



# PETROLEUM WATCH

## California Energy Commission

### November 2017

## Recent Petroleum News and Outside Analyses

### Prices

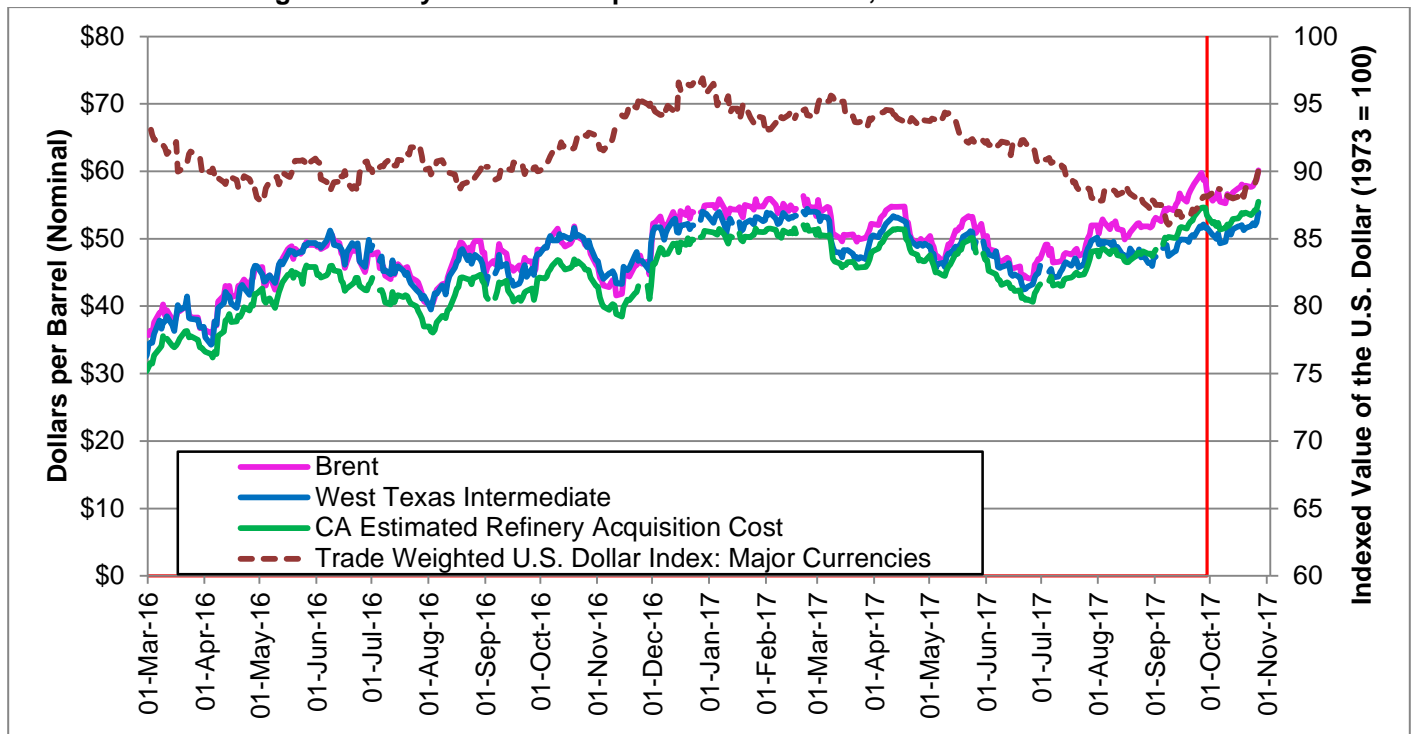
- **Crude Oil Prices:** Brent and West Texas Intermediate crude prices closed at \$60.65 and \$54.11, respectively, on October 30 (**page 2**).
- **California Retail Gasoline Prices:** On the week of October 30, prices dropped to \$3.07, a decrease of \$0.08 since the end of September. Through October, California prices averaged \$0.58 higher than the national average (**page 4**).
- **California Retail Diesel Prices:** On the week of October 30, prices reached \$3.19, an increase of \$0.01 from the end of September. Through October, California prices averaged \$0.38 higher than the national average (**page 5**).

### Refining News

- **Chevron El Segundo Refinery:** On October 5, planned maintenance began on multiple units, including a main atmospheric distillation unit, reformer, hydrotreater, and delayed coker units. Unplanned repairs brought an alkylation unit down on October 19 until work was completed October 28.
- **Chevron Richmond Refinery:** On October 15, a power interruption forced a fluid catalytic cracker unit offline and reduced production from an alkylation unit until October 17. Additional unplanned maintenance began on a reformer unit from October 30 to November 4.
- **PBF Torrance Refinery:** On October 27, a small fire broke out from leaks on a hydrogen line connection to a hydrotreater unit at the refinery. Workers put out the fire and completed damage assessments by October 28.
- **Phillips 66 Wilmington Refinery:** On October 3, unplanned maintenance shut down a reformer unit until October 4, and a reformer feed hydrotreater unit until October 15. Planned maintenance required shutdown of a gas oil hydrotreater unit from October 14 until November 4.

# 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 spot prices increased in October and set new highs for 2017 (**Figure 1**). Brent began October at \$55.67, decreased to \$55.29 on October 9, and reached \$60.65 on October 30, the highest price since July 2015. West Texas Intermediate (WTI) started October at \$50.59, decreased to \$49.34 on October 6, and finished at \$54.11 on October 30, the highest WTI price since February 2017. The California Estimated Refiner Acquisition Cost (CA-RAC)<sup>1</sup> rose from \$51.40 on October 6 to \$56.00 on October 30, also reaching the highest level since July 2015.

On October 23, the Saudi Arabian energy minister announced the Saudis' intention to extend Organization of Petroleum Exporting Countries (OPEC) supply cuts beyond March 2018. The cuts are intended to reduce global oil stockpiles and raise prices. The news caused the Brent price to increase 1.05 percent, or \$0.61, to \$58.45 on October 25. This was the largest one-day increase since September 25, when Kuwait's energy minister made similar comments at another OPEC meeting.

The spread between WTI and Brent crude oil shrank since October's *Petroleum Watch*. The spread averaged \$6.50 in September but shrank to \$5.88 in October. Gulf Coast refineries have an increased their appetite for WTI, due to the recovery from Hurricane Harvey. This expanding demand has tightened the market for WTI.

<u>Crude Oil Prices</u>	
<u>October 2017 vs 2016</u>	
<u>(Percent Change)</u>	
Brent	16% higher
WTI	3% higher
CA-RAC	17% higher
<u>October 2017 Averages</u>	
Brent	\$57.32
WTI	\$51.45
CA-RAC	\$53.18
<u>October 30, 2017</u>	
Brent	\$60.65
WTI	\$54.11
CA-RAC	\$56.00

<sup>1</sup> 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.

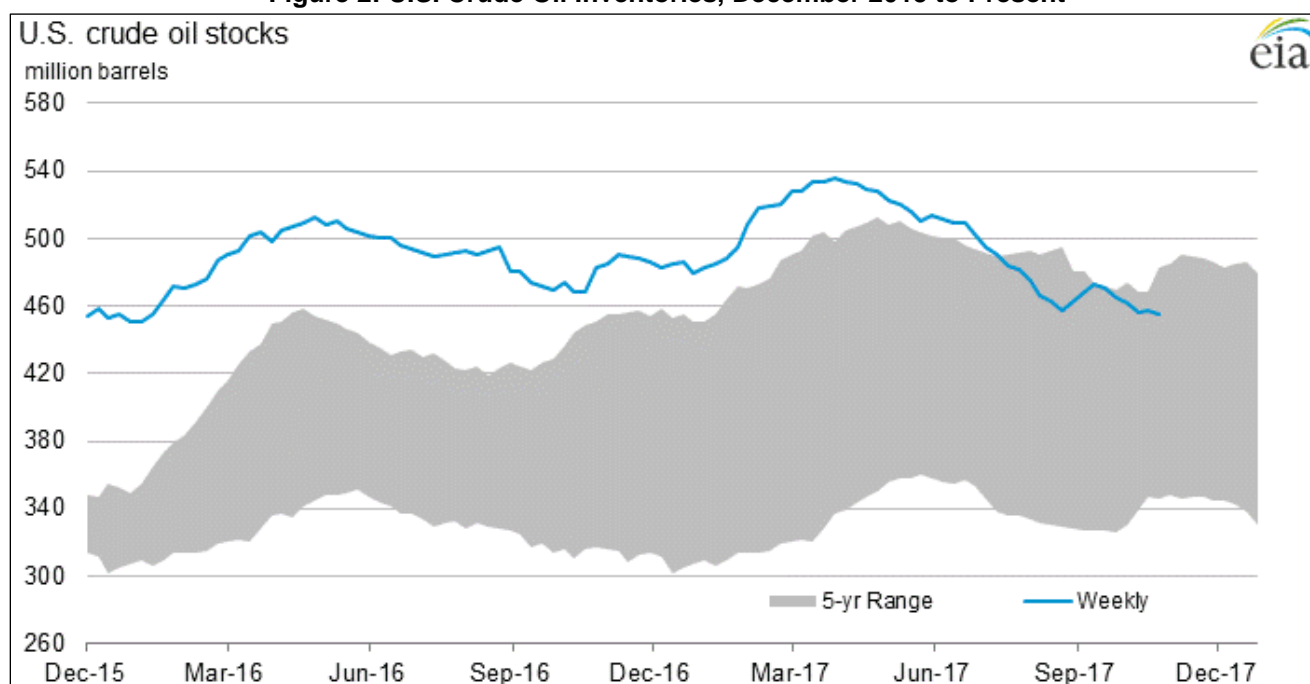
## Crude Oil Production and Storage

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

- U.S. crude oil production for October was estimated at 9.24 million barrel per day (bpd), 260,000 bpd lower than September's monthly average of 9.49 million bpd. This is a 750,000 bpd increase from a year ago, when production levels were 8.49 million bpd.
- Crude oil imports increased 550,000 bpd to 7.7 million bpd in September. When compared to import levels from October 2016, this is an increase of 40,000 bpd.
- U.S. crude oil refinery increased by 530,000 bpd since September's *Petroleum Watch*, finishing October at an average 15.9 million bpd. Refinery inputs are 450,000 bpd higher than year-ago levels.
- Crude oil inventories in the United States decreased by 1.1 million barrels during September to 455 million barrels. Current inventories are 27.7 million barrels lower than one year ago.

Refineries in the U.S. Gulf Coast have recovered most of the refining capacity lost in Hurricanes Harvey and Irma. Gulf Coast weekly refinery utilization improved to 90.4 percent on October 27 in line with historical utilization rates for the season. The year-over-year increases in crude production and imports show how domestic supply is stretching to meet demand. The decrease in crude oil inventories as well as increasing refinery inputs indicates demand growth over 2016.

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



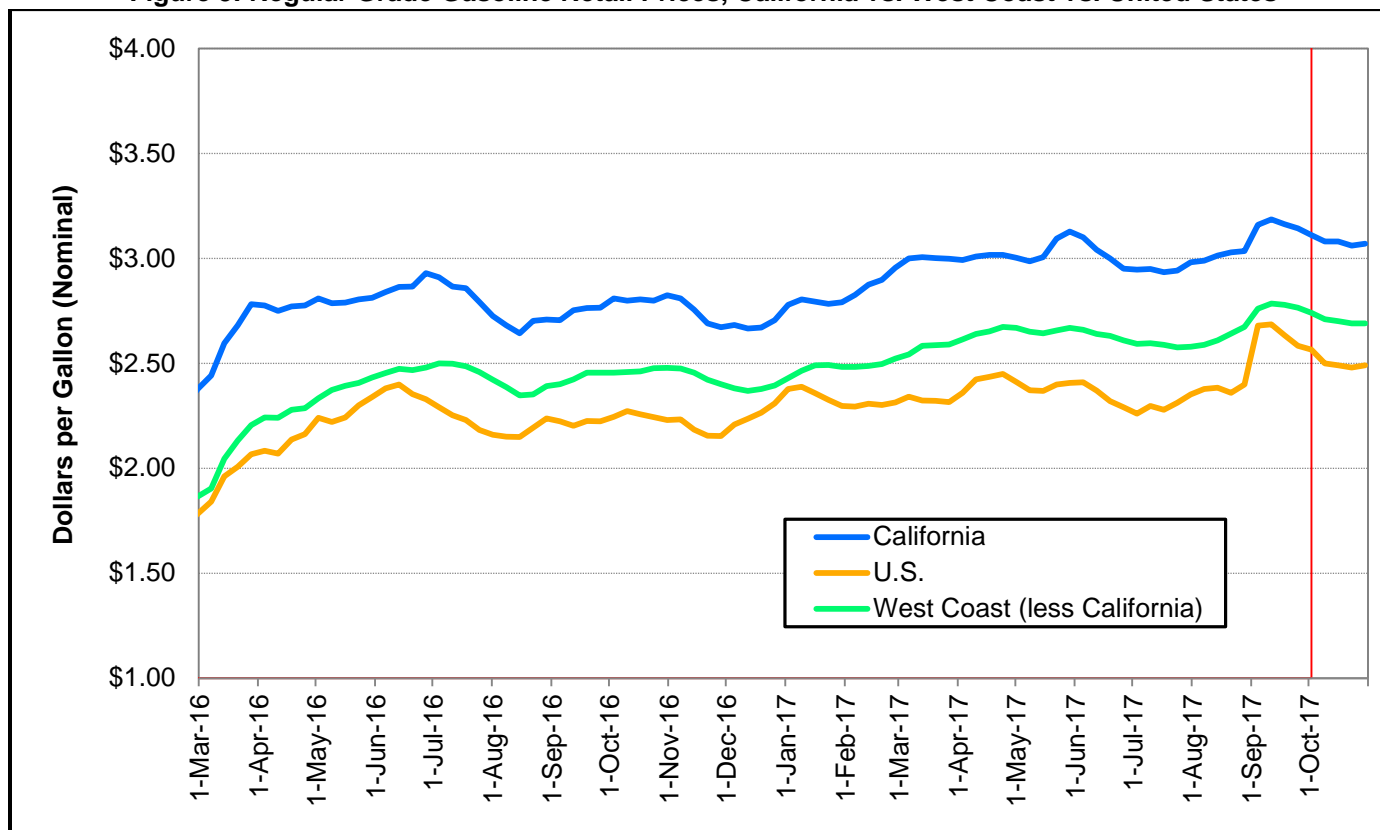
Source: U.S. EIA

- According to the OPEC's October *Monthly Oil Market Report*, total August OPEC production increased by 88,500 bpd to 32.7 million bpd. OPEC's target production set in November 2016 is 32.5 million bpd. OPEC increased its supply-and-demand balance forecast to 0.6 million bpd, 0.1 million bpd higher than the forecast reported in the previous *OPEC Monthly Oil Market Report*.<sup>2</sup>

<sup>2</sup> OPEC October Monthly Oil Monthly Report, page i, page 58: [http://www.opec.org/opec\\_web/static\\_files\\_project/media/downloads/publications/MOMR%20October%202017.pdf](http://www.opec.org/opec_web/static_files_project/media/downloads/publications/MOMR%20October%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

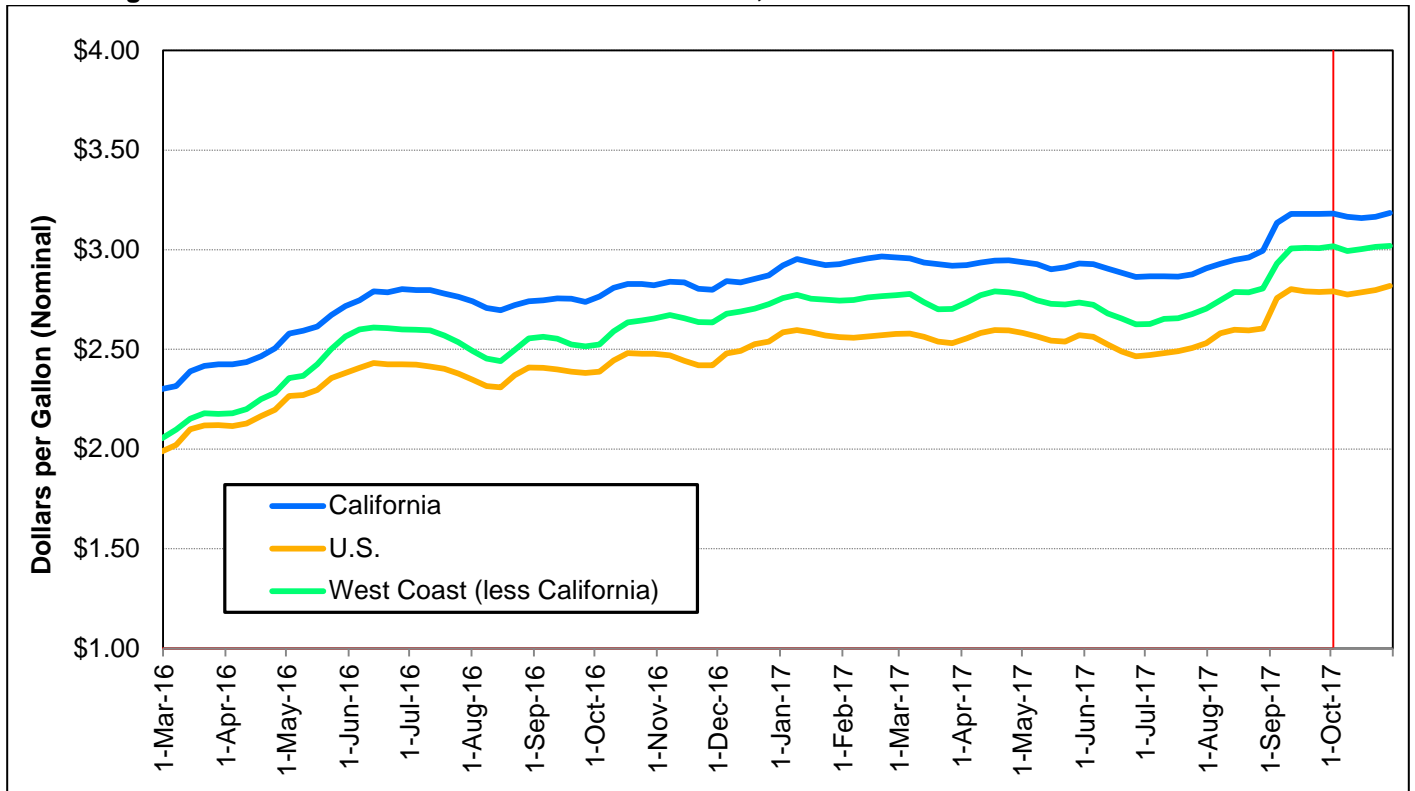
Gasoline retail prices saw a steady decline until October 9 and remained flat through the end of the month (**Figure 3**). Gasoline retail prices saw the largest drop in price for the month on October 9, with California and West Coast (Less CA) dropping \$0.03, and the United States losing \$0.07. Average gasoline retail prices are lower in October than September, with the United States seeing the greatest price drop of \$0.12. The monthly average retail prices in October were \$3.08, \$2.51, and \$2.71 (**sidebar**) which is 10, 11, and 10 percent above year-ago prices, respectively.

Last *Petroleum Watch* examined how Hurricanes Harvey and Irma caused a steep increase in prices even in California. October's retail price data show how temporary these increases can be. Historically, retail prices in October have not increased since 2013. A weakening price can indicate either increasing supply or decreasing demand, all other things being equal. The lower retail prices coupled with declining gasoline production and inventories (**page 9**) makes a case that demand for gasoline is decreasing. This downward trend is expected to continue into the holiday season.

On November 1, the state excise tax increased by \$0.12 per gallon, raising it from \$0.297 to \$0.417 per gallon. This was a one-time adjustment passed by the California State Legislature as Senate Bill 1 (SB 1, Beall, Chapter 5, Statutes of 2017). California's Board of Equalization regularly adjusts the excise tax of gasoline July 1 and will resume doing so in 2018.

<b>Gasoline Prices</b>	
<b>October 2017 vs 2016</b>	
<b>(Percent Change)</b>	
California	10% higher
U.S.	11% higher
West Coast	10% higher
<b>October 2017 Averages</b>	
California	\$3.08
U.S.	\$2.51
West Coast	\$2.71
<b>Week of October 30, 2017</b>	
California	\$3.07
U.S.	\$2.49
West Coast	\$2.69

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



Source: U.S. EIA

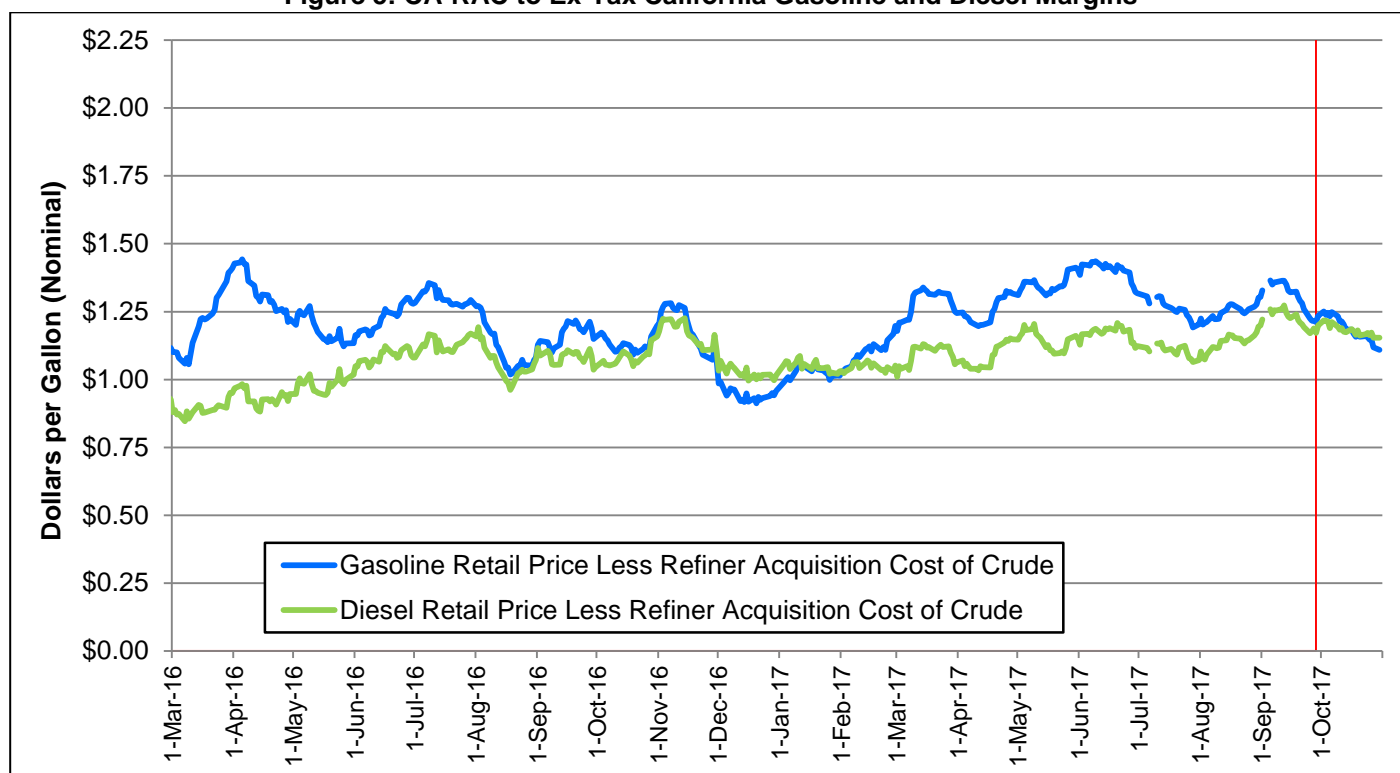
Diesel retail prices increased across the United States by \$0.03 from \$2.79 on October 2 to \$2.82 on October 30 (**Figure 4**). Meanwhile, gasoline prices decreased \$0.08 to \$2.49 during the same period (**Figure 3**). This trend of increasing diesel price and decreasing gasoline price has created a big gap between the costs of U.S. diesel and gasoline price by \$0.33 a gallon. The gap this year averaged \$0.21 a gallon.

The California diesel price had little change during October but was 13 percent or \$0.36 higher when compared to same month last year. Strong diesel prices have set high prices for 2017 for the last three months. These records were \$3.00 in August, \$3.18 in September, and \$3.19 in October. Diesel will continue to see higher prices when California diesel retail sales tax rates increase from 9 percent to 13 percent, and excise tax rates increase \$0.20 a gallon from \$0.16 to \$0.36, starting November 1.

West Coast (less California) diesel prices remained steady at \$3.02, starting October 2 and ending October 30 at the same price. The monthly West Coast diesel price of \$3.01 was the highest average since \$3.01 in June 2015, also the last time the West Coast diesel price was more than \$3.00 a gallon.

<b><u>Diesel Prices</u></b>	
<b><u>October 2017 vs 2016</u></b>	
<b>(Percent Change)</b>	
<b>California</b>	<b>13% higher</b>
<b>U.S.</b>	<b>14% higher</b>
<b>West Coast</b>	<b>15% higher</b>
<b><u>October 2017 Averages</u></b>	
<b>California</b>	<b>\$3.17</b>
<b>U.S.</b>	<b>\$2.78</b>
<b>West Coast</b>	<b>\$2.99</b>
<b><u>Week of October 30, 2017</u></b>	
<b>California</b>	<b>\$3.19</b>
<b>U.S.</b>	<b>\$2.82</b>
<b>West Coast</b>	<b>\$3.02</b>

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



Source: U.S. EIA and OPIS

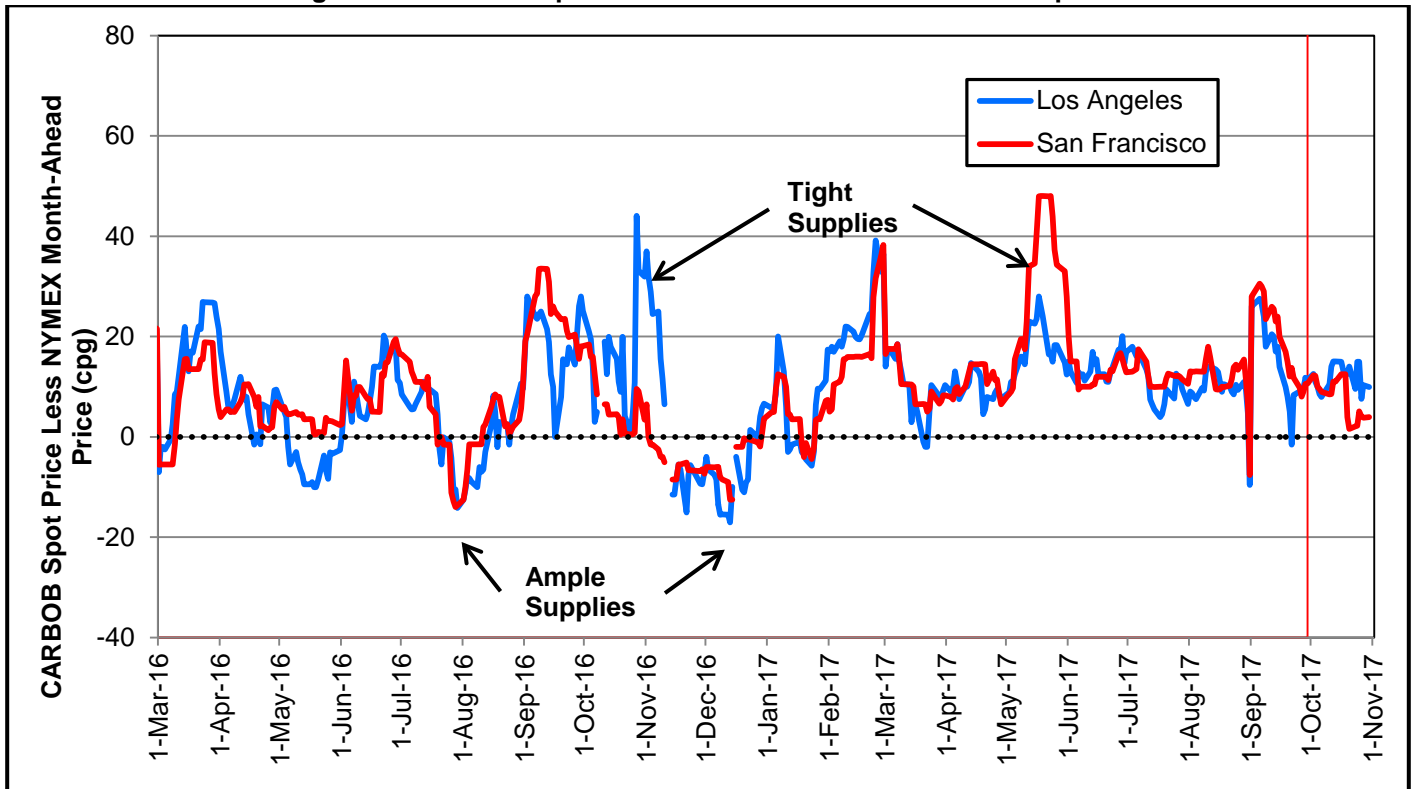
CA-RAC-to-ex-tax retail gasoline and diesel margins fell throughout October (**Figure 5**). The gasoline margin began October at \$1.25 before a steady decline to \$1.11 on October 30. The diesel margin began October at \$1.22 and remained steady until October 11 before slowly falling to \$1.15 on October 30. Retail gasoline prices decreased \$0.06 in October, while retail diesel prices increased \$0.02. Crude oil prices (CA-RAC) increased \$0.08 cents per gallon. The reduction in margins was inevitable with crude input prices outpacing California fuel retail prices.

Gasoline margins are 5 percent higher than October 2016 values, and diesel margins are 9 percent higher. The gap between the two margins appears to have a cyclic pattern, widening in the spring and narrowing midsummer. From January to July 2016, the average difference between the gasoline and diesel margin was \$0.26. The difference narrowed to \$0.16 in July. For 2017, the January-to-July average difference was \$0.14. In both 2016 and 2017, that difference shrank to averages of \$0.08 and \$0.03, respectively.

In the previous *Petroleum Watch*, the shrinking in the difference of margins was attributed to changes in demand for the respective products. Another factor to consider is that diesel demand in California stays predictable through the entire year, as trucking companies and farm equipment suppliers tend to buy ahead of time, when possible. Gasoline demand shows more volatility in seasonal demand patterns because margins are at the whim of broad consumer demand, and this becomes a harder pattern for producers to predict and respond to.

<u>Crude to Retail Margins</u>	
<u>October 2017 vs 2016</u> (Percent Change)	
Gasoline	5% higher
Diesel	9% higher
<u>October 2017 Averages</u>	
Gasoline	\$1.19
Diesel	\$1.18
<u>October 30, 2017</u>	
Gasoline	\$1.19
Diesel	\$1.18

Figure 6: California Spot Gasoline to NYMEX Futures Price Spread



Source: U.S. EIA and OPIS

The Los Angeles (LA) and San Francisco (SF) gasoline spot markets were relatively steady in October compared to September. The LA and SF-less-New York Mercantile Exchange (NYMEX) spot price differentials reduced to pre-hurricane values by September's end, with the seasonal change in gasoline formula being the main factor affecting the spreads later in the month.

The LA-less-NYMEX spot price differential decreased briefly from \$0.13 on October 2 to \$0.08 on October 6 (Figure 6). During this time, gasoline production and inventories were at the upper end of average levels within the five-year band (Figure 8). Southern California production decreased the following weeks due to unplanned and planned refinery shutdowns (page 1), leading to inventory declines. The approaching market deadline to trade summer-blend gasoline and the limited available gasoline stocks led to some refiner buying, which, in turn, helped the LA spot price differential rise and remain above the SF spot price. As a result, the LA spread widened to \$0.14 by October 11 but remained static thereafter. On October 26 the LA spot price fell to \$0.08, as it often happens after the switch to winter specification gasoline, but went up again due to production concerns from a refinery event on October 27.

The SF gasoline spot price differential followed a pattern similar to the LA component until it narrowed from \$0.13 on October 18 to \$0.04 on October 19, the day when the switch to winter-blend gasoline occurred. Unlike LA, the SF gasoline spot price differential remained low the rest of the month.

### Gasoline Spot-Futures Spread

#### October 2017 vs 2016

Los Angeles	4¢ lower
San Francisco	1¢ higher

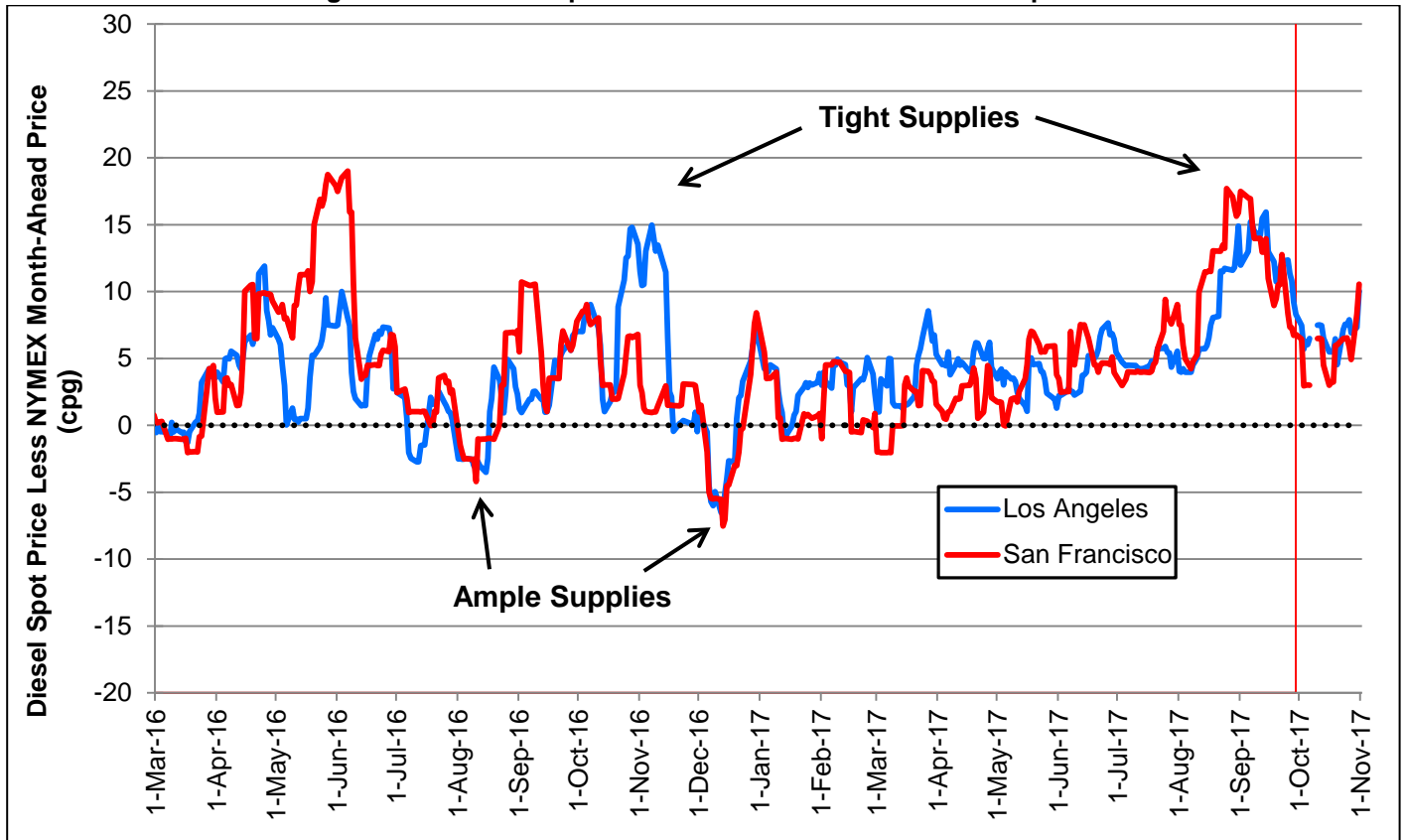
#### October 2017 Averages

Los Angeles	12¢
San Francisco	8¢

#### October 31, 2017

Los Angeles	13¢
San Francisco	5¢

Figure 7: California Spot Diesel to NYMEX Futures Price Spread



Source: U.S. EIA and OPIS

The SF-less-NYMEX diesel differential was relatively quiet throughout October. SF-less-NYMEX fluctuated between \$0.03 and \$0.07 until Halloween, when the differential increased to \$0.11. For October, the average SF diesel differential fell 54 percent from \$0.12 in September to \$0.05 to match the monthly average of October 2016. Like October 2016, the diesel differential was low through the middle of October 2017 before sharply increasing on October 30-31 (**Figure 7**).

The September average of \$0.13 was the highest LA-less-NYMEX diesel spread since September 2012 at \$0.16 and has decreased 46 percent to \$0.07 for the October average. The LA-less-NYMEX diesel differential spread stayed under \$0.10 through the first 30 days but gained \$0.03 on October 31 to \$0.10.

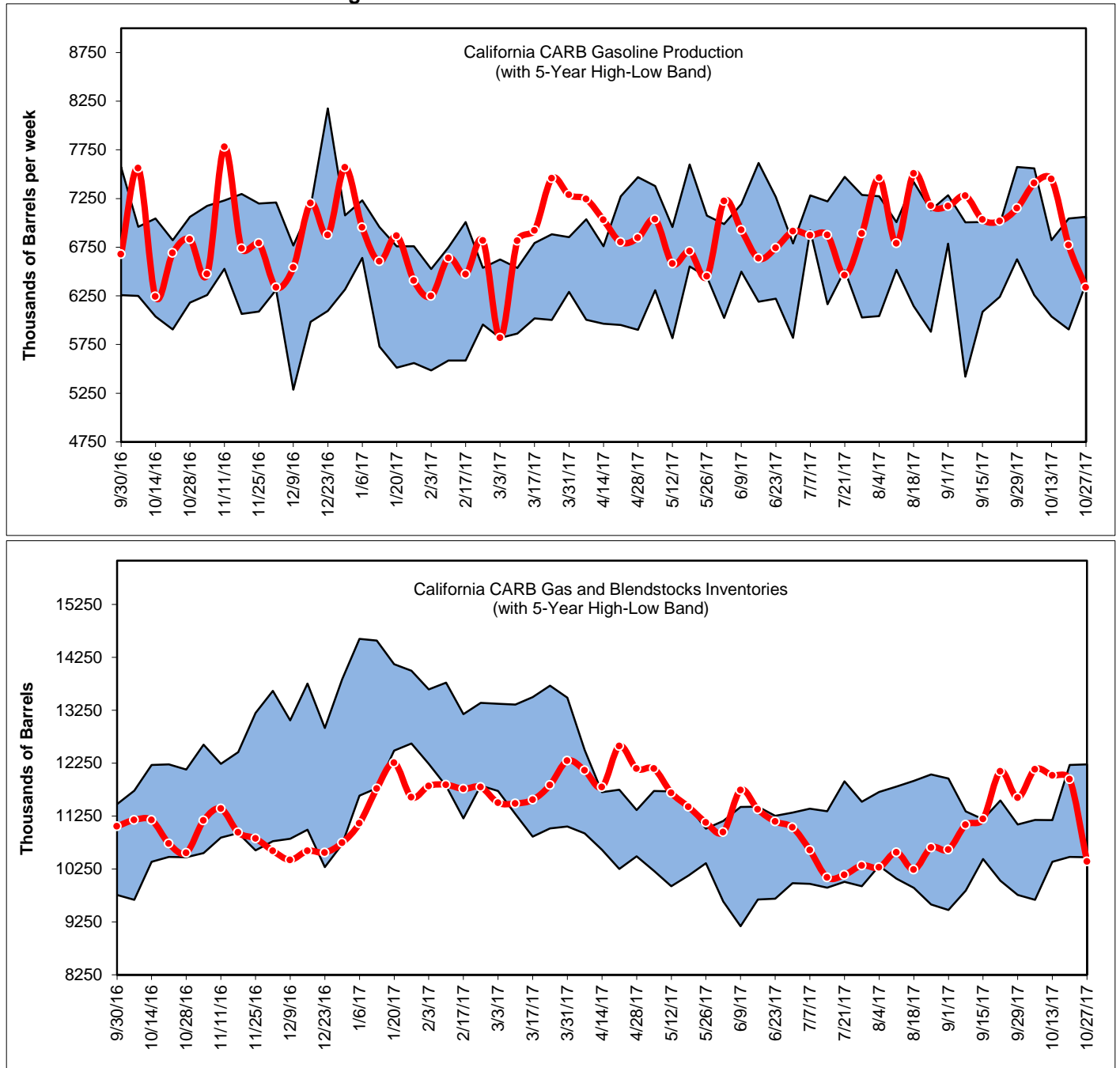
SF and LA diesel differentials increased \$0.08 and \$0.03 during October 2017, respectively. At the same time, diesel inventories were down 0.8 million of barrels statewide in the last three weeks (**Figure 9**). The decrease in diesel supplies added strength to higher diesel differential prices during the end of October.

<u>Diesel Spot-Futures Spread</u>	
<u>October 2017 vs 2016</u>	
Los Angeles	1¢ lower
San Francisco	0¢ even
<u>October 2017 Averages</u>	
Los Angeles	7¢
San Francisco	5¢
<u>October 31, 2017</u>	
Los Angeles	10¢
San Francisco	10¢



# California Gasoline and Diesel Production and Inventories

Figure 8: Gasoline Production and Inventories

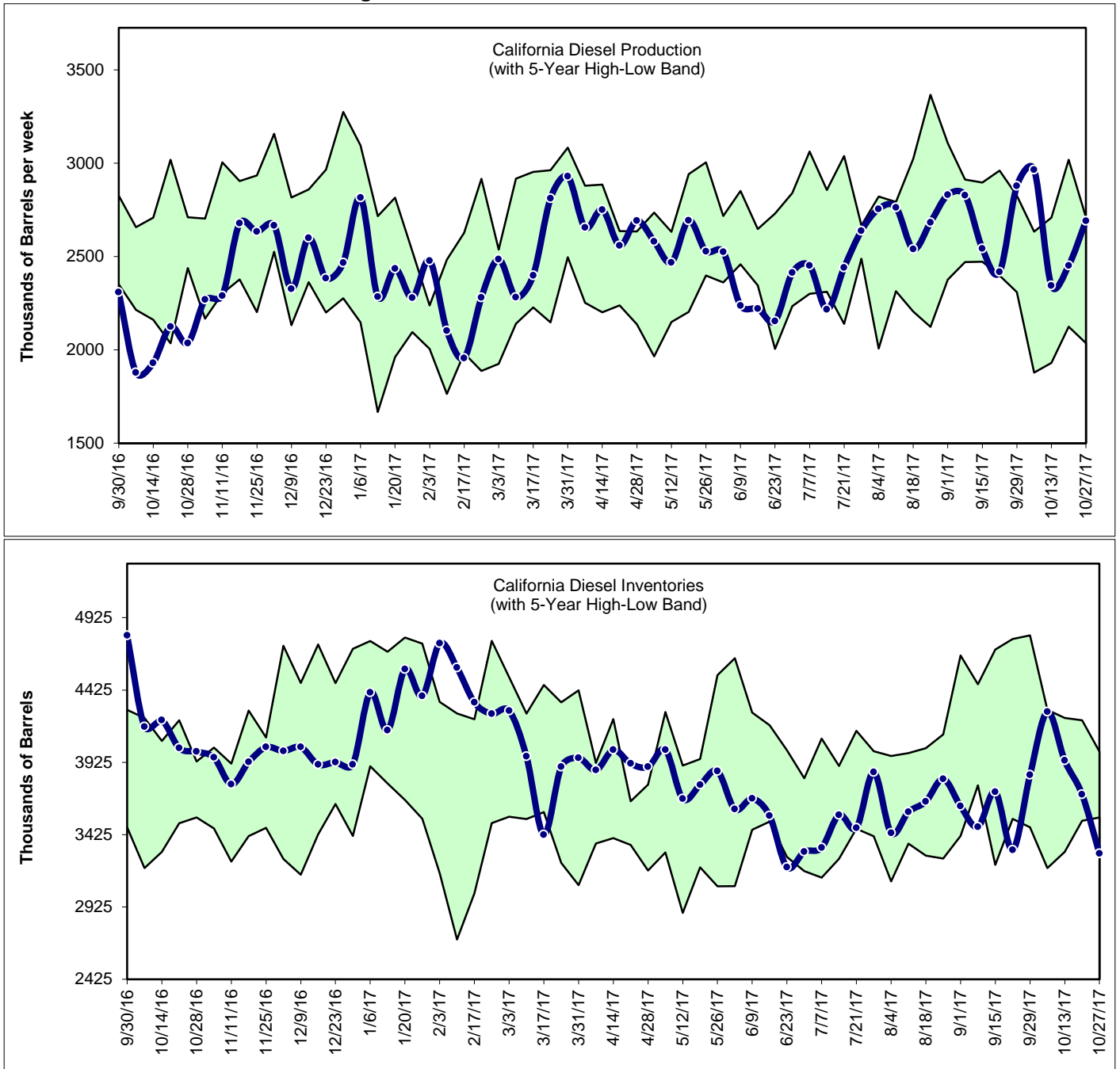


Source: PIIRA data

California gasoline production started high until October 13, averaging 7.4 million barrels per week (bpw). Production returned back to the five-year band at 6.7 million bpw on October 20 and 6.3 million bpw on October 27. October averaged 6.9 million bpw of gasoline production, which is 160,000 bpw higher than October 2016.

California gasoline and blendstock inventories reached a monthly peak on October 6 with 12.1 million barrels and would hover around the 12-million-barrel mark for the weeks of October 13 and October 20 before plunging to 10.4 million barrels on October 27. While October 27 dropped below the five-year band, it is down only 163,000 barrels from the same time last year.

**Figure 9: Diesel Production and Inventories**



Source: PIIRA data

California diesel production reached a peak of 2.9 million bpw on October 6, the highest production rate since April 30. Diesel production rates dropped back into the five-year band to 2.3 million bpw on October 13 before increasing at an average rate of 173,000 bpw for the rest of the month. California diesel production averaged 621,000 bpw more than the same period last year.

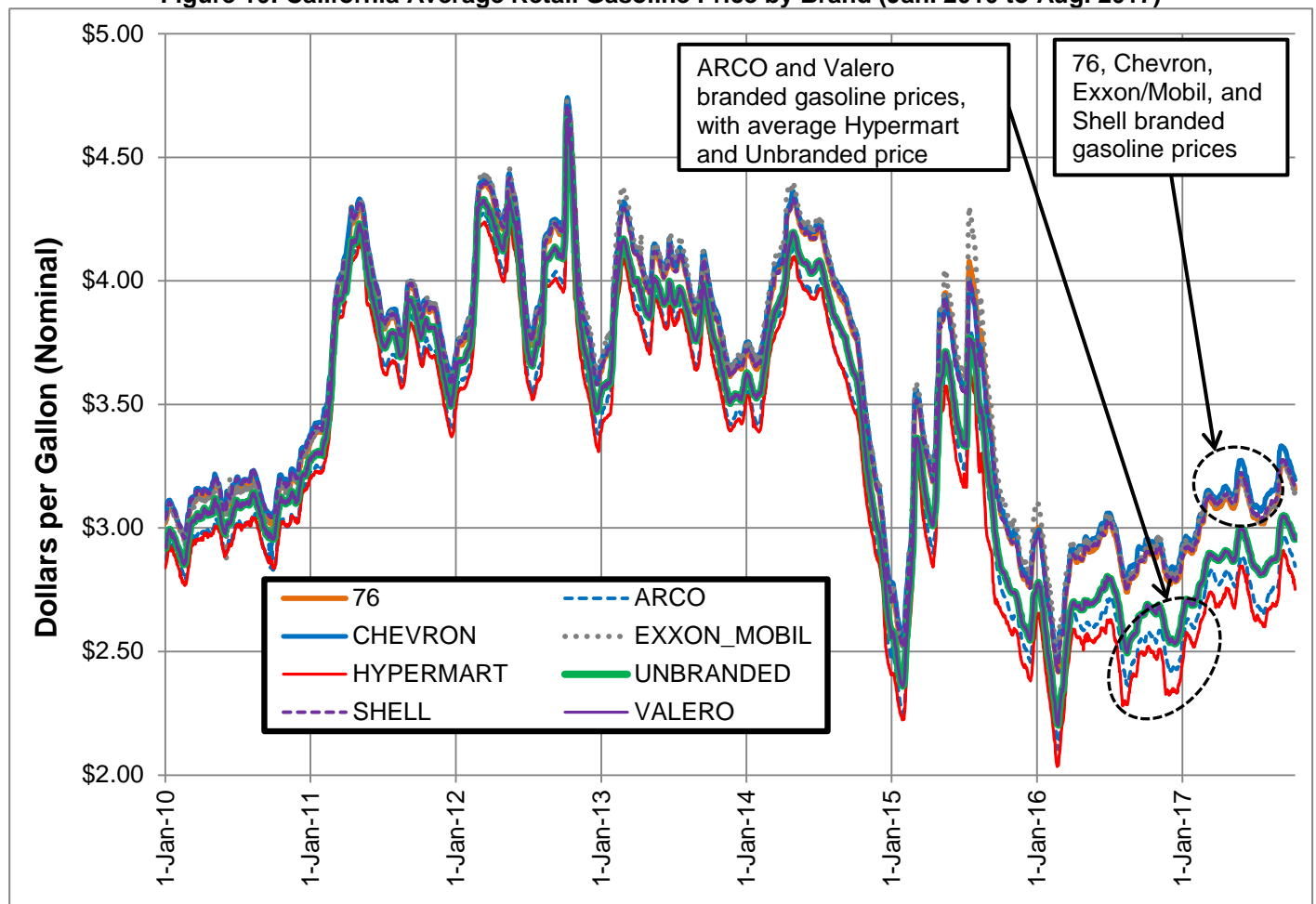
California diesel inventories started the month with 4.2 million barrels on October 6, the highest since March. Inventory levels then decreased at an average rate of 327,000 bpw, ending at 3.3 million barrels on October 21, a low point since September 22.

# Hot Topic Supplement – Brands and California Gasoline Retail Prices

In December 2014, the California Energy Commission created an independent, expert panel to discuss and review California’s petroleum market, the Petroleum Market Advisory Committee (PMAC). Over two years, the PMAC investigated the market response to the Torrance refinery accident that occurred February 18, 2015, and the changes in gasoline pricing that came with it. From this investigation several trends, unrelated to the accident, in the petroleum product market were identified on as requiring further research. One of these trends was the growing difference between one group of higher-priced gasoline retailers versus another group of lower-price gasoline retailers.

Using daily prices of individual retail stations obtained from the Oil Price Information Service (OPIS), from January 2010 to December 2011, average retail prices varied within a range of roughly \$0.20. In 2012, the difference of prices widened to \$0.24 and then later to \$0.25 in 2013. Through 2014 to 2016, the difference continued to grow at roughly \$0.06 a year to \$0.44, more than double the 2011 difference. In 2017, on the far right of **Figure 10**, this separation in brand prices is clearly noticeable, with brands roughly separating into two groups: a high price group of brands (76, Chevron, Exxon/Mobil, and Shell) and a group of lower price retailers (ARCO®, Valero, hypermarts<sup>3</sup>, and all other/unbranded retailers).

**Figure 10: California Average Retail Gasoline Price by Brand (Jan. 2010 to Aug. 2017)**

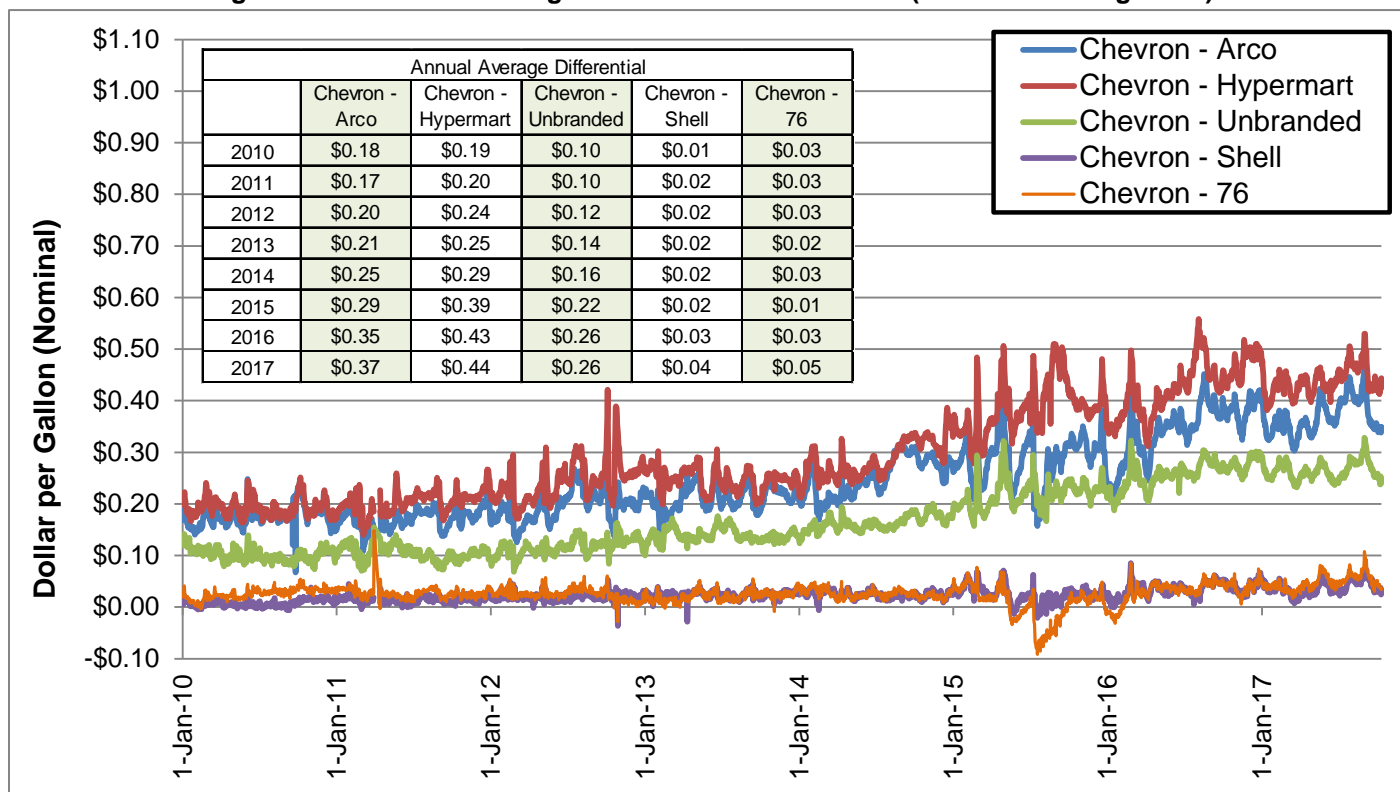


Source: Oil Price Information Service

<sup>3</sup> *Hypermart* is defined in this document as a combination department store and supermarket retailer which sells gasoline to an end user of that product. Examples of Hypermarts in this analysis include (but not limited to) COSTCO, Safeway, Vons, Ralphs, and Sam’s Club.

This growth in the gap between brands is more clearly seen in **Figure 11**, which shows the daily difference between various brands of gasoline compared to Chevron. In this figure, the purple and orange lines (difference between Chevron minus Shell and 76 respectively) remain straight throughout the entire period of the graphic, with annual averages of these differences ranging between \$0.01 and \$0.05. On the other hand, the difference between prices for the Chevron brand and ARCO brand doubled, from an annual average of \$0.18 in 2010 to \$0.037 in 2017. (See table included in **Figure 11**.) This story is roughly similar for both hypermart and unbranded retailers as well. In 2010, hypermart retailers sold gasoline at an average discount to Chevron of \$0.19, and unbranded retailers sold gasoline at a \$0.10 discount. By 2017, that difference has more than doubled to \$0.44 for hypermarts and \$0.26 for unbranded.

**Figure 11: California Average Retail Brand Differentials (Jan. 2010 to Aug. 2017)**



Source: Oil Price Information Service

There are a few factors to consider that preclude any conclusions without additional analysis:

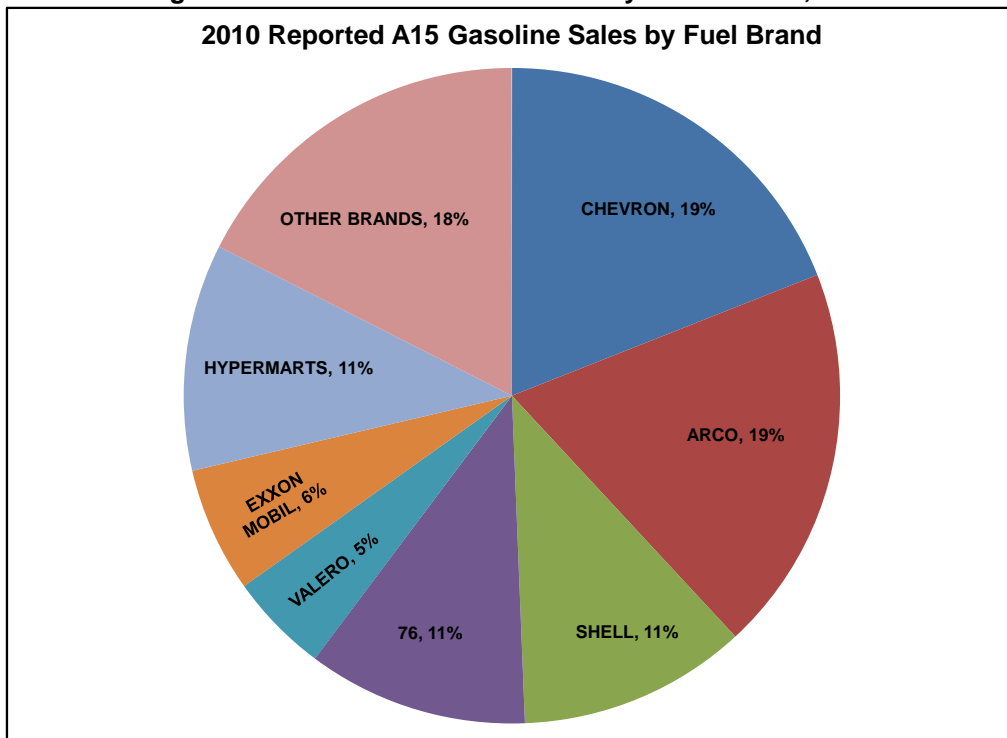
- 1) Different brands have different contract structures (for example: rack purchase vs dealer-tank-wagon, and so forth).
- 2) Stations sometimes imbed credit and debit card charges into the price of gasoline differently (for example, ARCO charges a flat card fee, while other stations will post two prices).
- 3) Many gasoline brands now have their own credit cards that offer discounts on gasoline purchases, which may be hiding the true cost of the fuel.
- 4) Stations and brands may be differentiating themselves on customer experience (for example, shorter lines, cleaner facilities, and so forth).
- 5) Certain brands often have propriety additive packages that are added to the fuel to improve the qualities of that fuel. Chevron famously has Techron,<sup>4</sup> while Shell provides nitrogen-enriched gasoline.<sup>5</sup> That said, all gasoline sold in California is held to a stricter standard than fuels sold meeting the minimum federal requirements.

<sup>4</sup> <http://www.techron.com/>.

<sup>5</sup> <http://www.shell.us/motorist/shell-fuels/shell-nitrogen-enriched-gasolines.html>.

Irrespective of these explanations in the difference among brands in gasoline prices, market share sales of gasoline in California has not changed greatly from 2010 to 2016. Using data collected from the Energy Commission’s annual report of retail fuel outlets (Form CEC-A15), staff grouped reported sales by stations into brand groupings, matching those found in the OPIS information. **Figure 12** shows the percentage of gasoline sales by retail fuel outlet brand for 2010, while **Figure 13** shows those percentages for 2016. In 2010, Chevron branded retail stations represented 19 percent of California’s total retail sales, and that remained unchanged in 2016. This is a similar story for both Shell and 76. Despite 76’s market share decreasing from 11 percent in 2010 to 9 percent in 2016, Shell retailers increased their market share, going from 11 percent in 2010 to 12 percent in 2016. Even though these retailers had roughly doubled their price differential to hypermarts, ARCO, and other brands, the higher-priced brands saw little to no loss in overall share of gasoline sales. When including ExxonMobil, which lost 2 percentage points of market share between the two years, going from 6 percent to 4 percent, high-priced retailers in California lost 3 percentage points of market share while increasing their price differential to ARCO and hypermart brands by roughly \$0.20.

**Figure 12: California Gasoline Sales by Retail Brand, 2010**

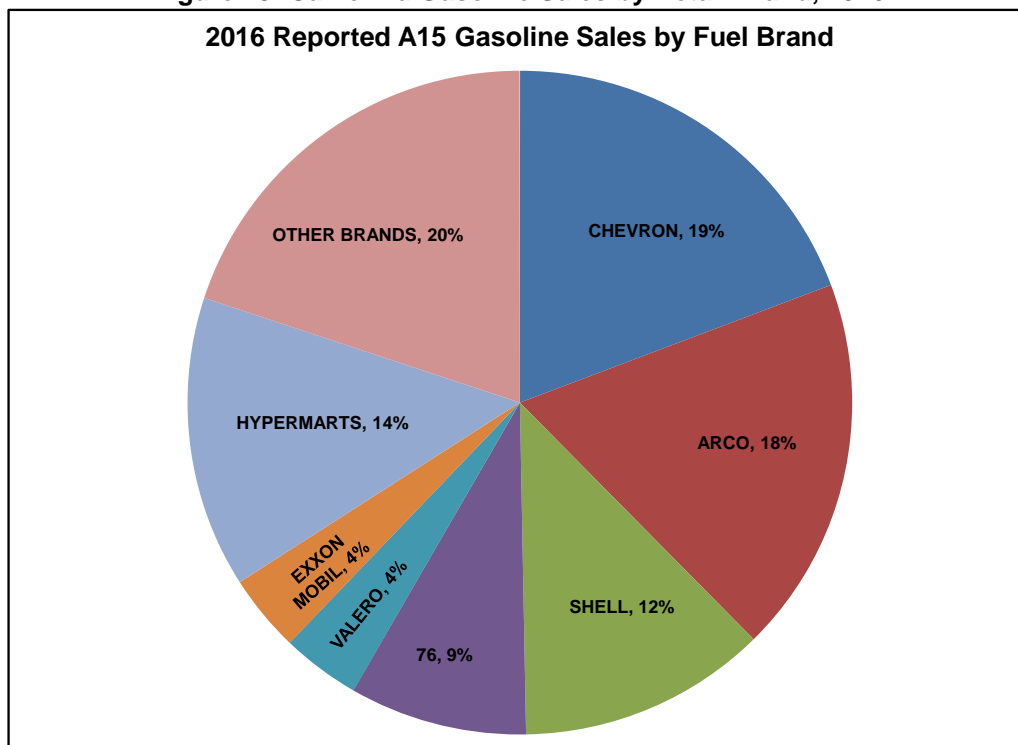


Source: California Energy Commission

Another reason for this divergence could be regional changes in retail gasoline prices that are affecting the statewide average. To examine this possibility, OPIS information was further separated into regions:

- Bay Area (from Salinas in the south, to Santa Rosa in the north, and Fairfield to the east)
- Central Valley (middle of California from Bakersfield in the south to Merced in the North)
- Los Angeles Area (Los Angeles and Orange Counties)
- Sacramento Area (from Stockton in the south to Yuba City in the north)
- San Diego Area (San Diego city only)
- Southern Desert (Riverside, San Bernardino, and Imperial Counties)

Figure 13: California Gasoline Sales by Retail Brand, 2016



Source: California Energy Commission

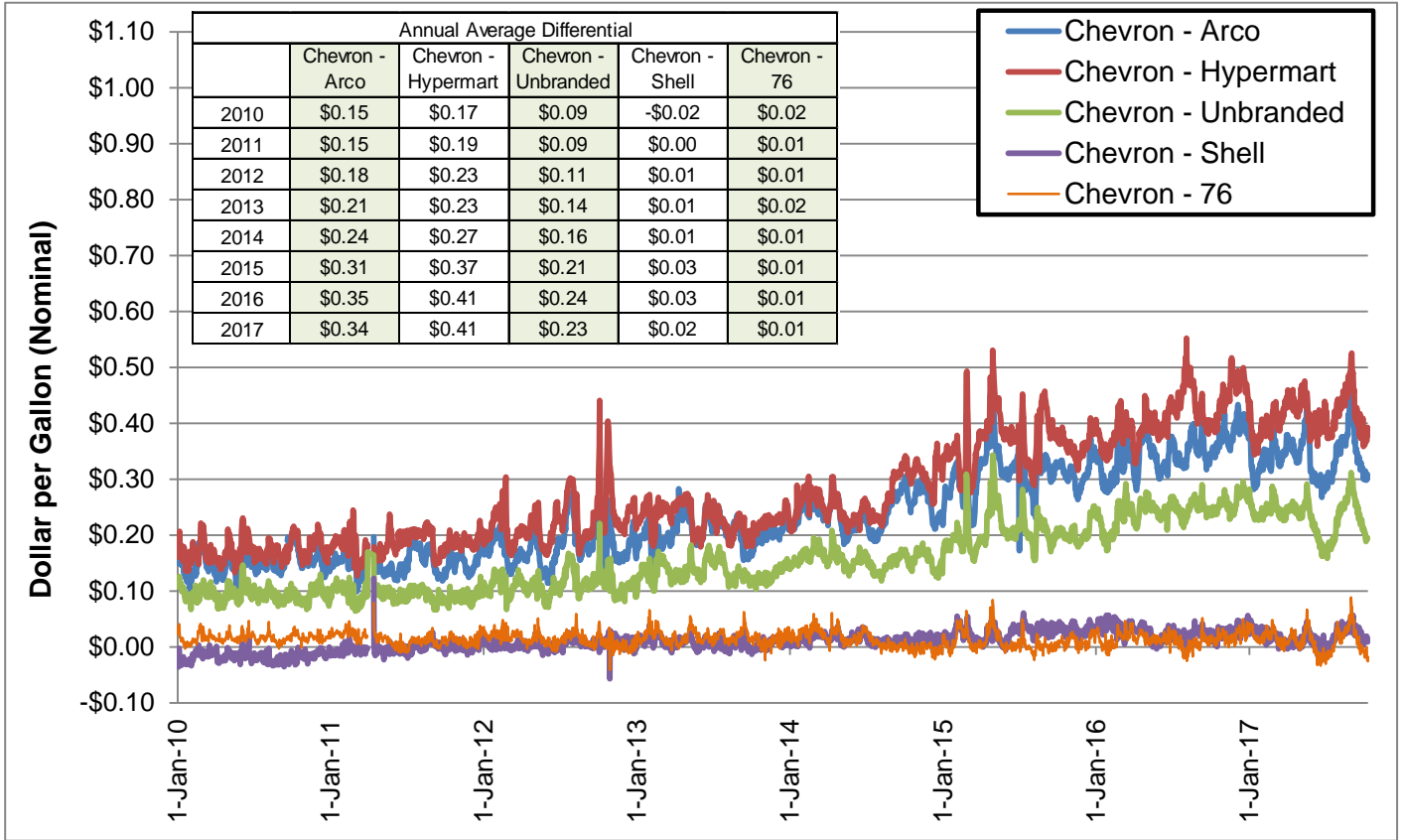
**Figure 14** displays the same differences as **Figure 11**, but here the differences are calculated for only stations in the Bay Area. When compared to the California average, the Bay Area differences were slightly smaller, roughly \$0.03 closer together for ARCO, hypermarkets, and unbranded stations. Yet, like the state average, hypermarkets, unbranded, and ARCO stations gasoline price differences continued to grow, hypermarkets being more than \$0.40 less expensive than Chevron gasoline and ARCO being more than \$0.30 less expensive, on average.

In the Central Valley (**Figure 15**), the growth in the differential has been even more pronounced than the statewide and Bay Area averages. Here the Chevron-to-ARCO differential has increased from \$0.25 to \$0.53 from 2011 to 2017, once again doubling, but also reaching a level almost \$0.20 higher than the California average. The Chevron-to-hypermart differential grew as well during that time, reaching the same \$0.53 in 2017 as the Chevron-to-ARCO differential, while starting in 2011 at a slightly higher level (\$0.27). The sample size of retailers in the Central Valley was roughly half that of the Bay Area, and data composition abnormalities may be skewing these results.

When looking at the Los Angeles Area (**Figure 16**), results of the differential calculations appear to be more in line with the Bay Area results. All Bay Area and Los Angeles Area differential calculations average roughly similar levels in 2010 and rise to similar levels by 2017.

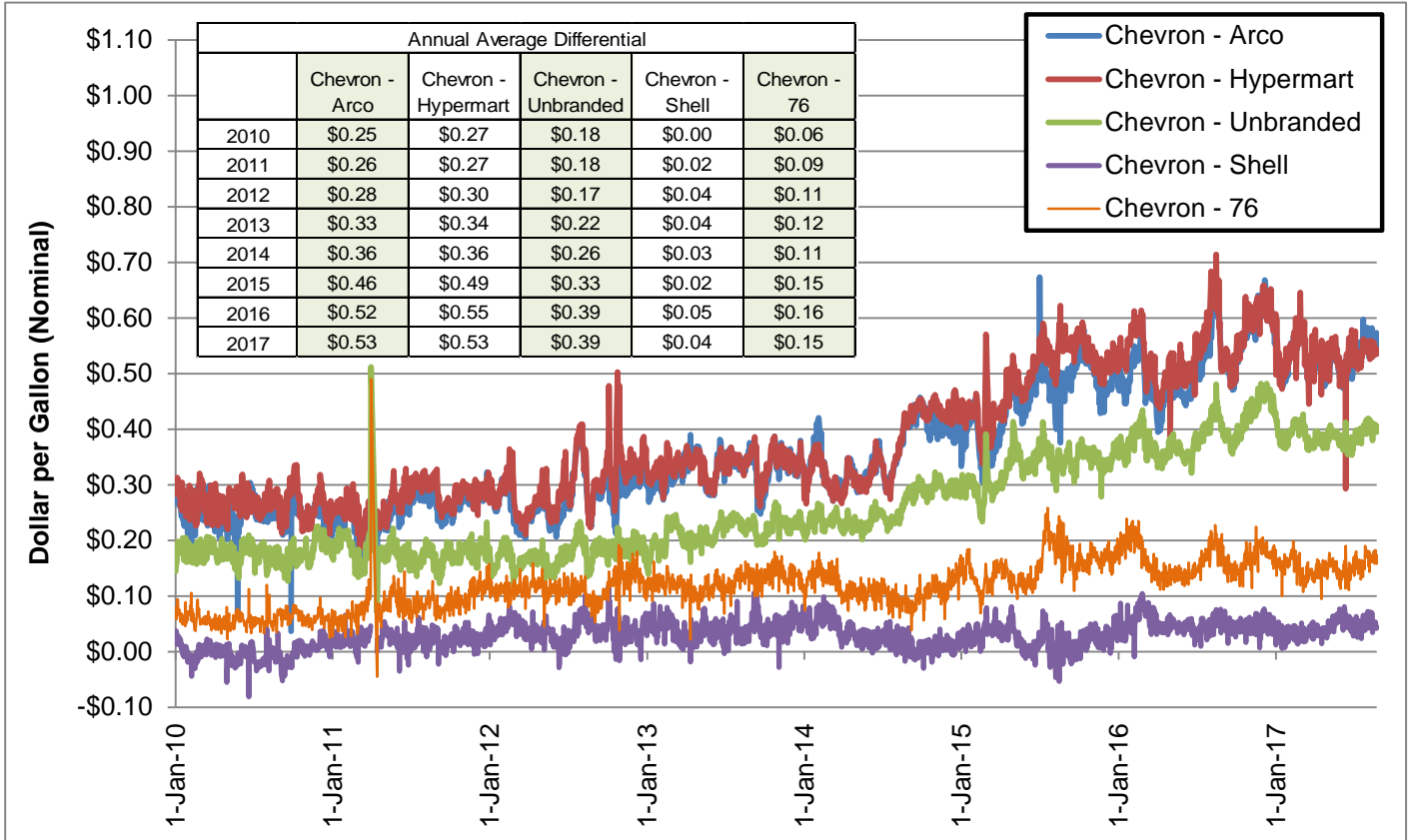
In the Sacramento area, differences between brands show many similarities to the overall California trend (**Figure 17**). Here, ARCO appears to be the average low price leader (as opposed to hypermarkets) with a differential on average \$0.02 less than the hypermart-to-Chevron differential. Also from 2015 on, Chevron versus ARCO and hypermart differentials have varied routinely between \$0.30 and \$0.50, a variation that appears twice that of any other region. Sacramento is also the one area where consistent growth in the differentials between Chevron versus Shell and 76 brands appear to be occurring, growing from roughly \$0.02 to \$0.04 and \$0.03, respectively.

**Figure 14: Bay Area Average Retail Brand Differentials (Jan. 2010 to Aug. 2017)**



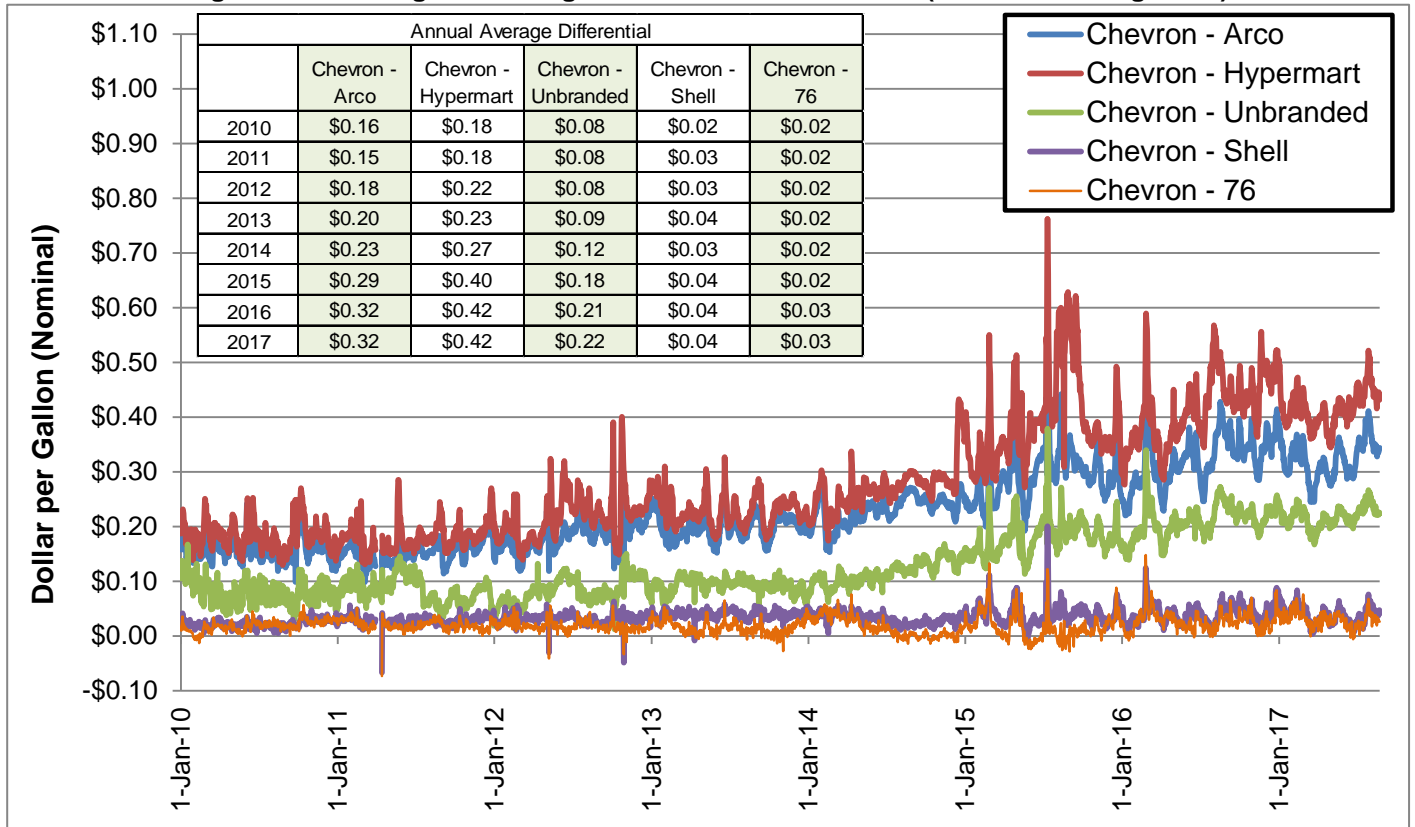
Source: Oil Price Information Service

**Figure 15: Central Valley Average Retail Brand Differentials (Jan. 2010 to Aug. 2017)**



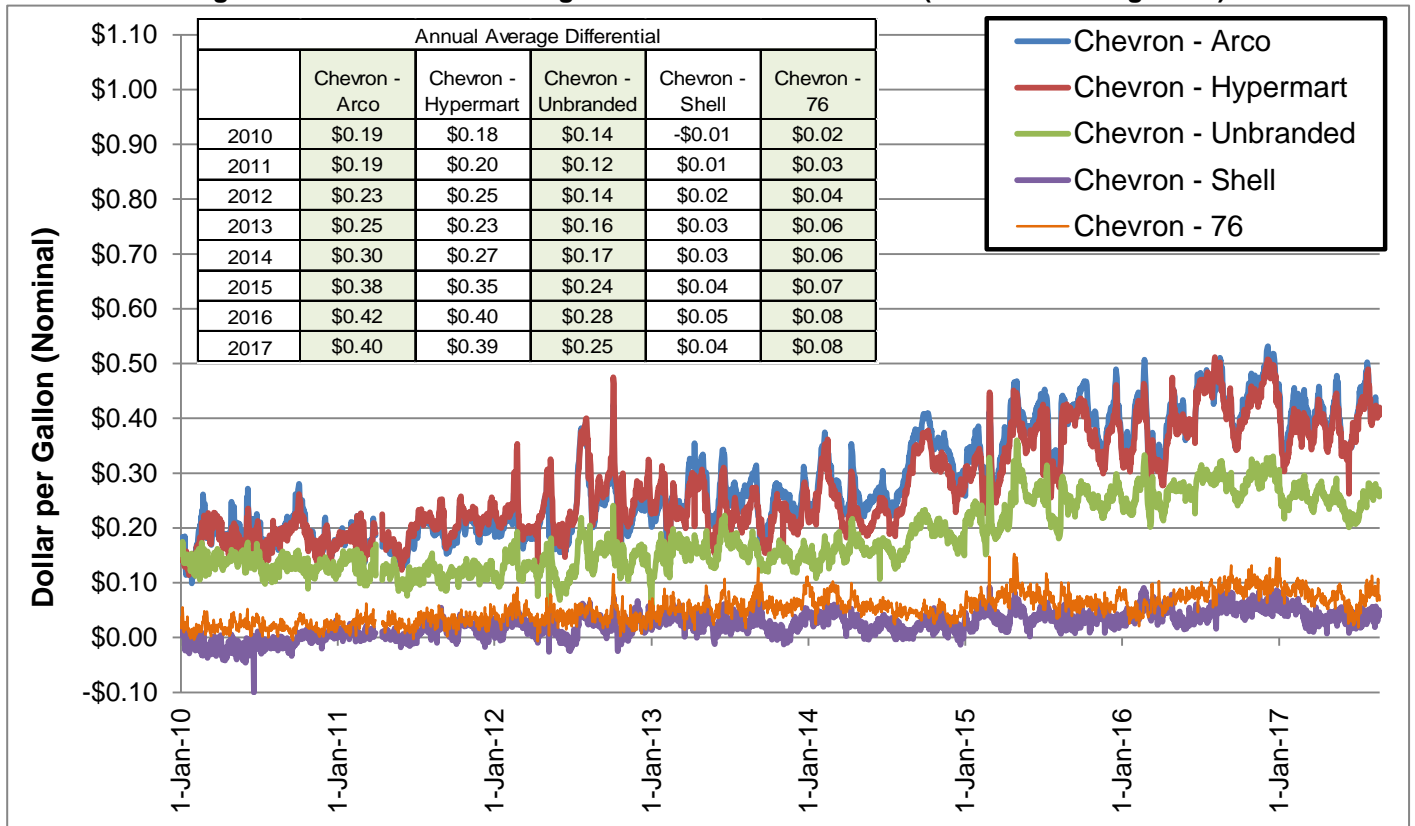
Source: Oil Price Information Service

**Figure 16: Los Angeles Average Retail Brand Differentials (Jan. 2010 to Aug. 2017)**



Source: Oil Price Information Service

**Figure 17: Sacramento Average Retail Brand Differentials (Jan. 2010 to Aug. 2017)**



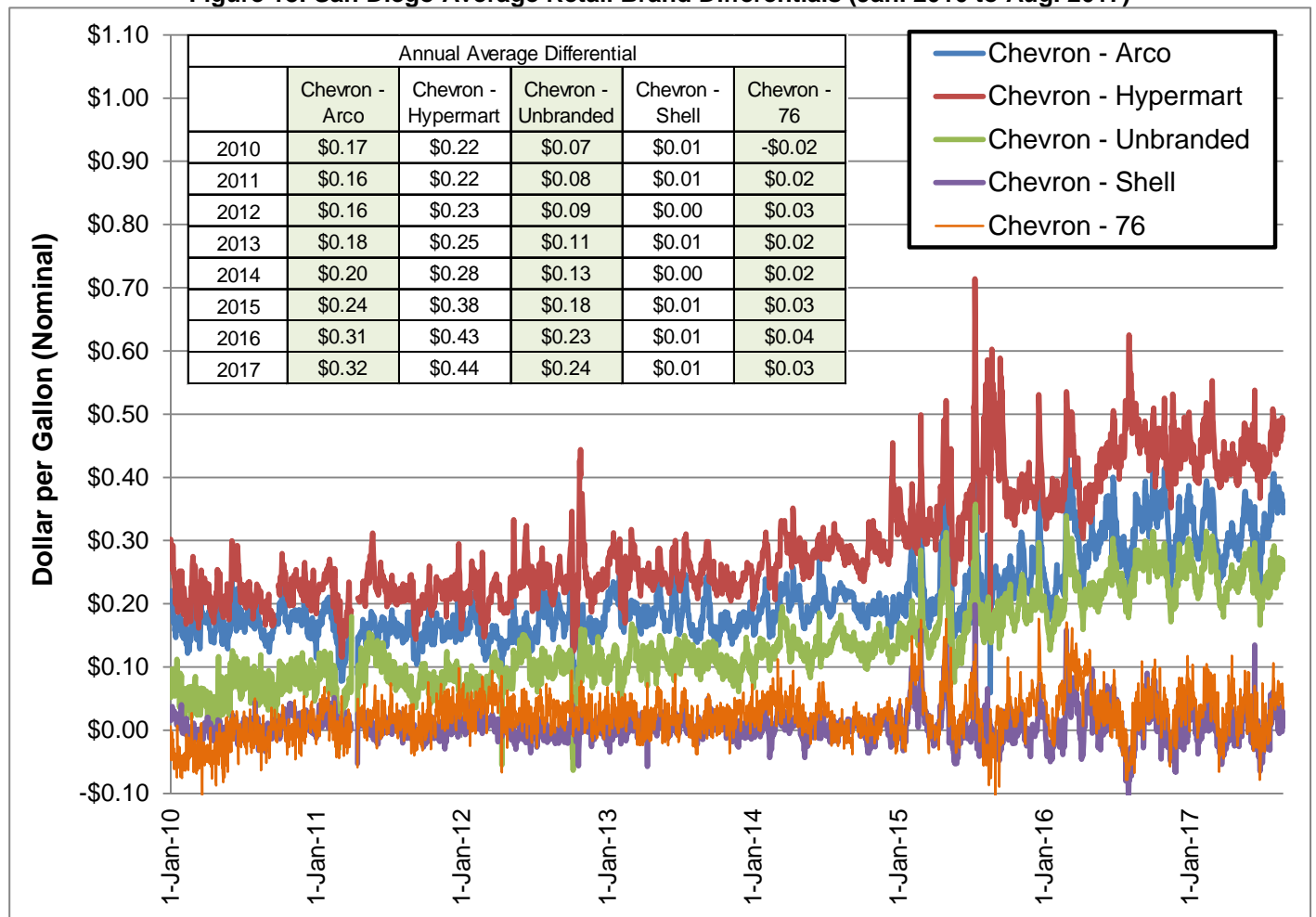
Source: Oil Price Information Service



Moving to the San Diego region (**Figure 18**), the overall trend of ARCO, hypermarkets, and unbranded gasoline retailer pricing disconnecting from Chevron, Shell, and 76 is seen here as well. In the case of ARCO and hypermarkets, the differential to Chevron gasoline prices started at an average of \$0.17 and \$0.22 in 2010, respectively, and rose to \$0.32 and \$0.44, respectively, by 2017. During this rise in the low-price brand differentials, differentials to Shell and 76 remained relatively constant, with no average rise between Chevron and Shell prices and a slight rise in the Chevron-to-76 differential to \$0.03 by 2017. Similar to the Central Valley Area and later with the Southern Desert Area, the San Diego differentials appear more volatile with constant large shifts up and down in the average difference.

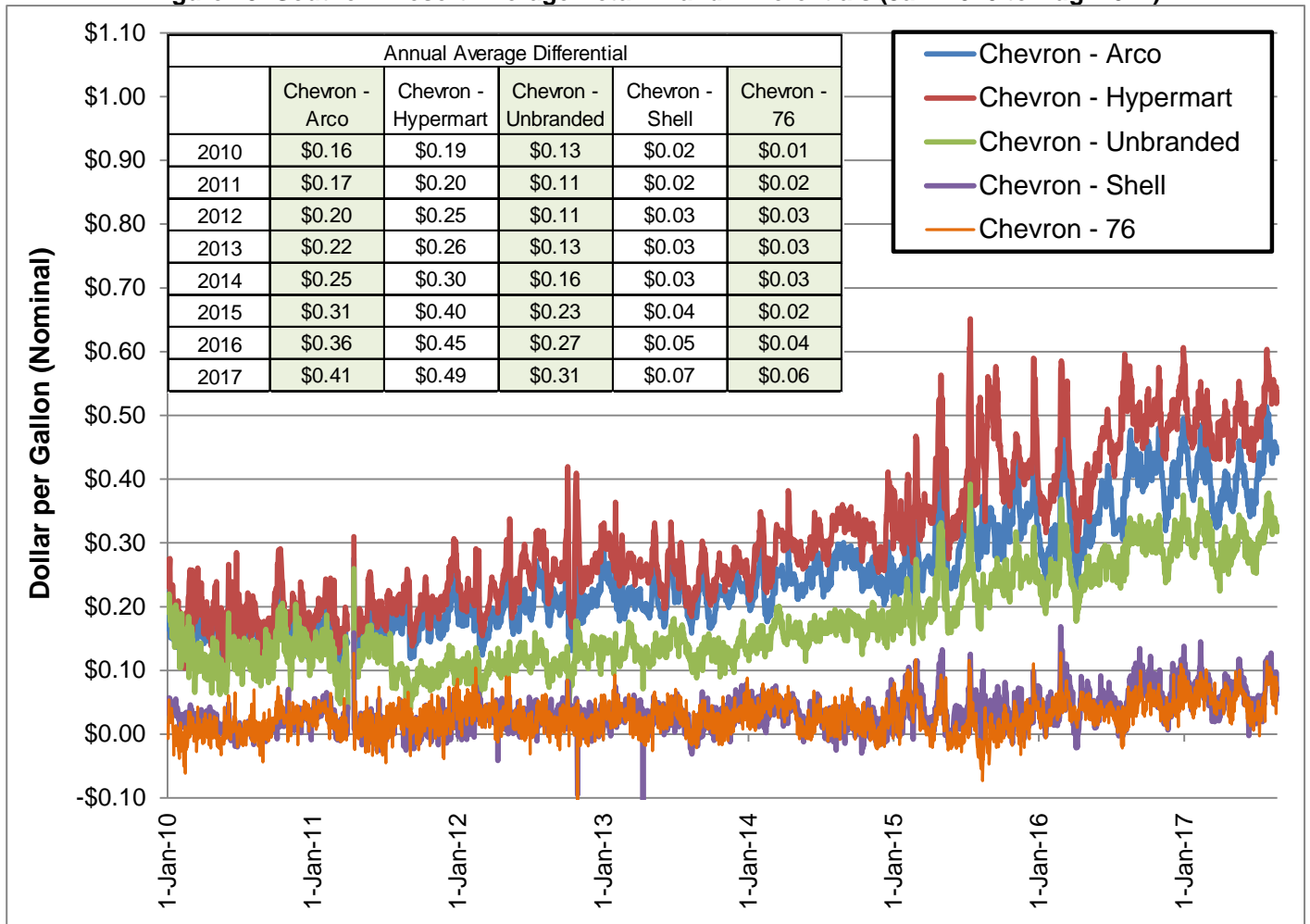
Finally, in the Southern Desert region, differentials here are moving in the same patterns seen in other areas (**Figure 19**). Like the Central Valley, Sacramento, and San Diego areas, the number of stations in the Southern Desert Area was roughly half that of both the Bay Area and Los Angeles Area. Like San Diego, but unlike the other areas, the Southern Desert had a higher concentration of ARCO stations in comparison to Chevron stations in the area (1.3 ARCO stations for every Chevron station in this area compared to an average of 0.5 for the other regions). In addition, likely because of the lesser number of reporting stations, the differentials in this area appear more volatile (similar to the Central Valley and San Diego regions). Differentials in this area reached levels similar to the Central Valley, with the Chevron-versus-ARCO and hypermarkets price differentials growing to as large as \$0.41 and \$0.49, respectively, by 2017.

**Figure 18: San Diego Average Retail Brand Differentials (Jan. 2010 to Aug. 2017)**



Source: Oil Price Information Service

**Figure 19: Southern Desert Average Retail Brand Differentials (Jan. 2010 to Aug. 2017)**



Source: Oil Price Information Service

In conclusion, the statewide disconnect between “low-priced” and “high-priced” brands appear to be a phenomenon that is happening in all areas of the state. The general pattern of the separation between brands is similar, but in absolute price terms, these increases appear to be largest in more rural areas. Based on this general increase in the differentials and lack of change in overall gasoline market share, casual inspection of the results indicates that there is a segment of consumers in California that views different brands of gasolines as different products and thus are willing to pay a higher price for them. Whether this is due to some sort of consumer experience preference (for example, reduced wait times) or from a perceived difference in product is unclear. What is clear is that the low-cost leaders for retail gasoline in California are ARCO and hypermart retailers. High-priced retail brands of gasoline have been able to differentiate their product from these low-cost leaders in such a way that allows them to maintain these higher prices without substantially changing their California market share.