenance was completed, and the hydrocracker was restarted December 14, 2017.
- **Valero Benicia Refinery:** On December 8, 2017, the 40,000 bpd naphtha reforming unit began planned maintenance at the 144,000 bpd refinery. The reformer was restarted December 14, 2017.
- **Valero Wilmington Refinery:** On November 26, 2017, the 40,000 bpd atmospheric distillation unit was taken down for planned maintenance. Maintenance was completed December 2, 2017.

Crude Oil Prices

Figure 1: Daily West Coast Spot Crude Oil Prices, June 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 have increased since November (Figure 1). Brent and WTI moved from \$63.56 and \$57.96 per barrel on November 28 to \$66.73 and \$60.46 per barrel on December 29. At the same time, the California Estimated Refiner Acquisition Cost (CA-RAC) of crude oil rose from \$60.40 to \$63.23 per barrel. Prices for all grades of crude oil were at least 10 percent higher than December 2016. The CA-RAC monthly average price was \$3 lower than WTI but \$3 higher than Brent through December 2017.

The difference between WTI and Brent crude oil continues to grow and was significantly greater in 2017 than 2016. The spread on December 29 increased to \$6.27, \$0.23 higher than November’s average of \$6.04. The increasing spread between WTI and Brent is similar to December 2015, before the United States lifted a ban on crude oil exports.

The future of the Brent/WTI spread for 2018 is not entirely clear in the current environment. The Organization of Petroleum Exporting Countries’ (OPEC) extension of supply cuts has increased Brent prices, while historically high levels of U.S. crude production are keeping WTI prices from rising as quickly. WTI prices depend on whether U.S. crude oil production can continue to meet demand. Current evidence shows that U.S. crude oil production is struggling to keep up with demand, as the recent decline in U.S. crude oil inventories continues (page 3, Figure 2). This will lead to a faster rising WTI price, leading to a shrinking Brent/WTI spread.

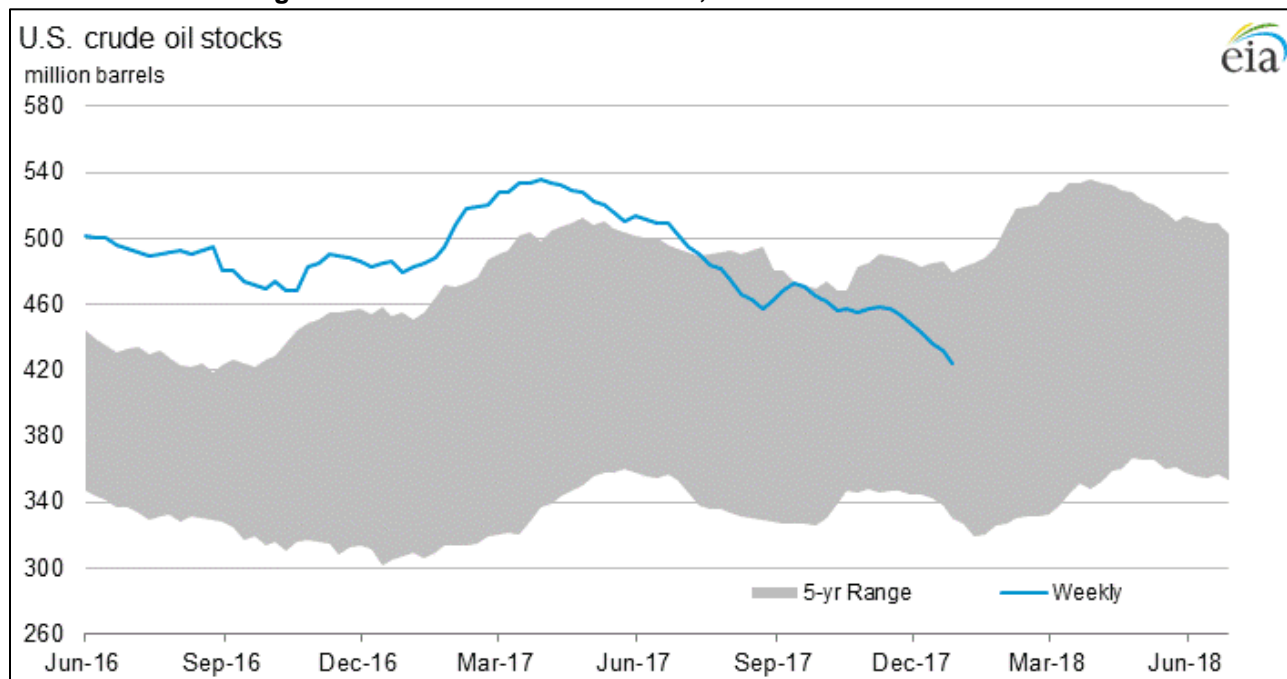
<u>Crude Oil Prices</u>	
<u>December 2017 vs 2016</u>	
<u>(Percent Change)</u>	
Brent	21% higher
WTI	11% higher
CA-RAC	24% higher
<u>December 2017 Averages</u>	
Brent	\$64.37
WTI	\$57.88
CA-RAC	\$60.83
<u>December 29, 2017</u>	
Brent	\$66.73
WTI	\$60.46
CA-RAC	\$63.23

Crude Oil Production and Storage

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

- U.S. crude oil production for December was estimated at 9.77 million barrel per day (bpd), 103,000 bpd higher than November's monthly average of 9.67 million bpd and the highest production rate as recorded by EIA. This is a 996,000 bpd increase from a year ago when production levels were 8.78 million bpd.
- Crude oil imports increased by 180,000 bpd to 7.79 million bpd in December. Compared to import levels from December 2016, this is a decrease of 10,000 bpd.
- U.S. crude oil refinery inputs increased by 550,000 bpd since December's *Petroleum Watch*, finishing December at an average 17.3 million bpd. Refinery inputs are 660,000 bpd higher than year-ago levels.
- Crude oil inventories in the United States decreased by 23.1 million barrels during December to 424.5 million barrels. Current inventories are 54.5 million barrels lower than one year ago.

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



Source: U.S. EIA

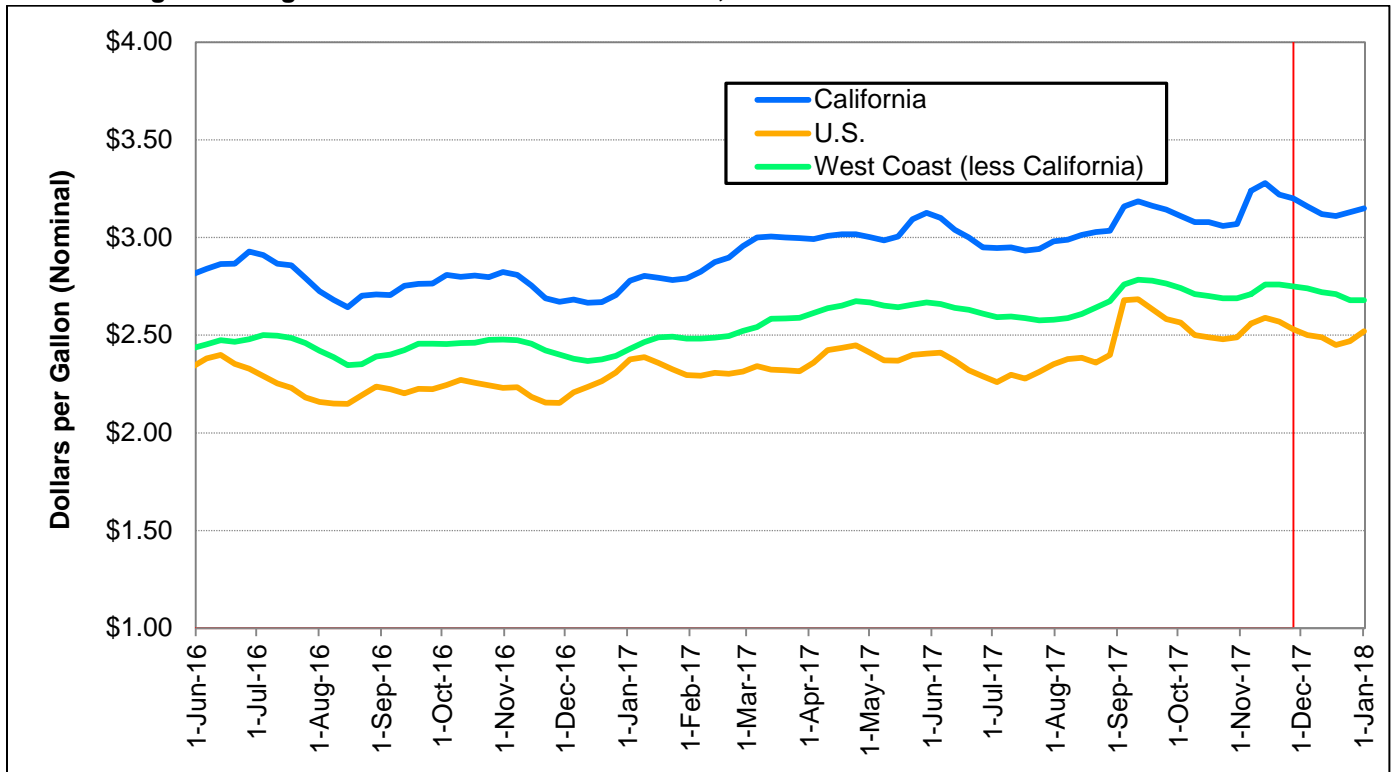
U.S. crude oil production and refinery inputs are at historical highs as recorded by the U.S. Energy Information Administration (U.S. EIA), while crude oil inventories are at the lowest level seen since September 2015. All indicators imply rising demand for products and crude oil. These demand indicators and OPEC's November 30 announcement of extending supply cuts indicate that prices for crude oil and petroleum products could rise in 2018 (page 2).

According to OPEC's December *Monthly Oil Market Report*, total November OPEC production decreased by 133,500 bpd to 32. million bpd. OPEC's crude oil estimate for the rest of 2018 is 33.2 million bpd, "an increase of 0.3 million bpd over the 2017 level."¹

¹ OPEC December Monthly Oil Monthly Report, page i, page 56: http://www.opec.org/opec_web/en/publications/338.htm.

Gasoline and Diesel Retail Prices

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



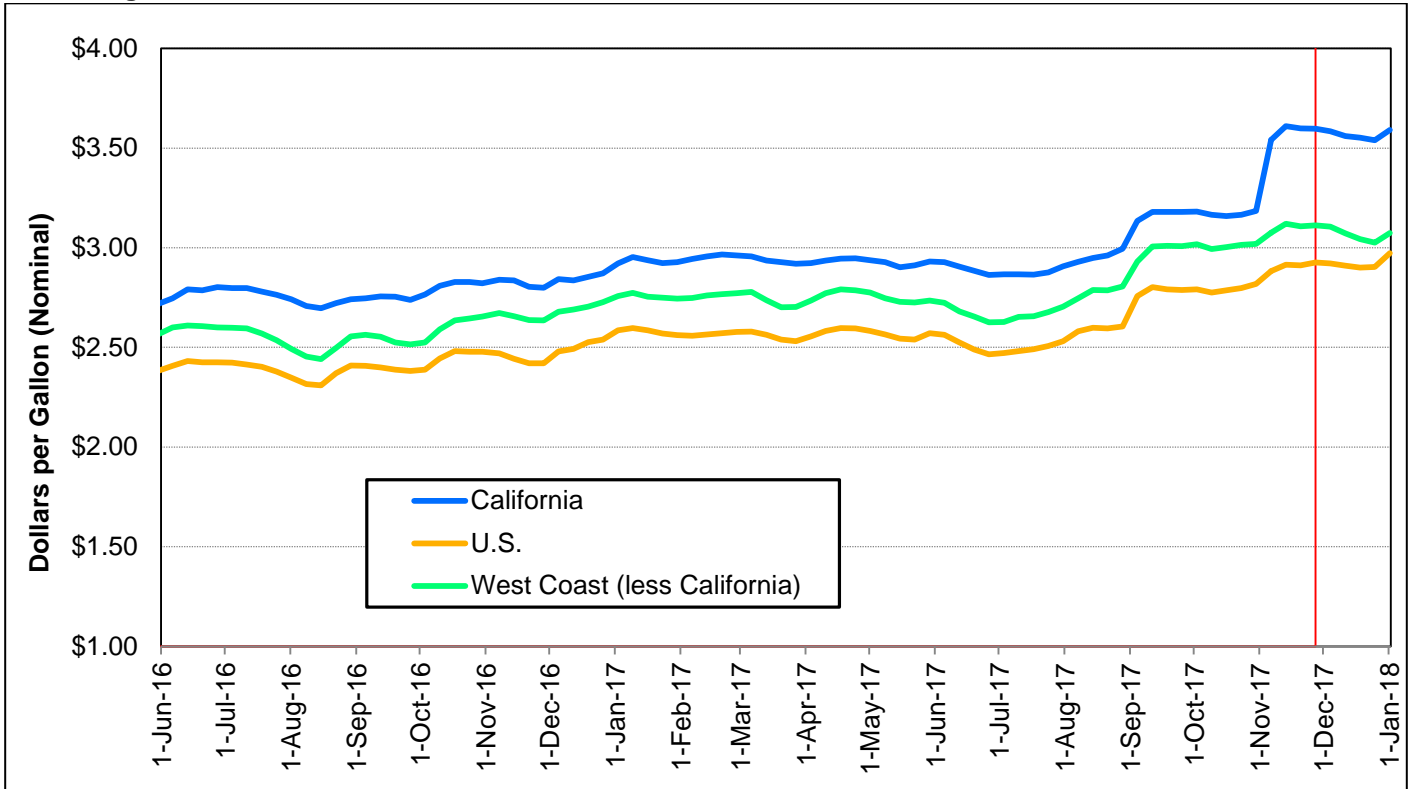
Source: U.S. EIA

Gasoline retail prices steadily decreased in December before rising during the holiday season (Figure 3). Gasoline prices across the United States were at the highest levels for the month on December 4, with California prices reaching \$3.16 a gallon. Prices decreased in the following weeks, with California reaching a monthly low of \$3.11 a gallon on December 18. Price trends diverged on December 18, with California and the United States seeing an increase in gasoline prices, while West Coast (less California) prices slightly dropped and leveled off. California and the United States ended December with prices at \$3.15 and \$2.52, while West Coast (less California) dropped to \$2.68. Following a long-term trend, all prices in the United States saw an increase in prices compared to 2016, with California seeing the largest at 17 percent higher (sidebar).

Gasoline retail price followed a historical trend of prices decreasing in December, before an upswing due to the holiday season. Following Thanksgiving, gas prices decline as colder weather generally keeps people from traveling. During the holiday season, the large quantity of people traveling briefly puts upward pressure on prices across the United States, with only the West Coast (less California) bucking this trend by staying flat. Colder weather in December stifles driving demand, which gives the industry the opportunity to build up inventory levels in preparation for refinery maintenance that typically occurs in January. Even with expected maintenance occurring, prices should flatten or continue to decrease through January due to lower demand after the holiday travel period.

Gasoline Prices	
December 2017 vs 2016 (Percent Change)	
California	17% higher
U.S.	10% higher
West Coast	14% higher
December 2017 Averages	
California	\$3.13
U.S.	\$2.48
West Coast	\$2.71
Week of January 1, 2018	
California	\$3.15
U.S.	\$2.51
West Coast	\$2.68

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



Source: U.S. EIA

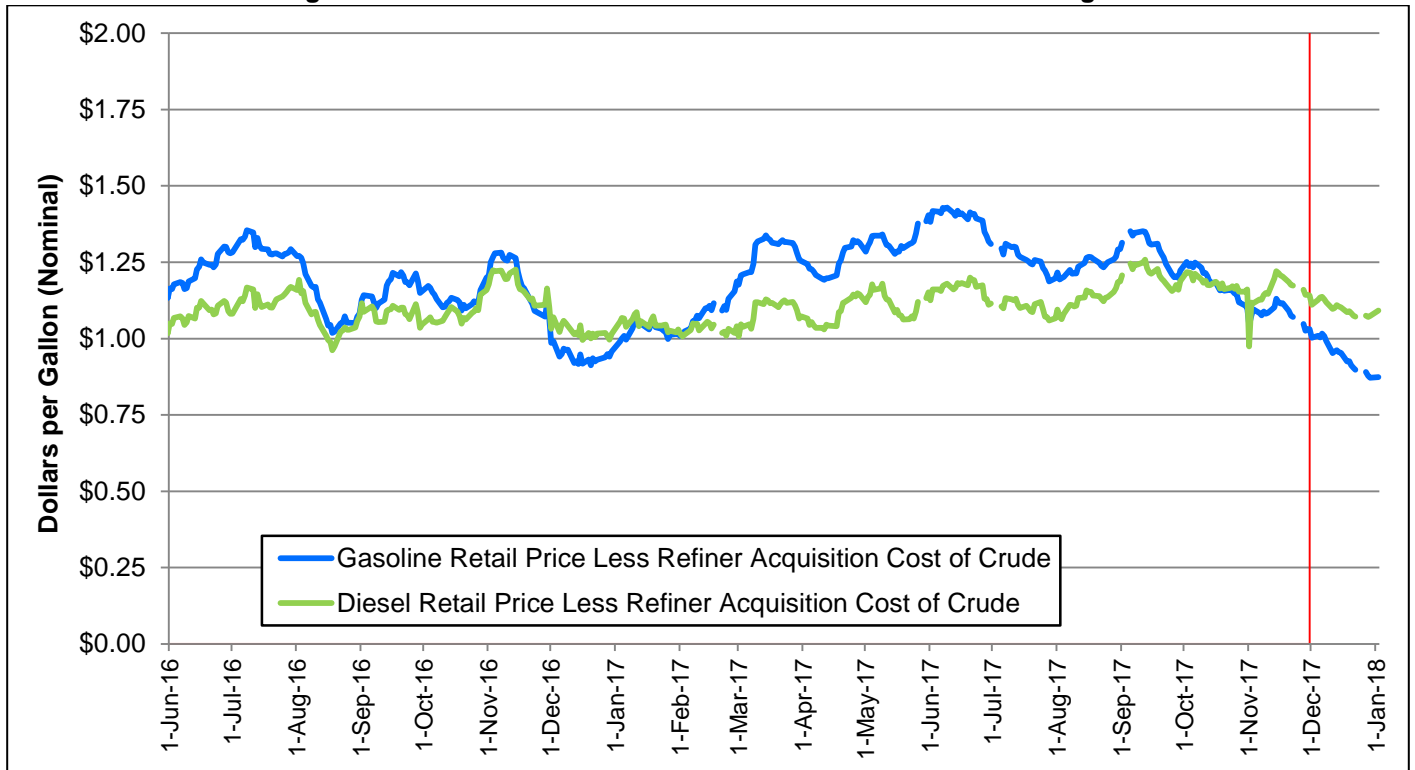
December California diesel prices decreased \$0.05 from December 4 at \$3.59 to \$3.54 on December 25 but remained 25 percent or \$0.71 higher when compared to December 2016. From December 25 to January 1, California diesel prices increased \$0.05 to \$3.59 to start the New Year. This is the first time that California diesel retail prices started a calendar year this high since January 2, 2014, at \$4.12 a gallon.

In 2016, West Coast diesel prices averaged \$0.19 less than the California price and \$0.19 higher than the U.S. price until the end of October 2016. Fast forward to December 25, the West Coast less the U.S. diesel price differential decreased to \$0.12, and the California less West Coast diesel price differential increased to \$0.51 (**Figure 4**). The recent excise tax hike was a major factor in the price difference between California and the rest of the West Coast. The United States and the West Coast are 16 percent and 13 percent, respectively, lower than California when compared to December 2016.

In 2017, diesel prices across the United States did not experience any drastic changes until Hurricane Harvey made landfall at the end of August and increased diesel prices roughly \$0.20 in two weeks in September (**Figure 4**). Meanwhile, 2018 New Year's Day started at \$2.97 a gallon of diesel across the United States and may see slight increases for the year due to decreasing in crude oil supply. The 2018 U.S. diesel prices may see an average of \$3.00 a gallon or more if WTI crude prices continue to increase.

<u>Diesel Prices</u>	
<u>December 2017 vs 2016</u>	
(Percent Change)	
California	25% higher
U.S.	16% higher
West Coast	13% higher
<u>December 2017 Averages</u>	
California	\$3.56
U.S.	\$2.91
West Coast	\$3.06
<u>Week of January 1, 2018</u>	
California	\$3.59
U.S.	\$2.97
West Coast	\$3.07

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



Source: U.S. EIA and OPIS

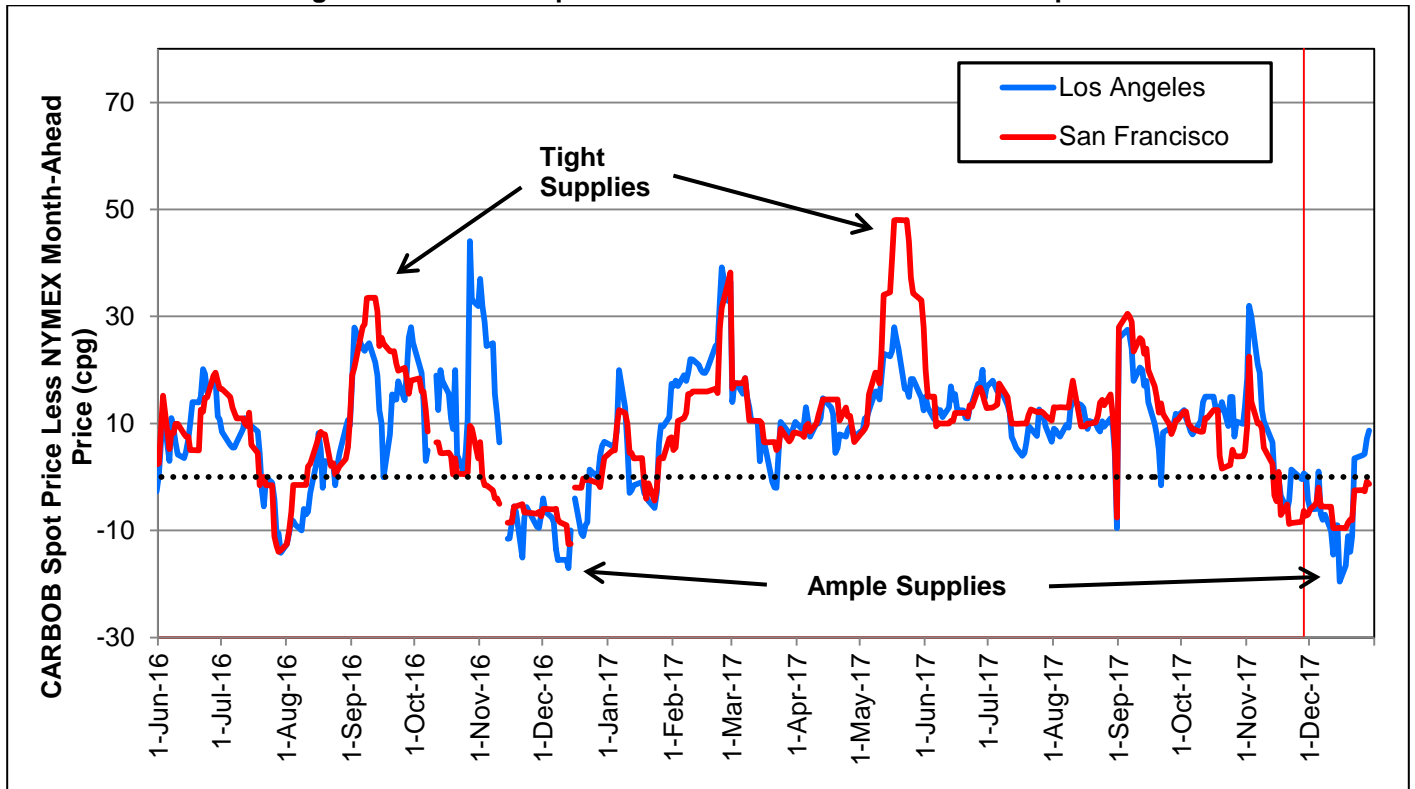
CA-RAC-to-ex-tax retail gasoline and diesel margins decreased throughout December 2017 (Figure 5). The gasoline margin began December 1 at \$1.00 before a constant decrease to \$0.87 by January 2. The diesel margin began December 1 at \$1.11 and saw a slow fall to \$1.07 on December 29, with a \$0.02 increase to \$1.09 on January 2. California retail gasoline prices decreased \$0.07 in December and retail diesel prices increased \$0.05. At the same time, crude oil prices (CA-RAC) increased \$2.80 dollars per barrel, translating to an increase of \$0.06 dollars per gallon. With the price of crude oil inputs rising faster than retail prices of both gasoline and diesel, margins naturally had to fall.

Product margins have followed a typical winter pattern so far, a gentle decline from October through January with an uptick in November. Margins followed a similar pattern in winter 2016-2017 as well, with gasoline margins falling below diesel margins. If this winter pattern holds, then gasoline margins should increase in February as driving season comes back for 2018.

California’s demand for gasoline and diesel typically declines during winter, and retailers find it hard to increase prices in general. The significance on margins is that the recent increase in crude oil prices has squeezed margins throughout December 2017. California has increased imports from foreign countries in the past 15 years, from 29.3 percent in 2001 to 54.3 percent in 2016. This has made product margins more sensitive to the recent price rises in Brent crude prices than in past years.

Crude to Retail Margins	
December 2017 vs 2016 (Percent Change)	
Gasoline	1% higher
Diesel	7% higher
December 2017 Averages	
Gasoline	\$0.95
Diesel	\$1.10
January 2, 2017	
Gasoline	\$0.87
Diesel	\$1.09

Figure 6: California Spot Gasoline to NYMEX Futures Price Spread



Source: U.S. EIA and OPIS

Los Angeles (LA) and San Francisco (SF) gasoline spot market differentials to the New York Mercantile Exchange (NYMEX) futures price increased through the first half of December. Both differentials began the month at $-\$0.06$, with the LA-less-NYMEX differential falling to $-\$0.20$ on December 15 and the SF-less-NYMEX differential falling to $-\$0.10$ on December 18. These values represented 2017 lows for both differentials and were likely a result of strong production and inventory numbers seen in the Energy Commission *Weekly Fuels Watch* information for that week (Figure 8).²

After setting 2017 lows, both differentials spent the second half of December climbing back to price parity with the NYMEX. The LA-less-NYMEX differential increased $\$0.29$ from December 15 to December 29, with most of that increase happening on December 22 with an increase of $\$0.14$. The SF-less-NYMEX differential underwent a less pronounced increase, moving from the December 18 low to $-\$0.01$ at the end of the month (a $\$0.09$ increase). Its largest increase happened on December 22 as well, increasing $\$0.05$. Both increases in the California differentials appear delinked from supply-side fundamentals at first glance, as California production and inventory numbers remained robust throughout December. Yet, gasoline demand typically picks up with holiday travel, and increases in the differentials would reflect those increases.

Gasoline Spot-Futures Spread

December 2017 vs 2016

Los Angeles	1¢ higher
San Francisco	1¢ lower

December 2017 Averages

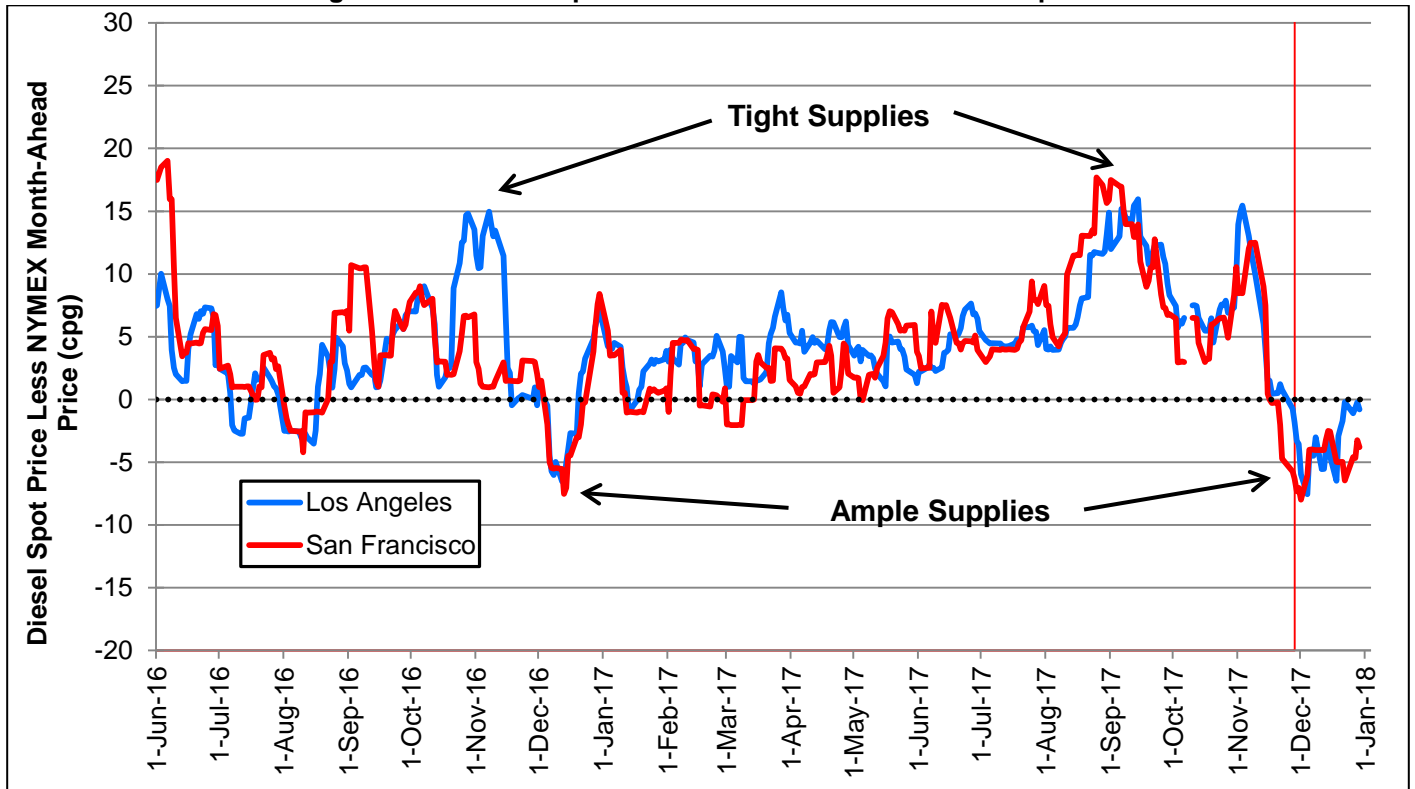
Los Angeles	-6¢
San Francisco	-6¢

December 29, 2017

Los Angeles	9¢
San Francisco	-1¢

² *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 averaged -\$0.03 for December. The LA spot price has been less than the NYMEX futures price, but for two days LA spot prices were equal to NYMEX futures price, making the LA-less-NYMEX diesel differential zero (Figure 7). LA spot prices averaged below the NYMEX throughout December 2017, the last time LA-less-NYMEX averaged a whole month in negative territory was December 2016 at -\$0.01.

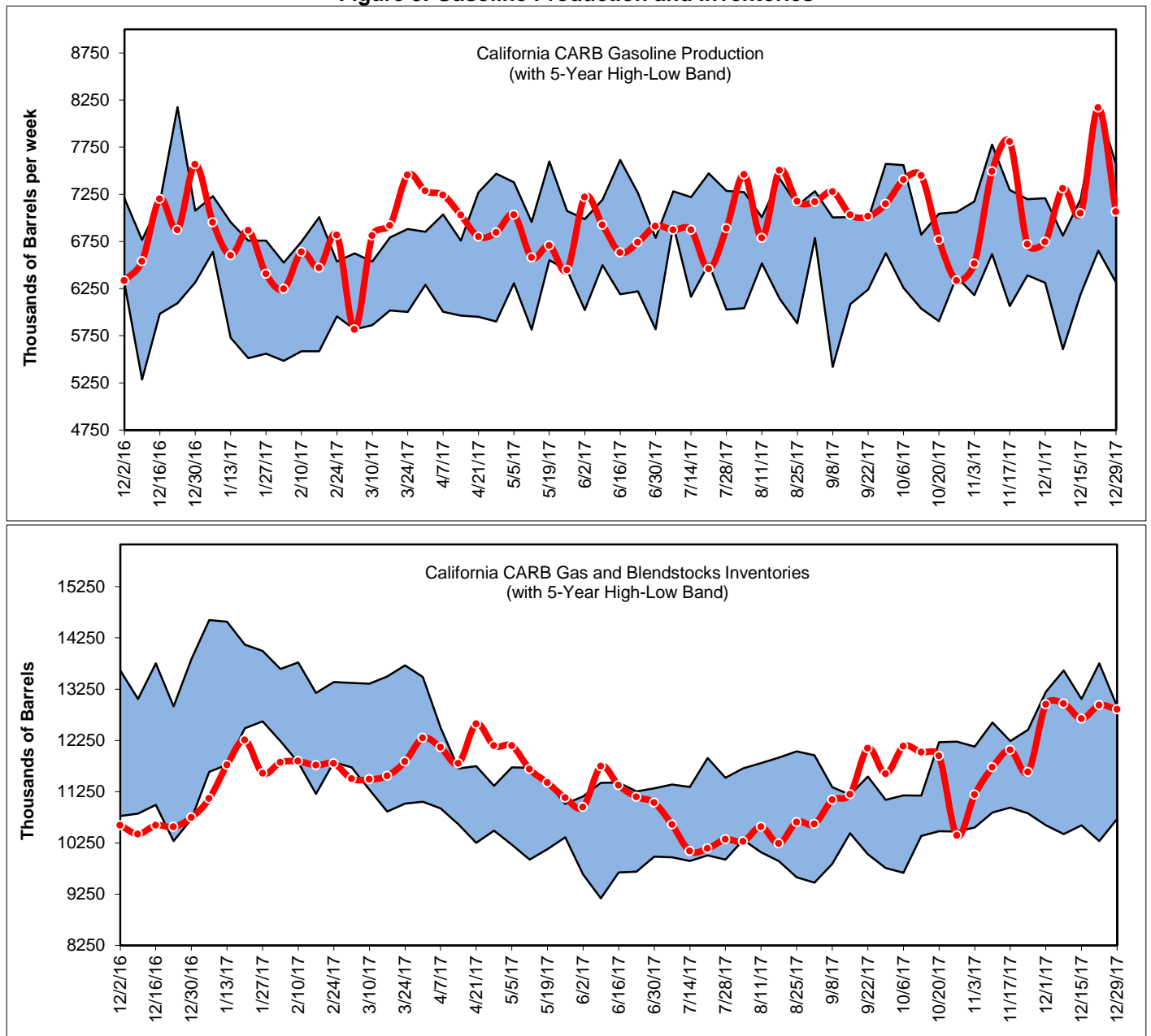
The SF-less-NYMEX diesel differential has been under -\$0.03 since the end November and has averaged -\$0.04 throughout December. The spread started December 1 at -\$0.08 and ended at -0.01 on December 29. California diesel inventories matched the spot market activity during this time. Diesel inventories were recorded at a strong, high level on the five-year band at the beginning of December but decreased to under the band by the end of December (Figure 9).

The New Year might bring increases in diesel prices as tight supplies persist. The 2017 diesel differential had a moment at the beginning of the year where it was under \$0.10 until the third quarter of 2017. But 2018 could follow 2015 and 2016, where the diesel differential increased during December through January. In those past two years, there has been an average of \$0.02 increase for both the LA and SF-less-NYMEX diesel differential.

<u>Diesel Spot-Futures Spread</u>	
<u>December 2017 vs 2016</u>	
Los Angeles	3¢ lower
San Francisco	3¢ lower
<u>December 2017 Averages</u>	
Los Angeles	-3¢
San Francisco	-4¢
<u>December 29, 2017</u>	
Los Angeles	-1¢
San Francisco	-4¢

California Gasoline and Diesel Production and Inventories

Figure 8: Gasoline Production and Inventories

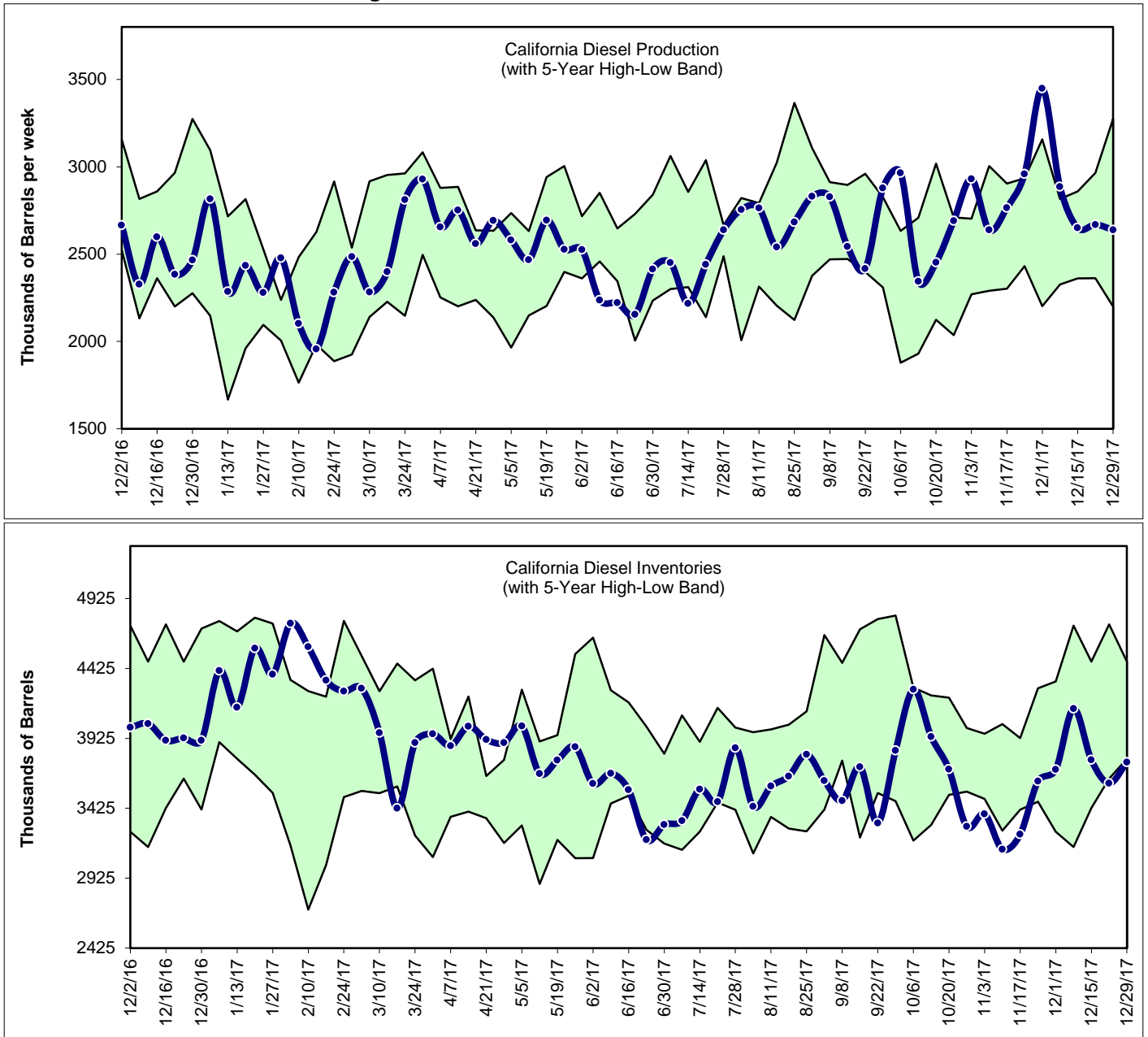


Source: PIIRA data

California gasoline production remained strong for much of December. Weekly production through December 1 was weakest at 6.7 million barrels per week (bpw), but the following weeks saw increased production. Refiners reached a production high of 8.2 million bpw on December 22, the highest level since 2014, before leveling off at 7.0 million bpw on December 29. On average, California produced 7.2 million bpw, which is 365,000 bpw more compared to December 2016.

California gasoline inventories remained stable for much of December. The monthly high was on December 1 at 13.0 million barrels, remaining steady before dipping to 12.7 million barrels on December 15 and return to 12.9 million barrels on December 29. While California lost 100,000 barrels of gasoline between December 1 and December 29, inventory levels are up 2 million barrels compared to this time last year.

Figure 9: Diesel Production and Inventories



Source: PIIRA data

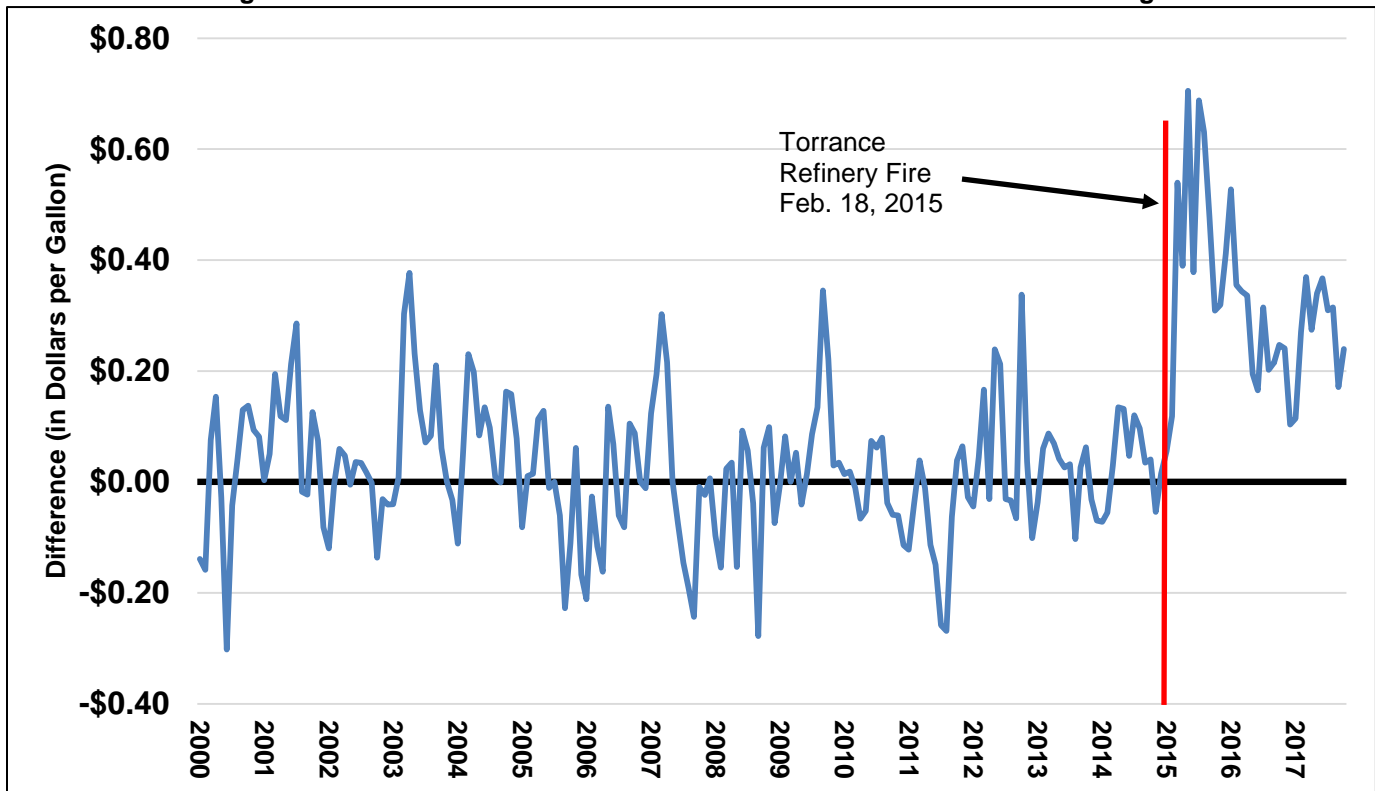
California diesel production started December above the five-year band, before settling to within the band in the following weeks (**Figure 9**). December 1 production was 3.4 million bpw, the highest seen in past five years. On December 8, production would decrease to 2.9 million bpw, before settling down for the next three weeks with production averaging about 2.7 million bpw. Strong production in December helped California maintain a monthly average of 2.9 million bpw, a 15 percent increase compared to December 2016.

Diesel inventories drastically increased in early December before settling below the five-year band. December 1 inventory levels started at 3.7 million barrels, followed by the monthly high of 4.1 million barrels on December 8. Inventory levels would then continue to decrease before slightly rising to 3.8 million barrels on December 29. California inventories averaged 3.8 million barrels in December, and while inventory levels improved, the current levels are short of 2016 levels by 100,000 barrels.

Hot Topic Supplement – California Gasoline Prices Compared to the Rest of the Nation

The September 2017 *Petroleum Market Advisory Committee Final Report* highlighted a changing relationship between the average retail gasoline prices for the United States and California. The authors of the report stated, “The state has seen price differentials 10-70 cents higher than could be explained by these cost factors, averaging 33 cents higher [than national average].” On October 30, 2017, former Petroleum Market Advisory Committee Chair Severin Borenstein would again highlight this difference in a post on the Energy Institute at Haas’s Energy Institute Blog (**Figure 10**).³ Neither the report nor the blog posting attributed this difference to any specific item.

Figure 10: California Retail Gasoline Price Differential to U.S. Price Average



Source: Energy Institute at Haas’s Energy Institute Blog

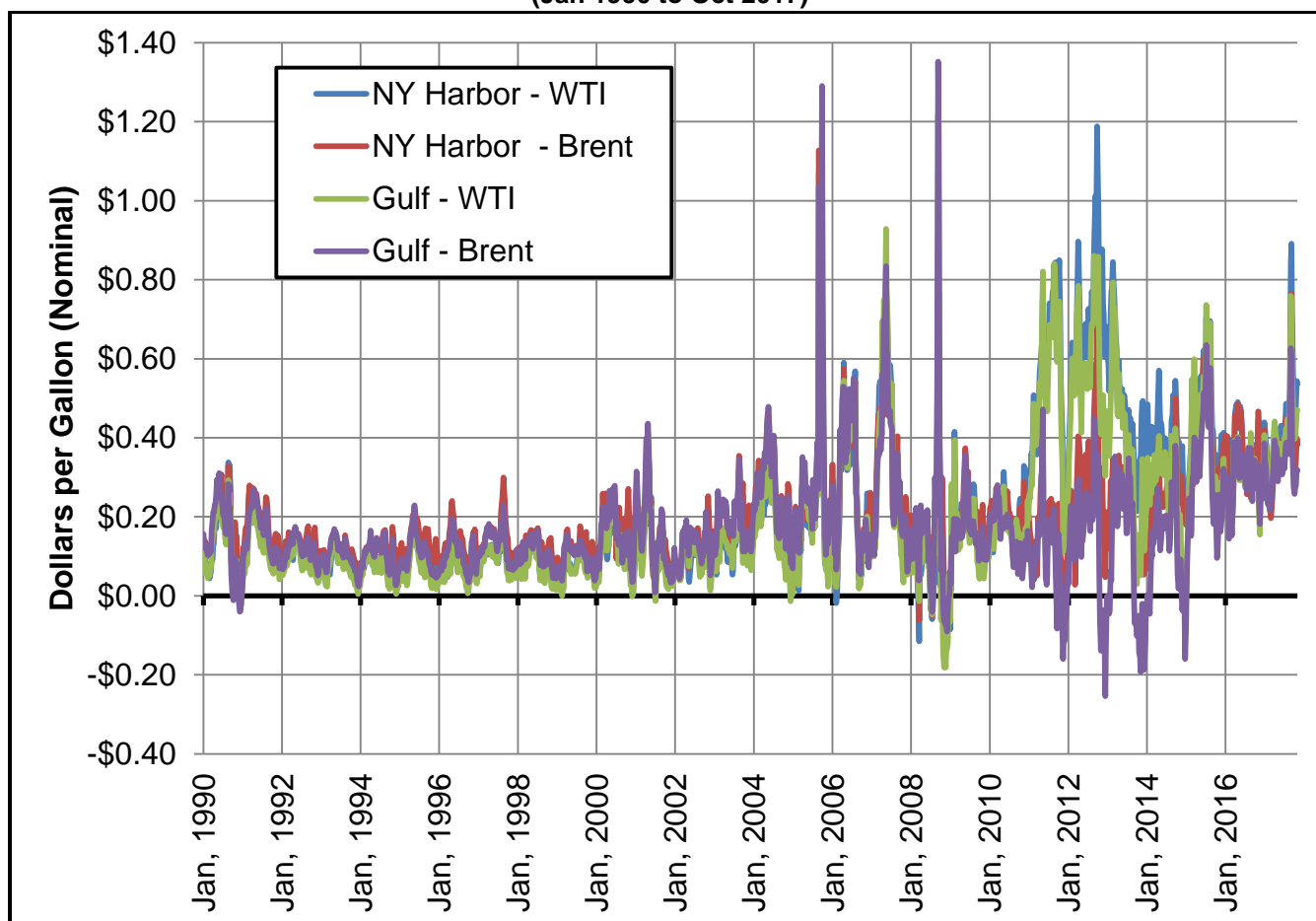
The November and December *Petroleum Watch* issues discussed California gasoline prices relative to brand distinctions and California spot markets for gasoline. In the *Petroleum Watch Hot Topic Supplements*, differently sourced gasoline price data show that California gasoline price relationships are changing with brands separating into two pricing groups and with those same prices widening the differential previously maintained with the California gasoline spot markets. While California’s trends appear to be changing in both cases, neither supplement addresses whether this relationship is California-specific or whether it is part of a national trend.

The Energy Commission does not collect national retail gasoline price information, only California-specific information, meaning national analysis of brand relationships is not possible in this supplement. From the *Petroleum Watch December 2017 Hot Topic Supplement*, analysis showed that California average gasoline retail prices by brands (minus taxes) are diverging from Californian gasoline spot market prices. Knowing that this divergence is occurring, EIA national retail and spot market gasoline price information can be analyzed to see if any divergence between the national retail gasoline price data and related gasoline spot market price data is occurring.

³ <https://energyathaas.wordpress.com/2017/10/30/californias-real-gasoline-tax-problems/>.

Before looking at differences between retail gasoline and spot gasoline prices, it is best to check to see if there is anything fundamentally different about other markets in the United States when compared to California. For starters, the Gulf Coast and East Coast of the United States are far more integrated, in petroleum product terms, than the West Coast. This makes transferring product between those areas substantially easier and provides more competition within those areas. California gasoline specifications are the most stringent in the nation, adding to production costs. These differences in markets have had a price impact on gasoline that can be seen when comparing **Figure 11** below to Figure 11 of the *Petroleum Watch December 2017 Hot Topic Supplement*. For the latter figure, the average gasoline spot minus crude oil price differential was between \$0.40 to \$0.60, whereas the New York (NY) Harbor and Gulf Coast (Gulf) gasoline spot minus crude oil price differential was roughly \$0.20 in 2004 before rising to roughly \$0.40 in 2017. Crude oil prices displayed below include the West Texas Intermediate (WTI) and the European Brent (Brent).

Figure 11: New York Harbor and Gulf Coast Spot Market Gasoline Price Minus Crude Oil Price (Jan 1990 to Oct 2017)

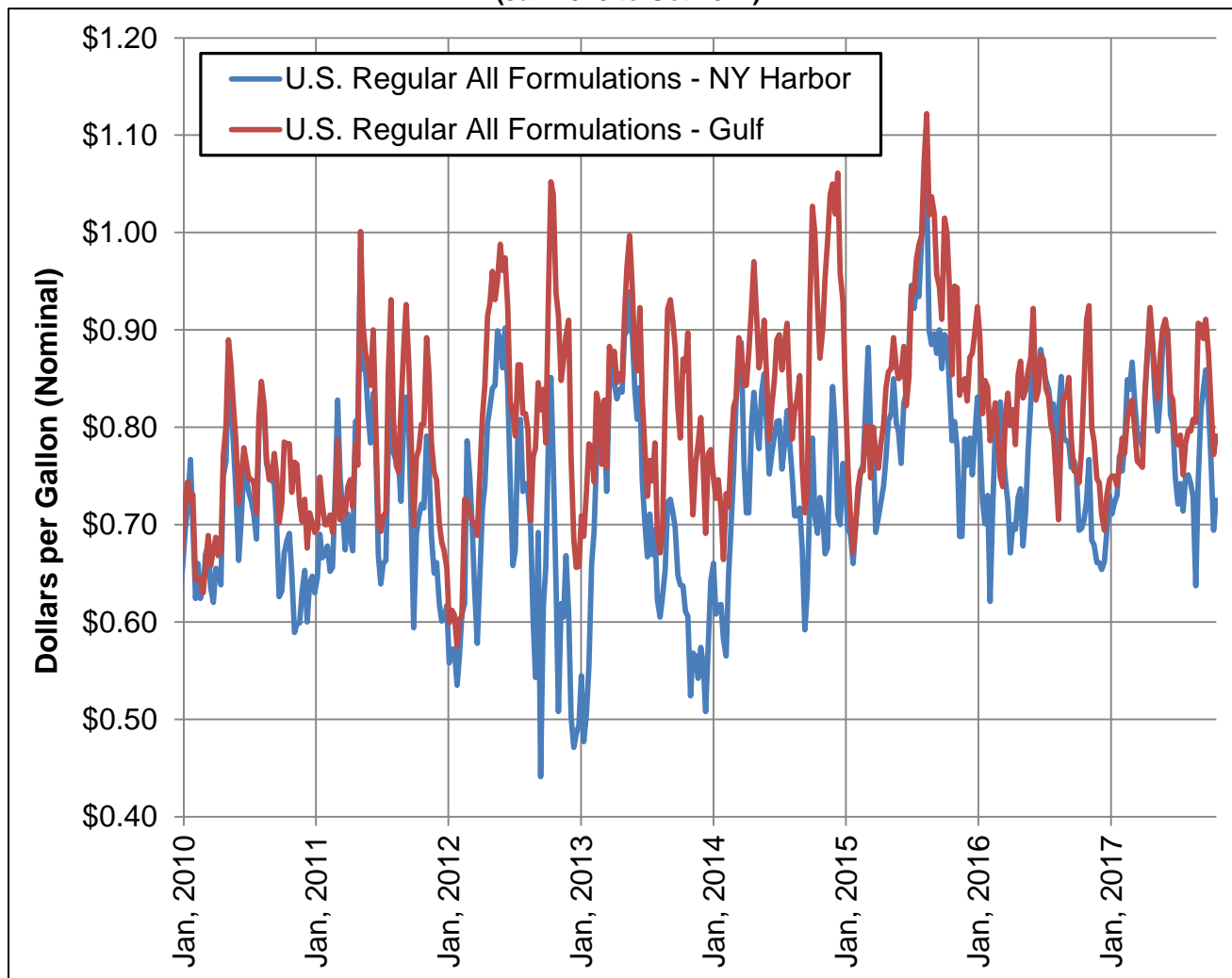


Source: Energy Information Administration

While a rise in the difference between crude oil to NY Harbor and Gulf spot gasoline price differential is a change to note in comparison to the California market, it actually works against explaining the increase in California prices relative to the rest of the nation that was highlighted by the Petroleum Market Advisory Committee. The reason for this is that the rise would increase gasoline costs in those areas relative to the California price, since the California differential appeared relatively steady throughout the time (though volatile in comparison). This means that if Californian retail gasoline prices are increasing relative to the national average, then a correspondingly larger increase in the spot market to retail gasoline price differential for California in comparison to the national average should be seen. When comparing Figure 12 and Figure 13 from the *Petroleum Watch December 2017* to **Figure 12** below, readers will notice that the U.S. average retail regular gasoline price differential to both the NY Harbor and Gulf appears to have increased from roughly \$0.70 in 2010 to an average of \$0.80 in 2017. In the case of the California spot to retail gasoline differential from the *Petroleum Watch December 2017*, that differential has increased from \$0.25 to almost \$0.70 in the

case of “higher priced brands” and from roughly \$0.15 to \$0.30 in the case of “lower priced brands.” (The national averages seen in **Figure 12** include taxes, while the *Petroleum Watch December 2017* figure does not.)

Figure 12: U.S. Average Retail Gasoline Price Minus Spot Market Gasoline Price Differential (Jan 2010 to Oct 2017)

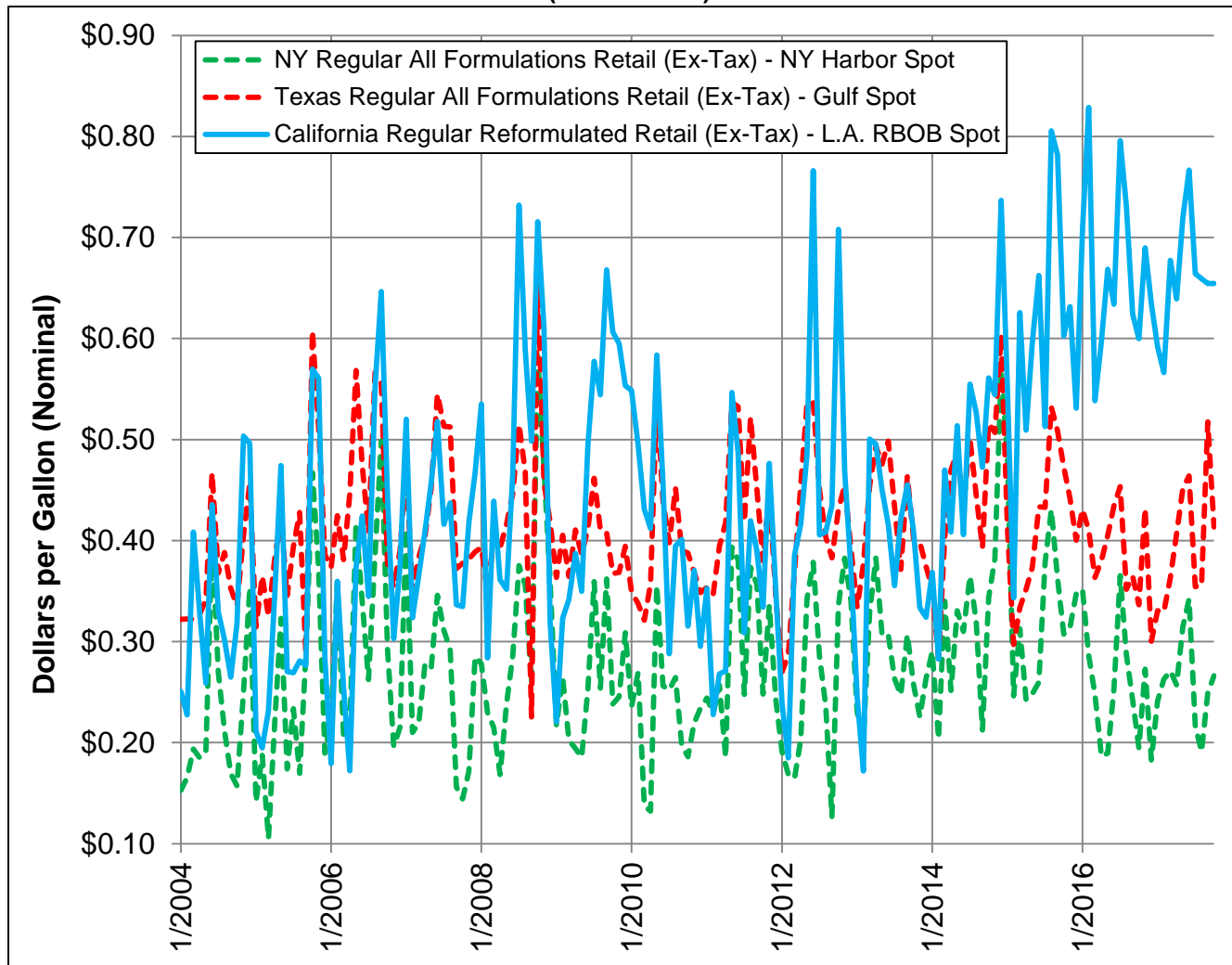


Source: Energy Information Administration

This large rise in the gasoline spot to retail differential can also be seen in **Figure 13**. This figure shows New York (NY), Texas, and California retail gasoline price differentials with their respective local spot markets (with taxes removed).⁴ In **Figure 13**, all differentials displayed appear to be closely grouped together from 2004 to 2014, with the California differential seemingly right in line with the Texas differential. Yet, from 2015 on, the California differential has steadily increased to roughly \$0.65, while the Texas differential has remained at \$0.40.

⁴ California differentials include removal of estimates for the cost of compliance with Low Carbon Fuel Standards and AB 32 Cap-and-Trade programs.

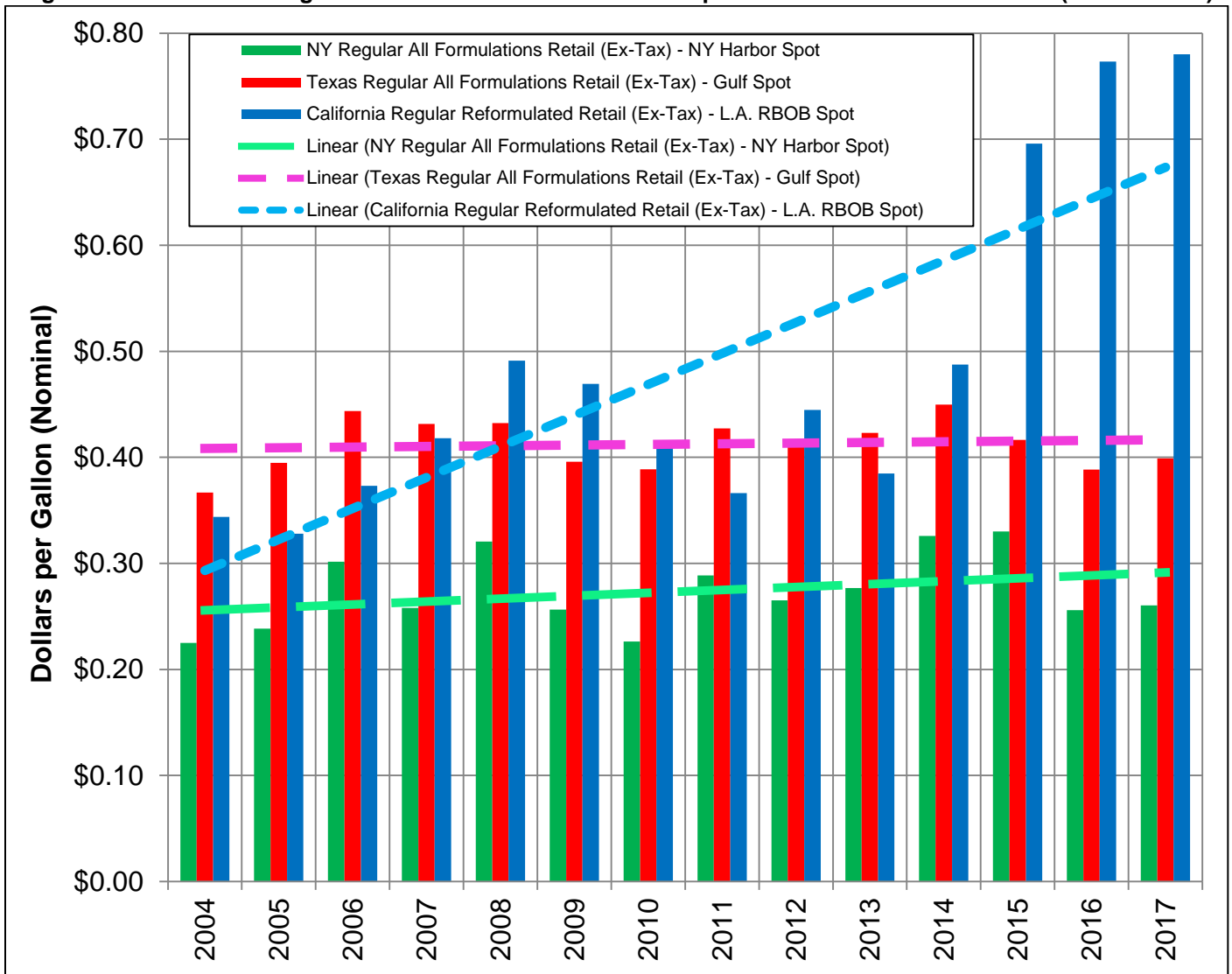
Figure 13: U.S. States Retail Gasoline Price Minus Spot Market Gasoline Differentials (2004 to 2017)



Source: Energy Information Administration

Figure 14 takes the same weekly differential data seen in **Figure 13** and annualizes that information. Linear trend lines are then added to the annual averages (dashed lines). On an annual basis, the gasoline spot-to-retail (ex-tax) differential has been stable for both the NY differential and Texas differential. The California differential, on the other hand, has been increasing, as denoted by the blue dotted line. This upward trend is a result of the large increase in that differential that occurred in 2015 and has been sustained since. Prior to 2015, the annual California spot-to-retail (ex-tax) differential had never increased above \$0.50. From 2015 on, the annual California spot to retail (ex-tax) differential has averaged roughly \$0.70 and above.

Figure 14: Annualized Regional Retail Gasoline Price Minus Spot Market Gasoline Differential (2004 to 2017)



Source: Energy Information Administration

In conclusion, increased differences in California retail gasoline prices compared to the national average that the Petroleum Market Advisory Committee highlighted seem to have been caused by some change in the market relationship between refinery operations and retail operations, as the differential that has increased in relation to the rest of the nation has been the spot market to retail differential. These changes are most noticeable from 2015 onward. Based on analysis presented in the November and December editions of *Petroleum Watch*, the average retail price in California is increasing by a growing separation in pricing that is occurring among different retail brands (*Petroleum Watch November 2017*) and the general increase relative to California’s average spot market price (*Petroleum Watch December 2017*). Differences between spot market gasoline prices and retail prices (ex-tax) for the rest of the nation are not apparent.