ENERGY INDUSTRY DATA AND TRENDS

Shale's Effect on Global Oil and Gas Projects

May, 2017

Welcome to the EnerCom Energy Industry Data and Trends for May 2017. The advancement of unconventional drilling has been a game changer for North American oil and gas producers, and has dramatically changed the role the continent plays in the global energy space, but this month we decided to look at what those changes mean for the rest of the world.

With the crash in oil prices came a dramatic shift from growth to efficiency. Companies began to focus on returns, and investors became much more risk-averse. Unconventional plays have become increasingly popular as investors look for fast returns on their invested capital, something North American E&Ps have been happy to do, but as capital rushes to shale plays, what happens to development of the rest of the world's oil and gas assets?

For the sake of this analysis, we examined the spending of supermajors, particularly offshore. These large public companies offer a transparent look at spending in other parts of the world, and the long-lead time and high investment into offshore projects offer a counterpoint to shale operations.

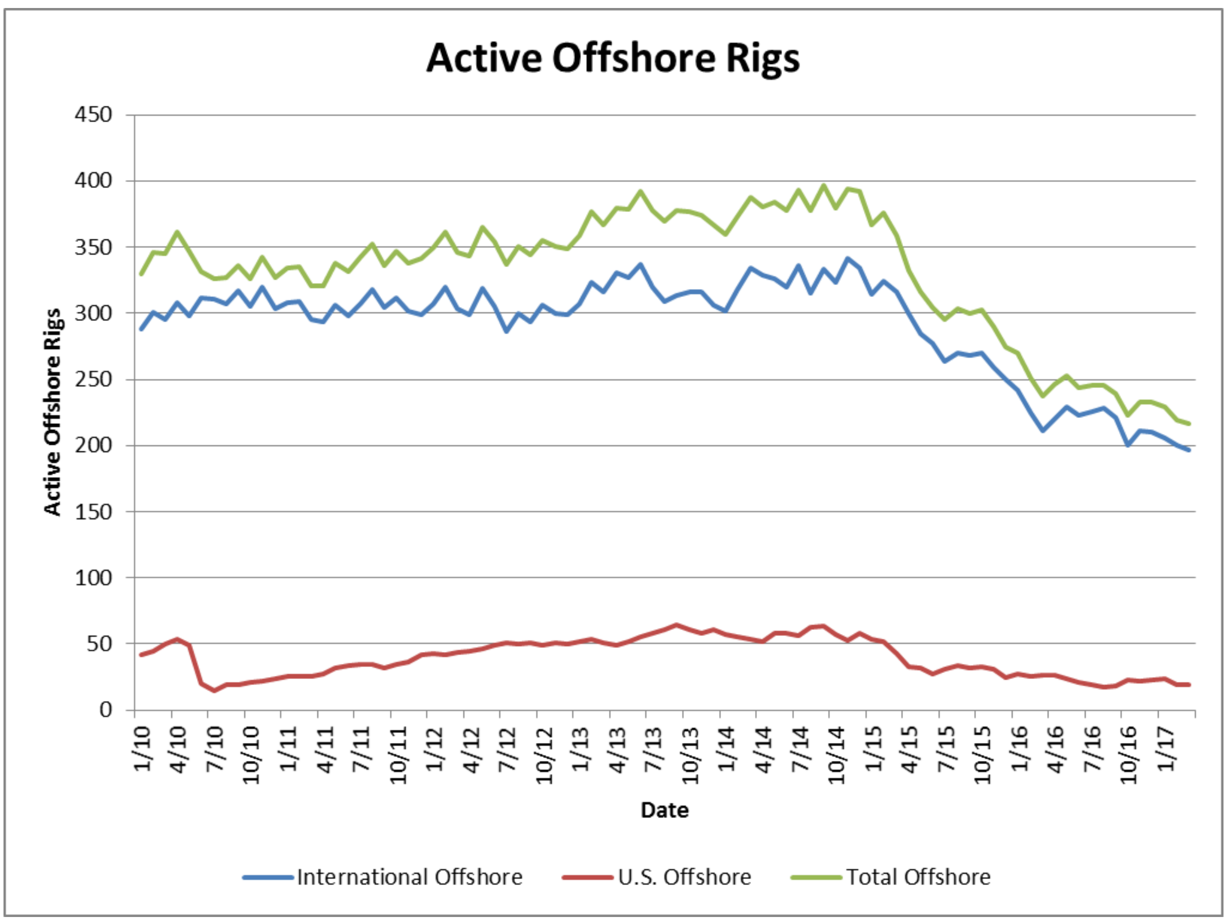
In This Report – Key Summary Points:

- A strong preference for low risk and fast returns has made it difficult for anyone other than super majors to operate offshore
- Shale has changed the focus from "Peak Oil" to "Peak Demand"
- Unlocking shale remains a priority for Saudi Arabia
- Offshore operators have improved economics to the point that they could outperform the Delaware long-term
- Investors continue to have a strong preference for fast returns on shale projects
- Despite shale's impressive performance, many feel it will not be enough to meet future demand alone

MONEY TALKS

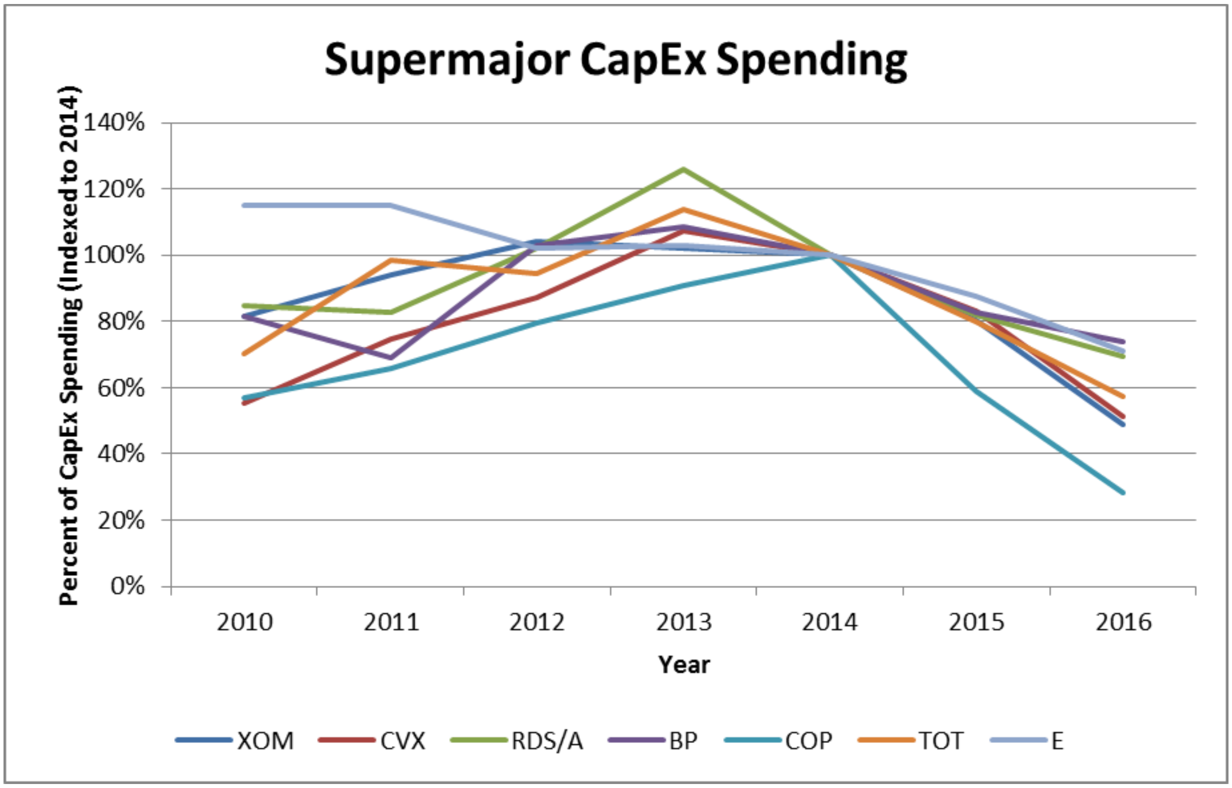
Oil and gas companies take their time to ensure they spend their money as smartly as they can, investing capital in projects they believe will create the greatest value possible. Prior to the oil price downturn in 2015 and 2016, international oil companies (IOCs) like Shell, ExxonMobil and ConocoPhillips often turned to larger, long-life projects to increase their reserves and to give them line-of-site on sustainable production growth.

Large offshore projects often cost billions of dollars, but with demand continuing to increase, and oil prices in the triple-digits, companies were comfortable making those types of investments, even if they would not see returns for several years. In November of 2014, the same month that OPEC made the decision to defend market share which would send oil prices crashing, international offshore drilling was at a peak with 341 rigs, and an additional 53 rigs were drilling offshore the United States. As of March 31, just 197 rigs were drilling in international waters and 19 in the U.S., representing declines of 42% and 64%, respectively.



Lower commodity prices have made expensive offshore developments far less attractive in terms of absolute returns, but investors have also become increasingly risk adverse, preferring instead to put their money into projects with fast, relatively predictable returns. The risk of putting billions of dollars of capital into a project that might not generate returns for several years, if ever, became too much for the industry to stomach.

Companies slashed their CapEx budgets across the board with supermajors spending significantly less following the crash in oil prices. ConocoPhillips, for example, spent just 28% of its 2014 budget in 2016 as the industry waited for oil prices to recover. Indexed to 2014 CapEx spending, supermajors and nearly every other sized company slashed spending dramatically.

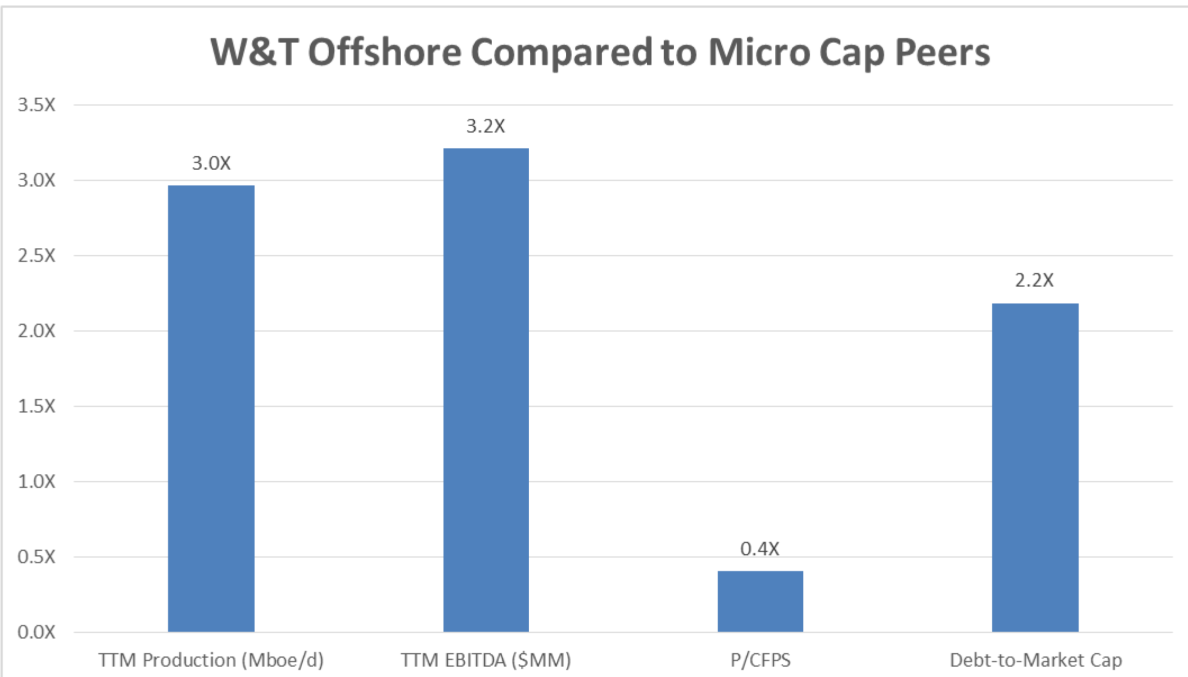


THE DEATH OF SMALL OFFSHORE COMPANIES

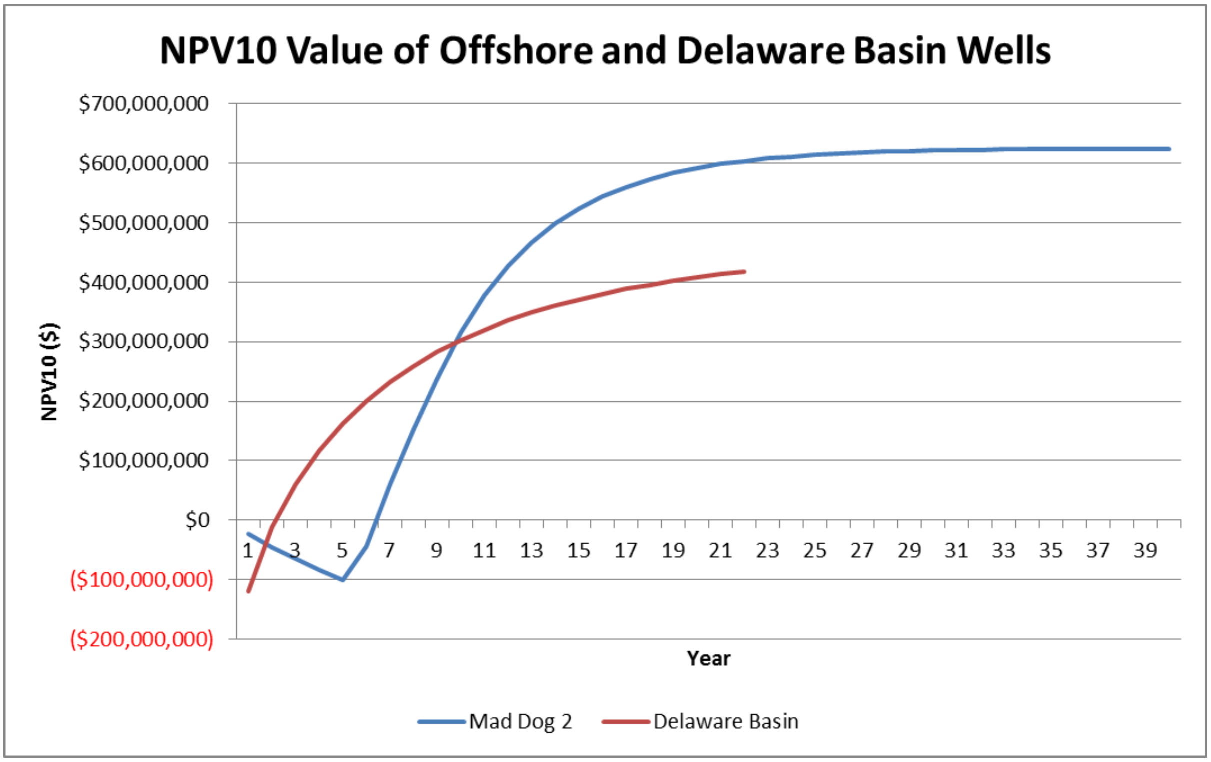
A study conducted by the Energy Information Administration in March of 2016 found the full-cycle costs on Gulf of Mexico deepwater projects bring breakeven prices on the majority of wells drilled offshore above $60 per barrel. The high price and risk factor of a major offshore development mean that a single mistake can spell the end for smaller companies.

Looking for pure-play offshore companies to compare to onshore drillers, we found that most have filed for bankruptcy since the oil and gas downturn. The exception, W&T Offshore Inc., is currently struggling to realize similar multiples compared to other companies its size in our database.

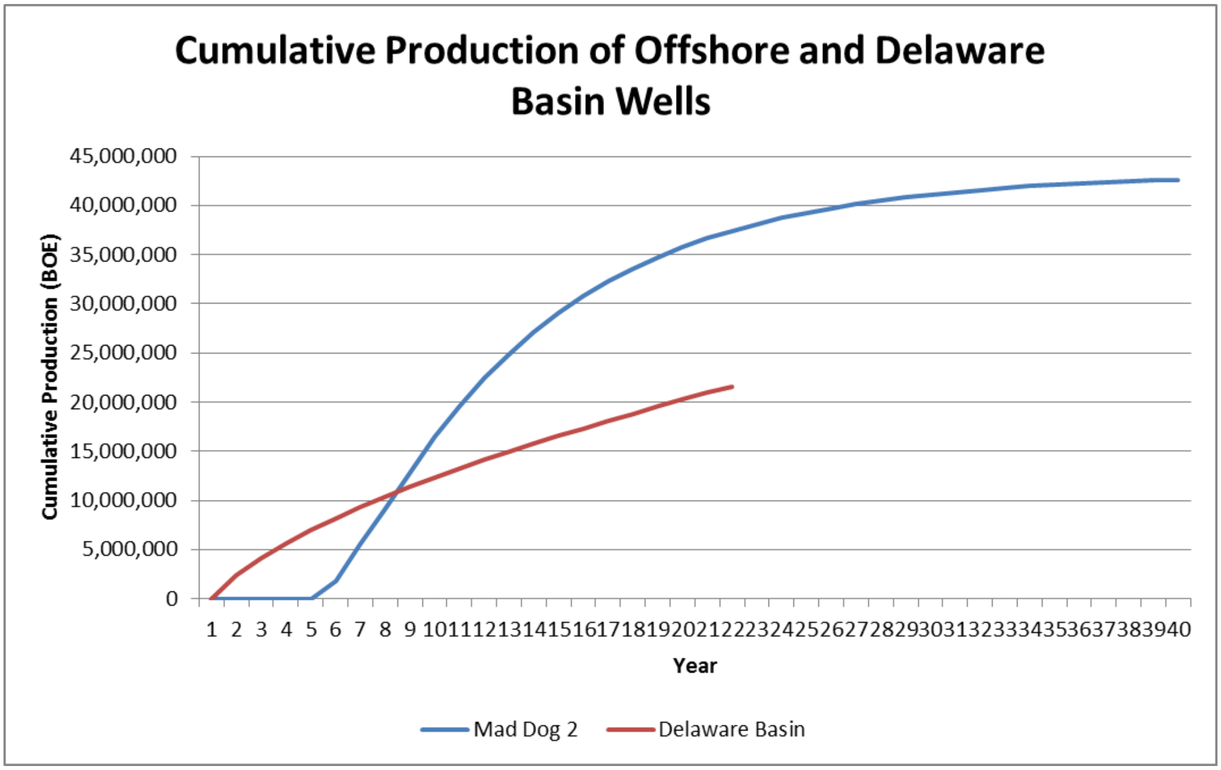
Despite having trailing twelve month production nearly three-times greater than the group's median and 2016 trailing twelve month EBITDA 5.2x in excess of the group's median, the company's share price to cash flow was just 1.1x compared to a median of 2.7x for the group. Investors are much less willing to give strong premiums to a company with high-risk assets, and the cost of offshore development means that W&T also carries significantly more debt on its books than its peers with Q4 2016 debt-to-market cap exceeding other micro-cap companies by 2.3x.



Low oil prices have made offshore development an extremely difficult proposition for all but supermajors and IOCs, but even they seem to be shying away from deepwater drilling as they look for quick returns on their investments. The average cost of a deepwater well targeting the Miocene, which benefits from higher estimated well productivity and relatively shallower reservoir depth compared to other zones, is $120 million. Even assuming the relatively high per-well cost of $8 million for a shale project, a company could drill 15 wells onshore for the same cost as one offshore well, and with much less risk.



Looking at the net present value discount 10% (NPV10) of 15 average Delaware Basin wells versus one of the 14 Mad Dog 2 wells, it becomes clear quickly why many companies choose to drill unconventional wells in a market that is cost-conscious. Delaware Basin wells typically pay themselves off in less than two years, making the returns much more immediate when compared to an offshore project like Mad Dog which is not expected to break even for roughly six years.



The cumulative production of an offshore well can offset the cost over time, but given the massive investment required to drill an offshore well compared to an unconventional well, the option is hardly worth considering unless the operator is well capitalized and can absorb the risk and capital outlay.

TRADING PEAK OIL FOR PEAK DEMAND

Multi-billion dollar investments were made, at least in part, under the assumption that oil prices were bound to go higher moving forward Founder of Petrie Partners Tom Petrie said. Peak Oil was going to drive oil prices higher as consumption continued to grow and existing supplies dwindled. Pumping billions of dollars into projects over a number of years made sense because oil prices had nowhere to go but up.

“Our concern a decade and a half ago was when would Peak Oil kick in and drive the price of oil up and make these multi-billion dollar investments in the deepwater economic,” said Petrie. “Now the problem is there’s been a switch from the notion of global Peak Oil to Peak Demand, which could, quite possibly, have the opposite effect on future prices.”

If demand were to level off, or demand growth were to stutter, the excess supplies in storage and new supply being produced out of the ground would have significant downward pressure on oil prices. Even now, oil prices are struggling to maintain a level above $50 per barrel as markets wait for meaningful draws on crude oil inventories as demand continues to grow.

"I'm not a huge believer that Peak Demand is such a huge problem for shale because, with the innovation that we've already seen, we've been able to weather an incredible storm," Petrie added.

UNCONVENTIONALS CONTINUE TO BE A MAJOR FOCUS ABROAD

Onshore shale development will not be the sole source of oil and gas moving forward, but many other countries continue to try and replicate the success of U.S. operators abroad. Saudi Arabia's conventional oil and gas developments will continue to be the major source of the country's output, but unconventional projects are still high up on the Saudi's list, according to Petrie.

"The deputy crown prince, with the charge from the king, has communicated 'don't fight [unconventional development]. Find a way to embrace it.'

"Back in 2011 and 2012, the Saudis said 'if breaking up source rock is the issue, let's go do it. We've got plenty of source rock, many times thicker than what the Americans have,' and so they thought they would see flowrates that were many times larger as well. What they found though was that you drilled much more expensive wells because of the thickness, but when you break up the source rock, if you don't have the right brittleness, it's not going to work."

Because of the difference in the source rock, Saudi Arabia has so far been unable to replicate the shale revolution, but that could change. "I have to believe, in an oil province as prolific as Saudi Arabia, you can find rocks with the right kind of brittleness, but they haven't so far. Making unconventionals work will be a priority, though. If they can make it work, shale development in Saudi Arabia could be somewhat successful, although, it's not clear to me that it will be as successful, proportionately, as it has been in North America, especially the U.S."

On the conventional side, Saudi Arabia nearer maturity than many people thought, according to Petrie. "The giant Ghawar Field is probably now in irreversible decline. There are four or five other large fields, but not like Ghawar. The other fields are maybe 15% of the size of Ghawar, and that's what they have to overcome."

Saudi Arabia is taking a longer-term look at its own economy though, with the kingdom's Saudi Vision 2030 plan designed to diversify its economy away from oil export revenues. Part of that plan includes "transform[ing] Aramco from an oil producing company into a global industrial conglomerate," according to the government's website explaining the plan.

"There is a lot of thought behind taking Saudi Aramco public," said Petrie. "They believe it will still command a big premium in today's market."

By selling off a piece of the company now, the kingdom hopes to capitalize on the value of its national oil and gas giant, and then use the proceeds to fund its shift into new markets. Some of the proceeds from the Aramco IPO and Saudi's diversification will go back into its oil business, but OPEC's largest oil producer appears to be preparing for different world, one in which oil is not its sole source of wealth.

EXISTING RESERVES ARE QUICKLY BEING DEPLETED

Short-cycle return projects like shale have helped to keep global production higher than many market analysts expected over the course of the downturn, but as investment dollars flow increasingly into these types of projects future reserves are dwindling.

North American operators have continued to ramp up production from their core acreage as they pump from only the most economic assets available. Traditionally, E&P companies would invest part of their capital into finding new reserves to replace those they produced. Keeping production on top-tier acreage has held off production decline to a greater extent than many expected when oil prices crashed, but the lack of investment in new resources has mean that the depletion of total reserves that could be produced has increased more quickly.

"A look at the underlying production and reserves data from many of the countries outside the Middle East, Russia, and North America land reveals that depletion rates are indeed rapidly increasing," said Schlumberger CEO Paul Kibsgaard. "Production from the continental shelves of Norway, U.K., and the U.S. Gulf of Mexico has been held flat or even increased over the past three years, which represents a flattening and even reversal of the established decline rate trends," he said, noting that production from these parts of the world make up approximately 50 MMBOPD, or roughly 52%, of global output.

"These depletion rate trends will only accelerate going forward if production continues to be upheld without significant additions to proven developed reserves through increased CapEx spend… It seems clear that the industry indeed is heading towards a supply crunch in the coming years unless there is a significant global increase in E&P investments," said Kibsgaard.

U.S. ONSHORE PRODUCERS ARE NOT ALONE IN DRIVING EFFICIENCIES

Since oil prices cratered in 2015, lowering the cost of wells and increasing their ultimate recoveries has been a major focus for the industry, which was more focused on growth in the past. Onshore operators have dialed in their focus to their most attractive assets, and gone to longer laterals to lower the cost per-foot of new wells drilled, but they are certainly not alone in pursuing better results per well.

Supermajors have lowered the cost of large-scale, offshore projects since 2014 as well. Shell and BP both approved new offshore projects this year after dramatically cutting the expected costs for their respective developments.

The estimated cost of Shell's Kaikias project located 60 miles south of the Louisiana coast was lowered by 40% after simplifying its design. Three wells will be drilled in the first phase of the project, which is designed to produce up to 40 MBOEPD, with an expected breakeven cost below $40 per barrel, according to Shell.

BP was able to reduce the cost of its Mad Dog Phase 2 project even more drastically, cutting the expected cost by 60% from an original price tag of over $20 billion. The project will produce up to 140 BOEPD from 14 new wells, according to BP.

A report from Wood Mackenzie found that, on the whole, the offshore industry was able to reduce costs by about 20% following the Deepwater Horizon disaster through the use of new technology, and activity in 2017 is already looking healthier than last year. The most recent lease sale in the Gulf of Mexico saw 163 tracts sold for $275 million. While not as high as the $850 million spent in 2014, it still exceeds the $156 million spent in 2016.

Even with the drastically improved economics surrounding these projects, they cost many times more than shale developments. Even after the 60% cut in cost on Mad Dog 2, BP is projecting total costs of around $9 billion, and first production isn't expected until late 2021. Similarly, Shell's Kaikias is expecting first production in 2019 making it a major capital outlay for its operator.

IN THE LONG RUN, THE OFFSHORE PROJECTS MAY HAVE STRONGER ECONOMICS

Despite the risk and huge upfront cost associated with offshore projects like Mad Dog 2, on a per BOE basis it may be a more attractive deal for investors who are thinking several years out. BP believes the project will have a 35-year lifespan, which equates to an estimated ultimate recovery of about 1.8 billion barrels of oil equivalent at 140 MBOEPD. Even with its $9 billion price tag, that works out to approximately $5.03 per BOE.

Doing a similar analysis for wells drilled in the Permian, even the Delaware Basin is not able to generate the same types of returns. Looking at the costs and EURs of six different Delaware Basin well type-curves, operators expect to spend approximately $6.73 per barrel in the hottest shale play in the country.

Even if the price is more attractive on a per-BOE basis, large projects like those drilled offshore still cannot replicate the flexibility of onshore drilling. Looking at Mad Dog over its 35 year lifespan helps to give the project perspective, but once BP decided to make the investment and move it forward, it locked itself into a position where it would not be seeing any returns for at least four years. Shale operators, on the other hand, can react much more quickly to changes in the market, drilling however many wells they feel makes the most sense at the moment.

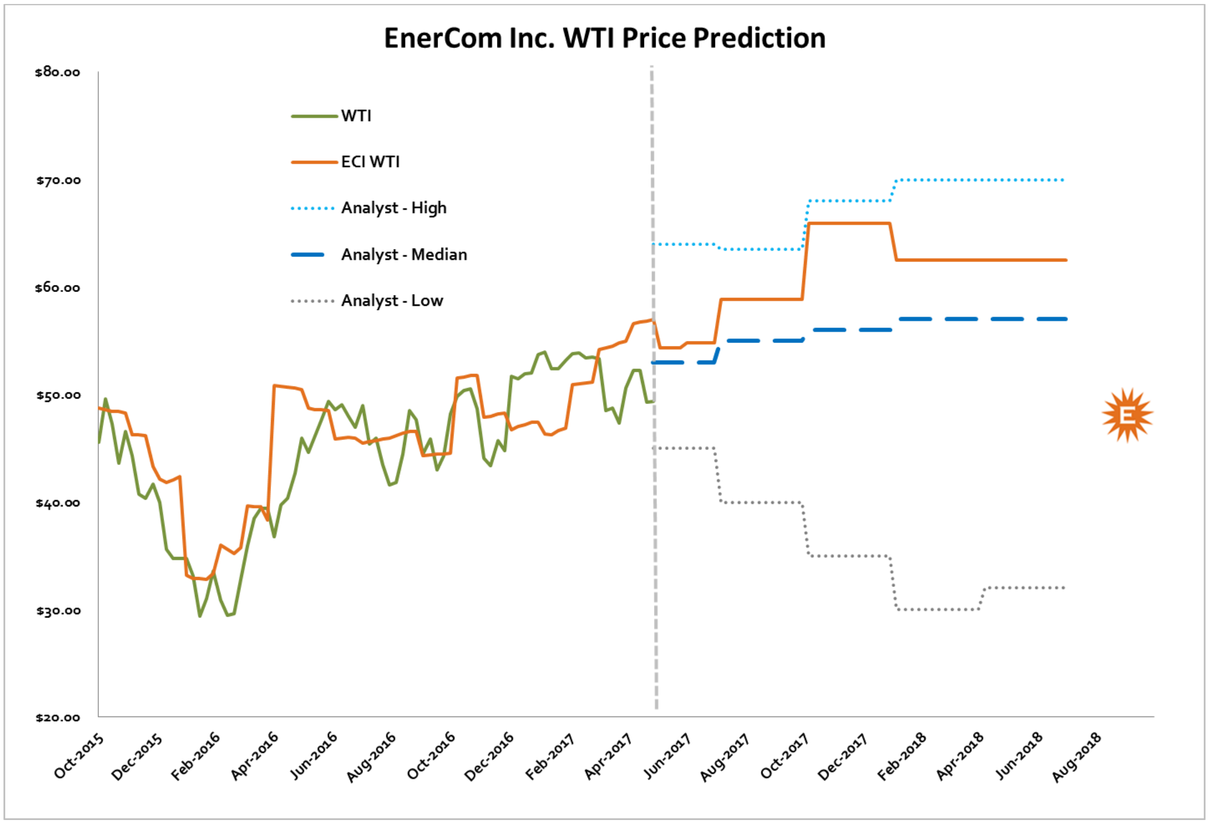
NORTH AMERICAN SHALE IS NOT ENOUGH TO MEET FUTURE DEMAND

Global demand is expended to grow by 1.3 million barrels per day this year, according to the International Energy Agency, and is expected to continue growing by about 1 million barrels per year after that. Shale is expected to meet a portion of that demand, but even unconventional developments will not be enough to satisfy growing demand.

“Certainly between now and the end of the decade it will be a big contributor to meeting that million-barrels-of-oil-demand growth that’s out there,” said Chevron CEO John Watson, “but ultimately oil fields decline and we’re going to need all sources of supply, including the shales, but also deepwater and other sources around the world.”

OPEC seems to be banking on shale being unable to keep pace with growing global demand as well. When discussing extending the group’s production cuts through the end of 2017 and possible into 2018, Saudi Arabian Energy Minister Khalid al-Falih said there is about 20 million barrels a day of combined demand growth and natural oil-field output declines that need to be offset. “No matter how fast U.S. shale grows, it won’t make a dent in that number,” he said.

As demand starts to outpace available supply, prices will start to increase. How far ahead operators start to make investments into larger projects could greatly affect by how much prices rise, but EnerCom’s WTI crude oil price model forecasts that the U.S. crude oil benchmark will average $62.48 for full-year 2018 based on demand assumptions from the International Energy Agency.



Unconventional drilling as changed the mindset of investors away from growth for growth’s sake to one that values growth supported by strong well economics. This, in turn, has made it more difficult for other countries to develop other types of projects, and spending on major developments, like those offshore, has fallen off substantially since 2014.

So far, North American E&Ps have been able to meet the expectations of the market by improving drilling efficiencies, but even majors like ConocoPhillips are beginning to look ahead and realize that the shale revolution may need a hand from other sources to meet future demand. What those projects will look like, and where they will be located, is difficult to say, but as oil prices increase the improved economics of large-scale projects offshore could become a more attractive investment moving forward.

A WORD OF THANKS

Thank you again for putting your trust in **ENERCOM**. Please do not hesitate to contact us with questions or additional needs. And, remember that you can get frequent updates and analysis on **Oil & Gas 360®** at **www.OAG360.com**

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Energy Industry Data and Trends Supplemental Slides:
The Effects of Shale

May 2017

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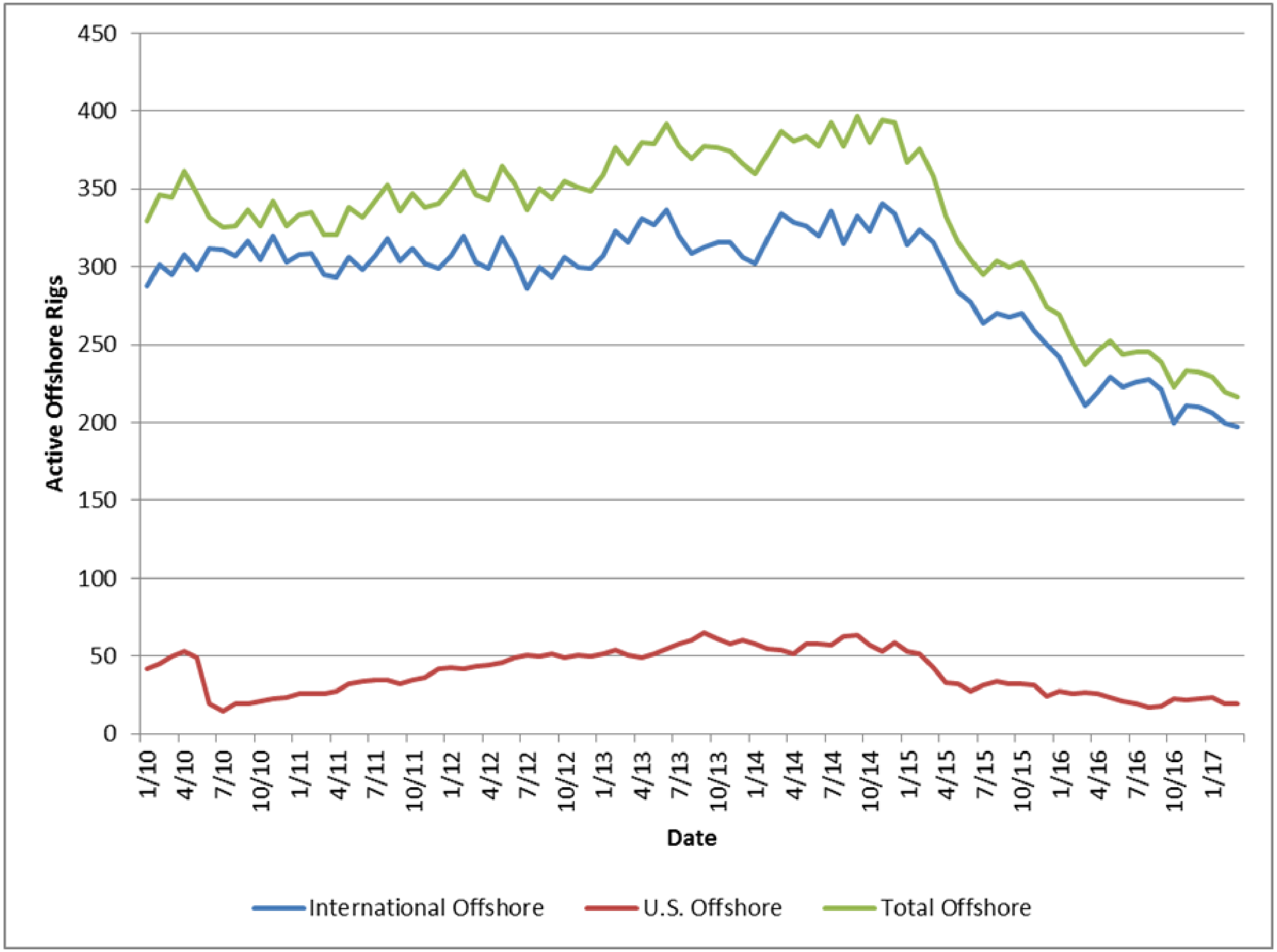
The Effects of Shale Slides

Offshore Activity 2010 - Present



Source: Baker Hughes Industries

Supermajor CapEx Spending (Indexed to 2014)

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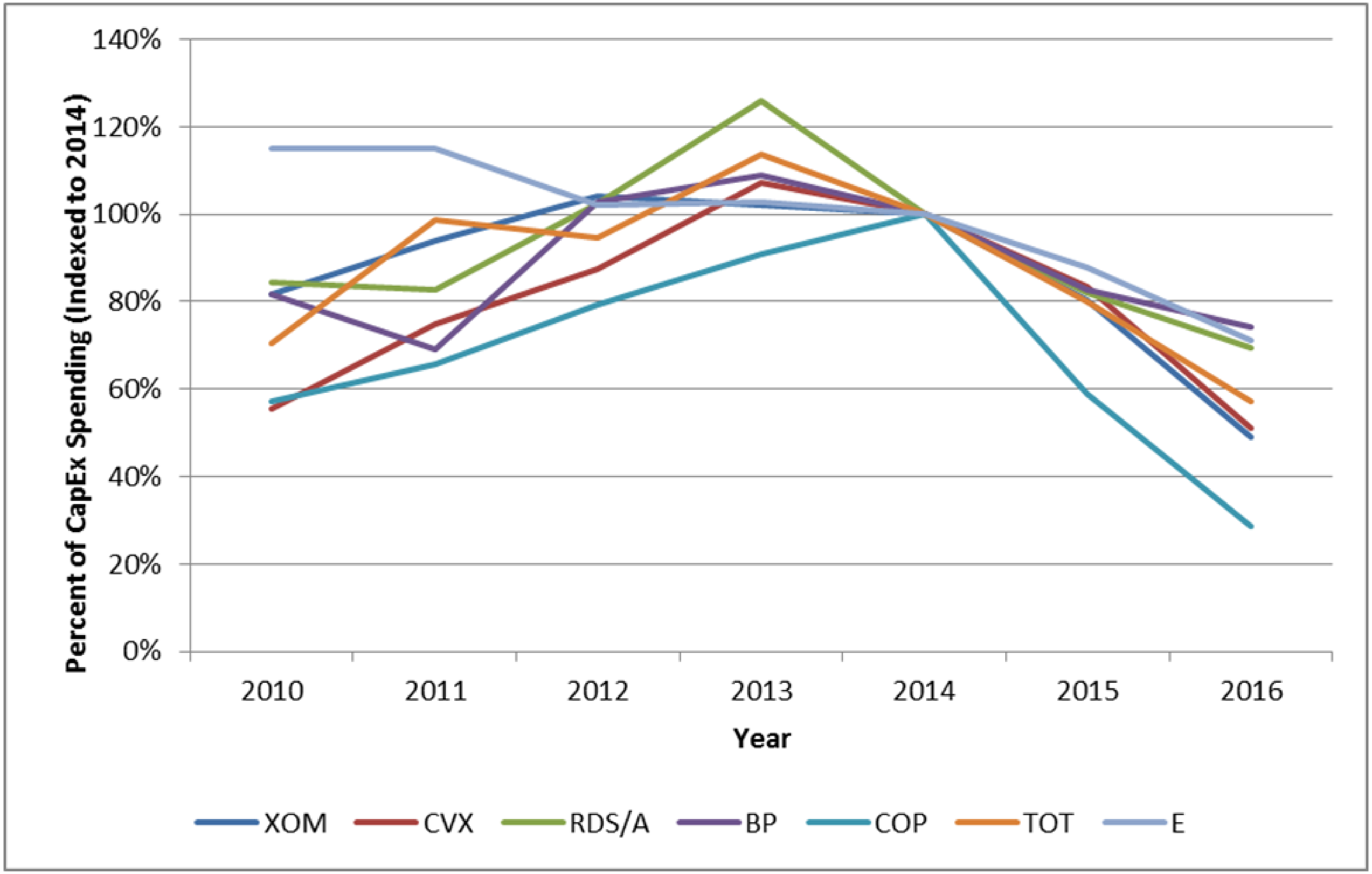

Source: Bloomberg

W&T Offshore Performance Compared to Micro Cap Peers

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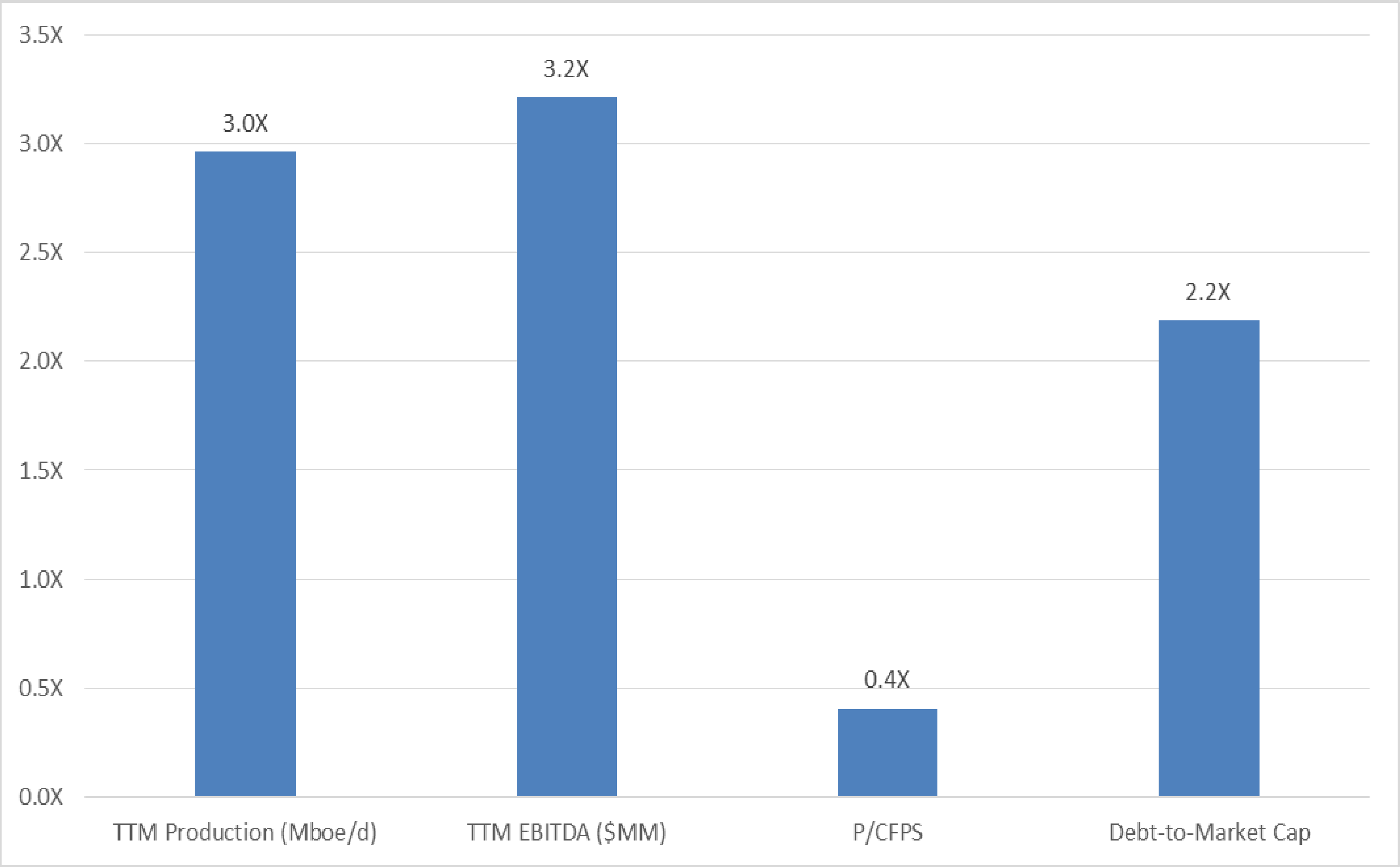
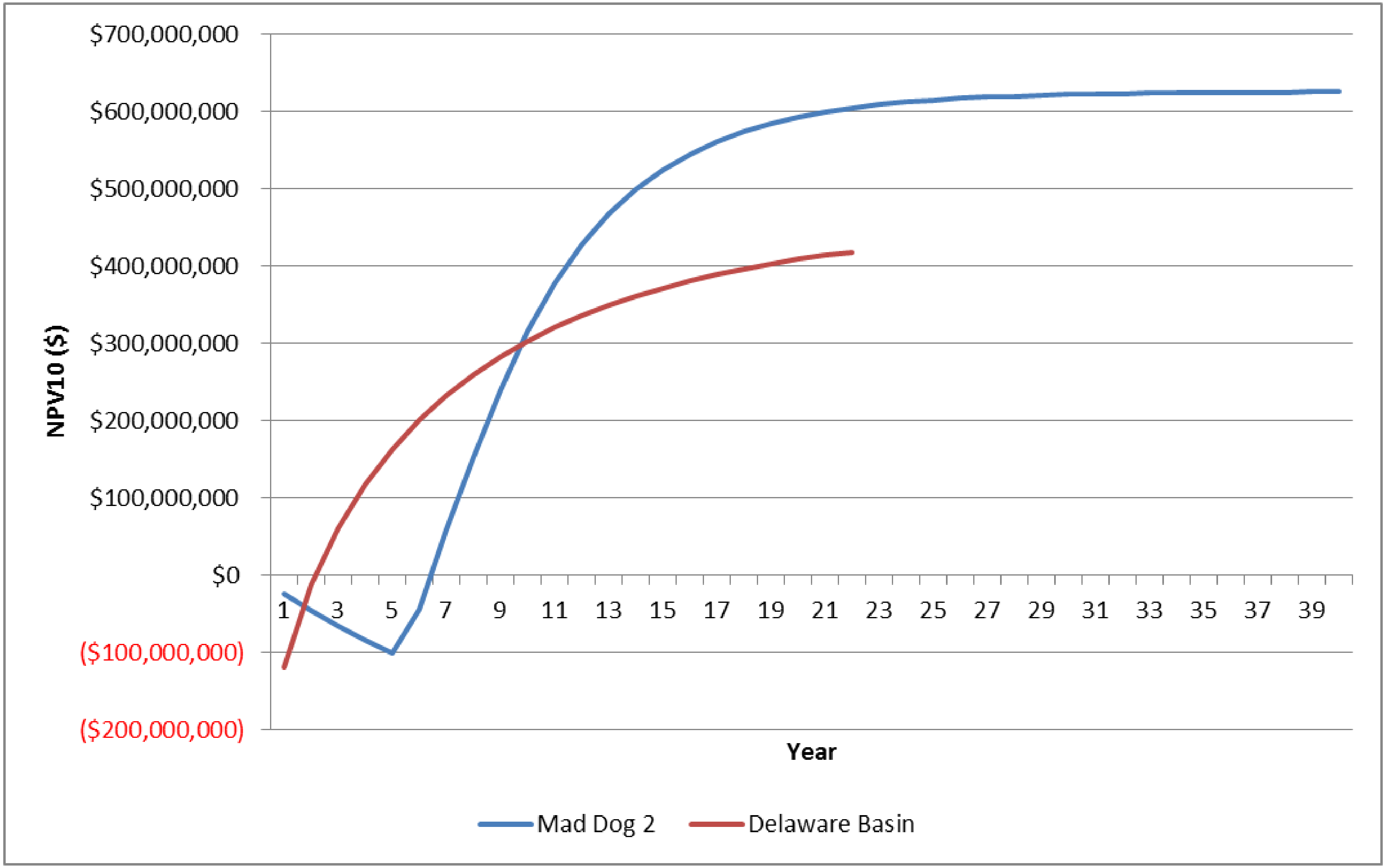


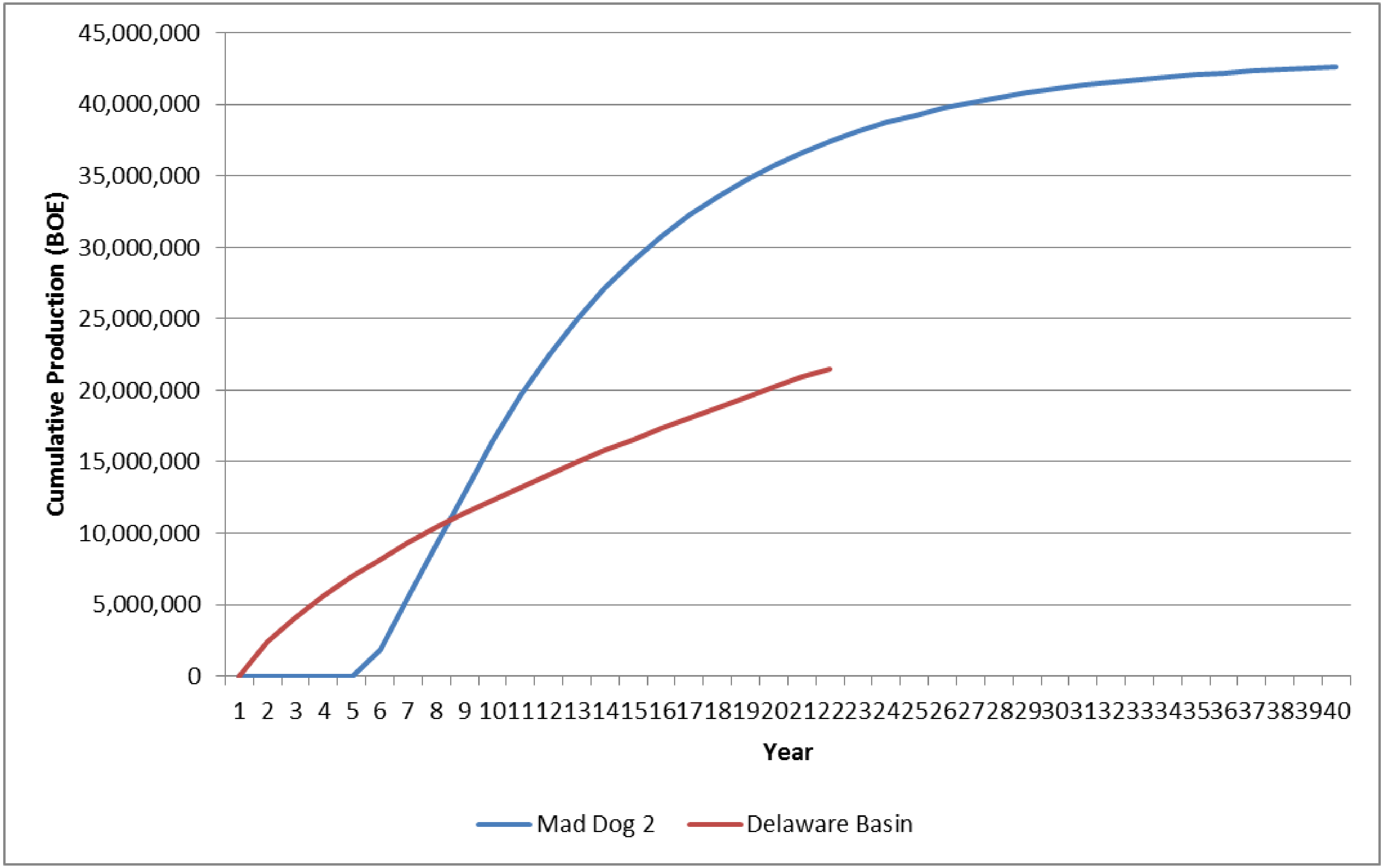
Source: Bloomberg, EnerCom Analytics

NPV10 Value of 15 Delaware Basin Wells and a Single Mad Dog 2 Well



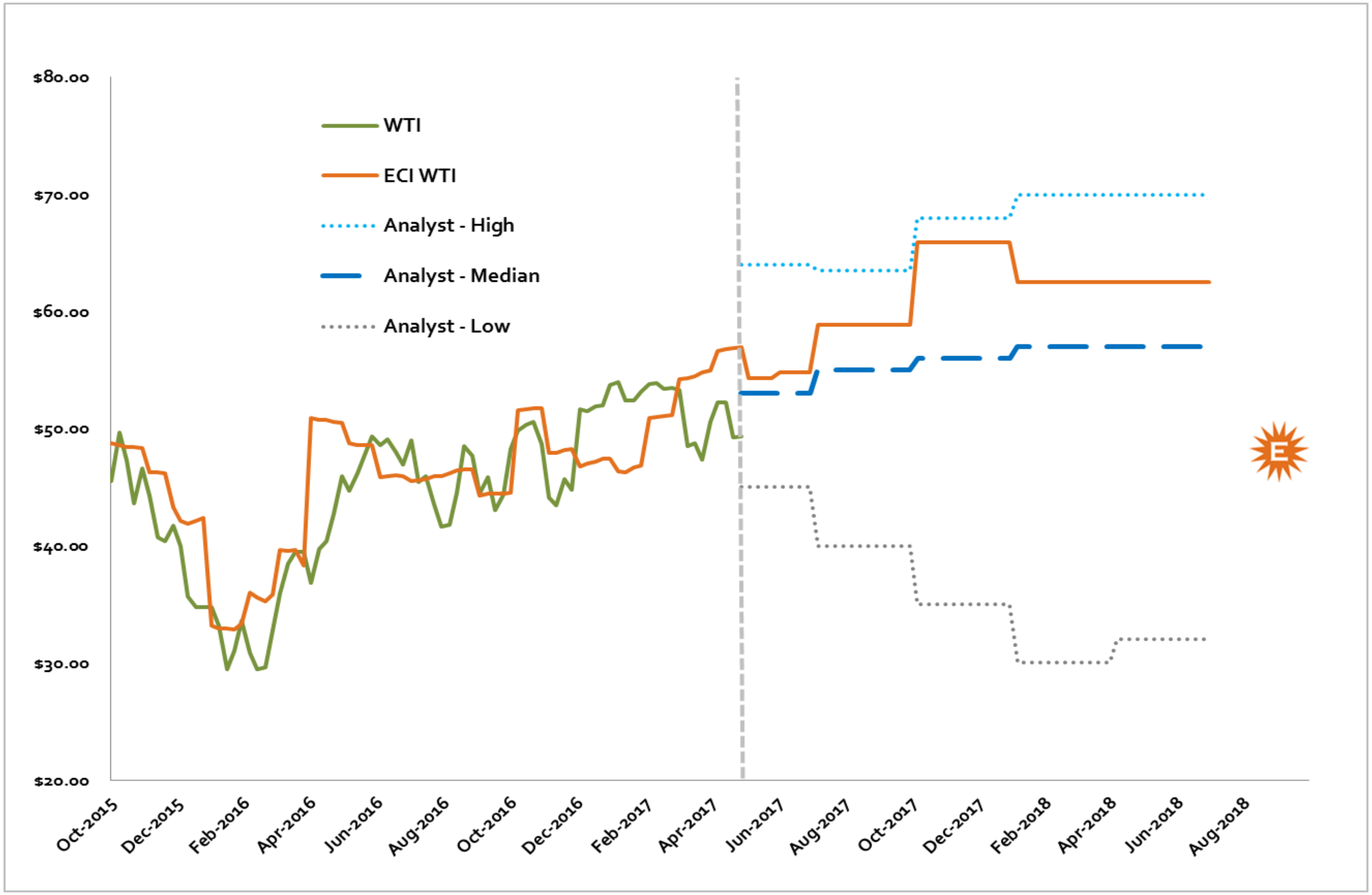
Source: EnerCom Analytics

Cumulative Production for 15 Delaware Wells and a Single Mad Dog 2 Well



Source: EnerCom Analytics

EnerCom Inc. WTI Price Forecast



Data: Bloomberg and EnerCom Inc.

Supplemental Market Slides

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U.S. Treasury Yields

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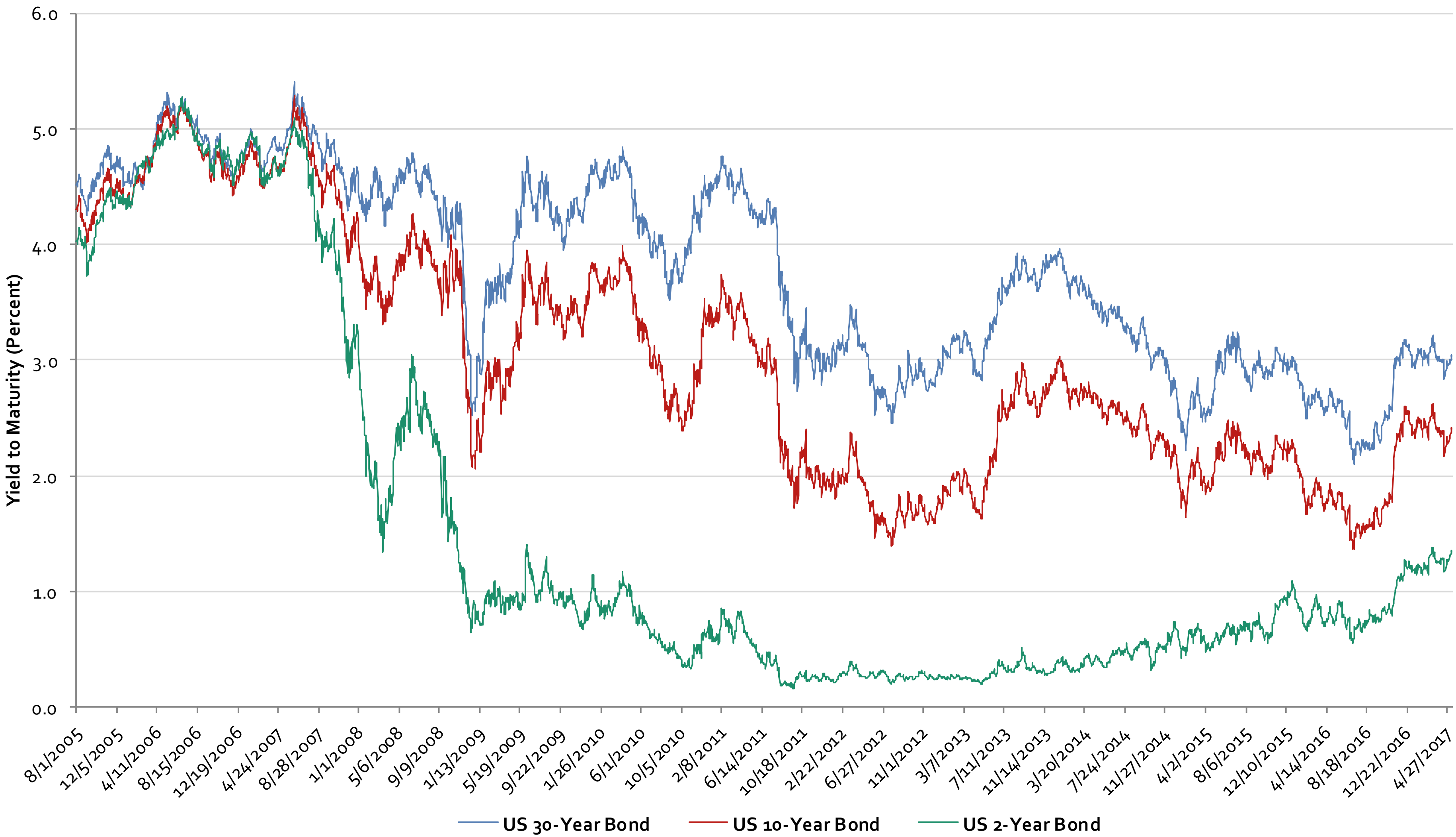

S&P 500 vs. 360-Day MAVG (Long-Term)

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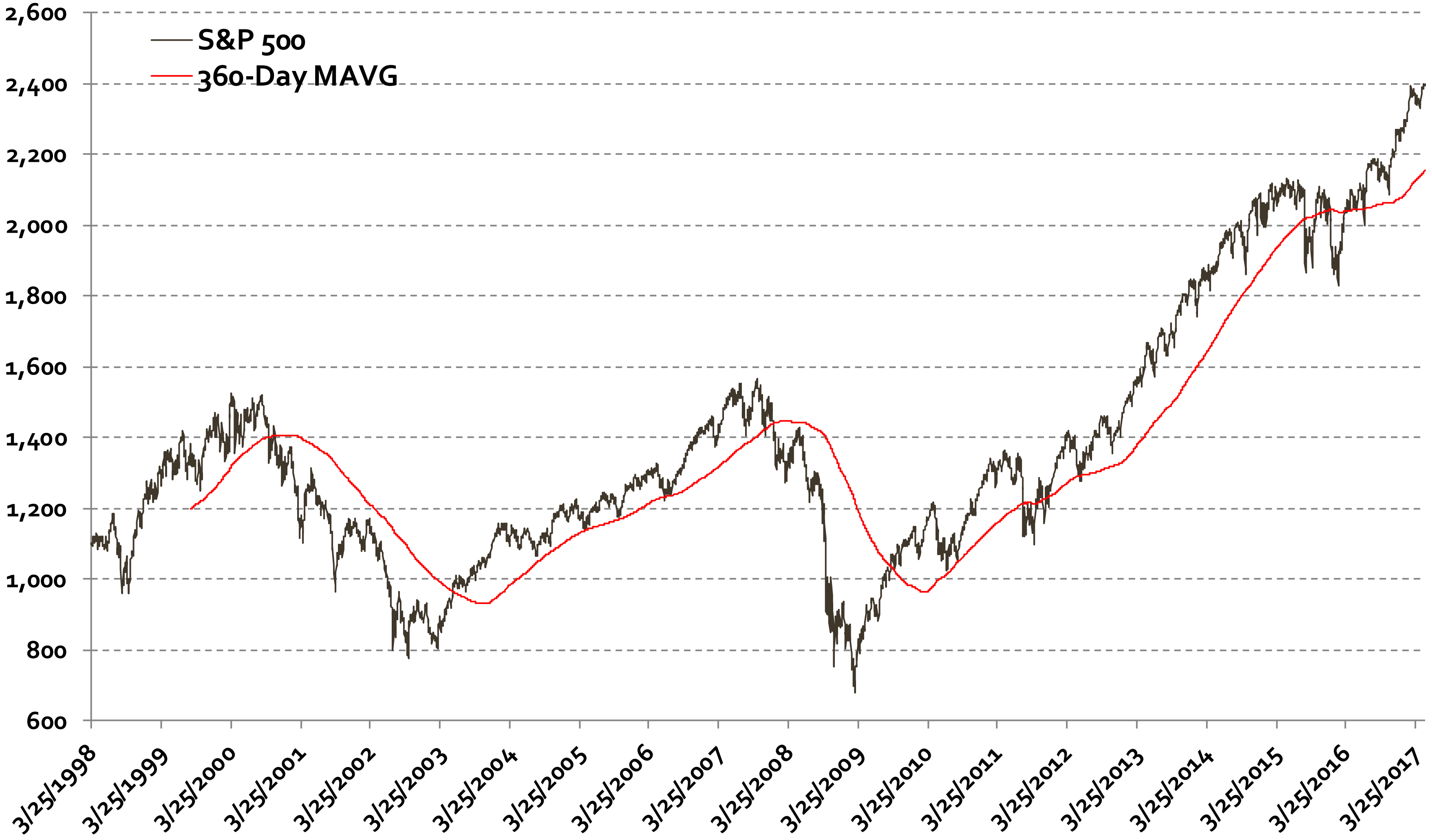
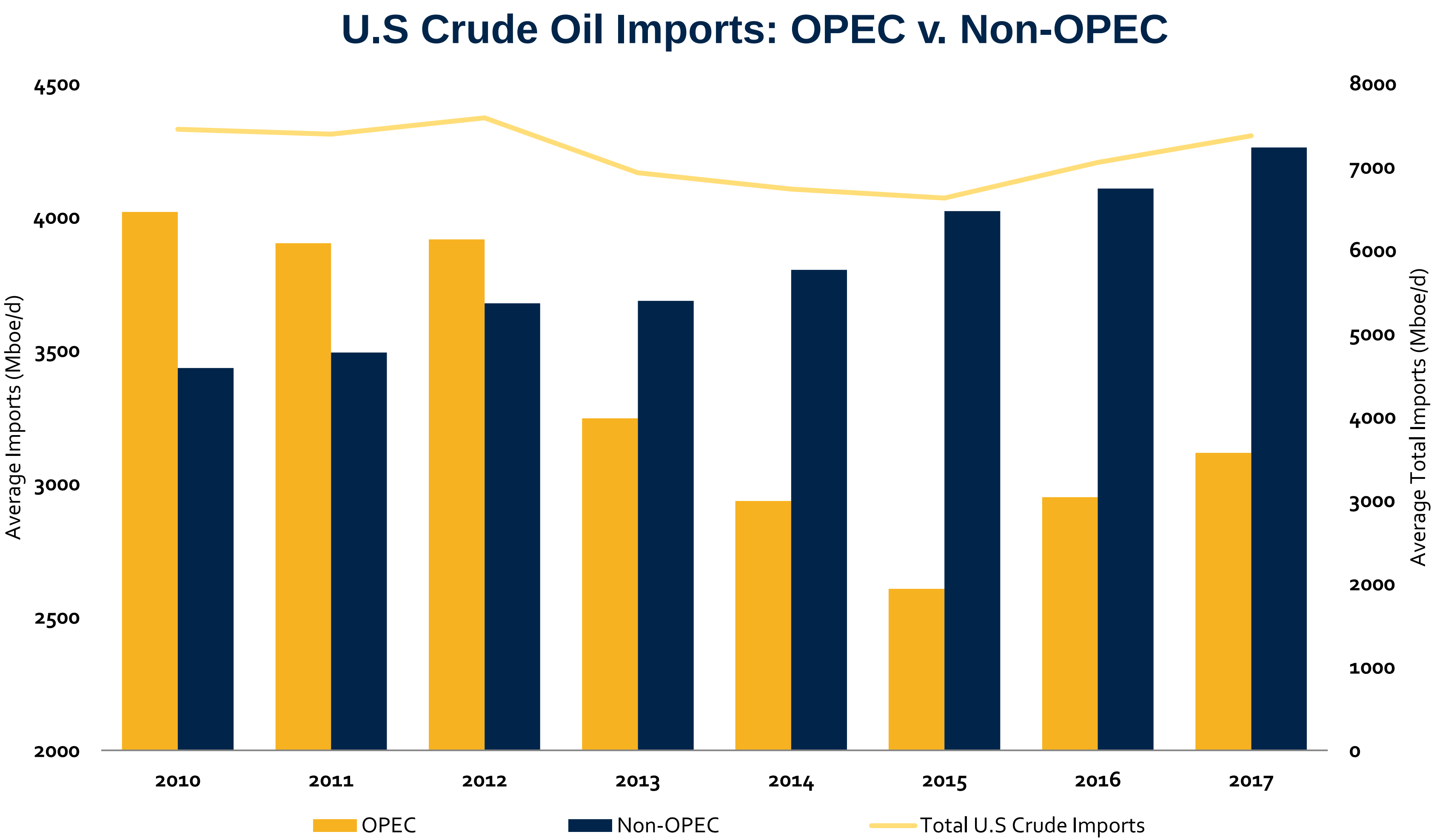


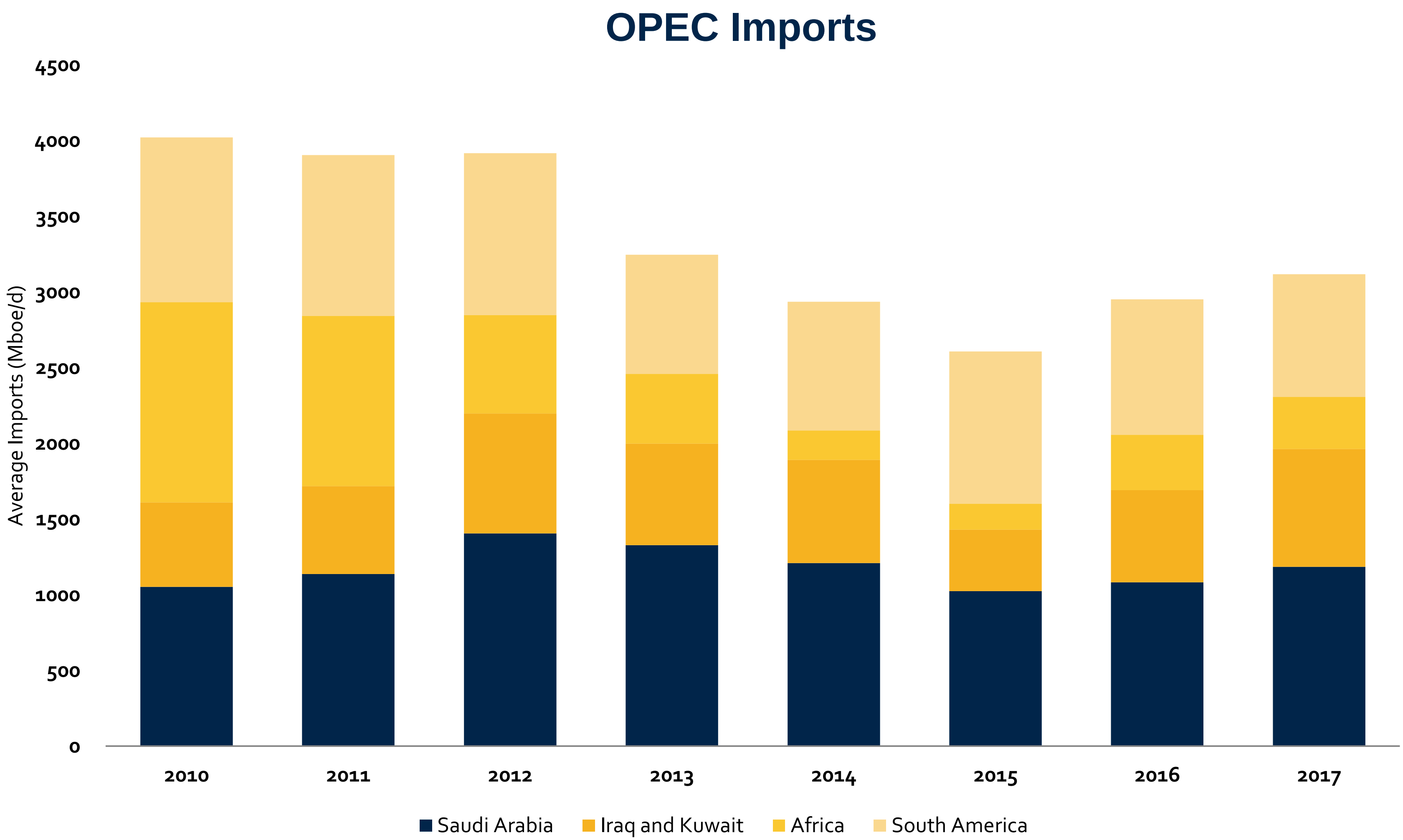
Source: Bloomberg.

OPEC Crude Exports to U.S Declining



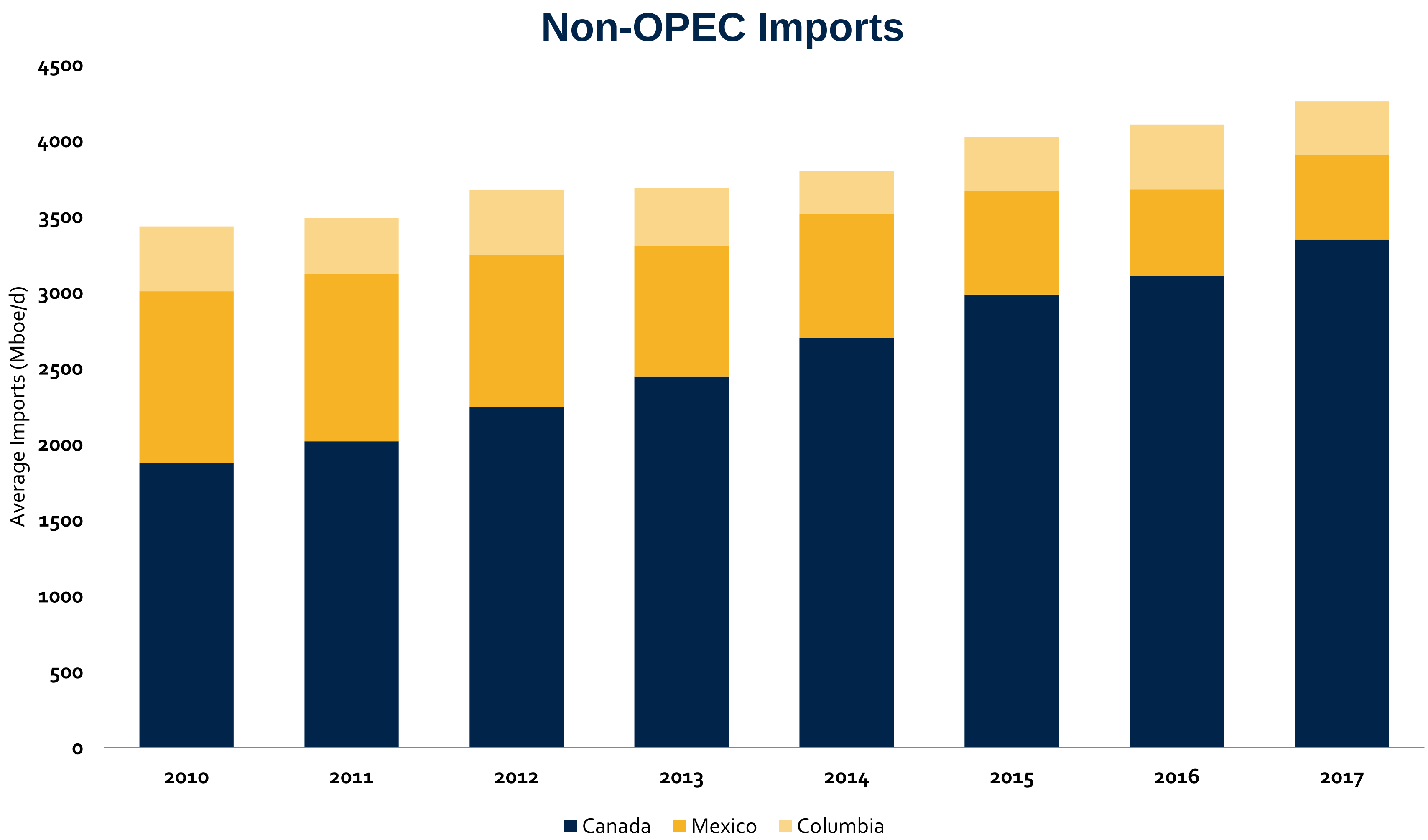
Source: EIA Short Term Energy Outlook

African Imports Decline, Middle East Increase



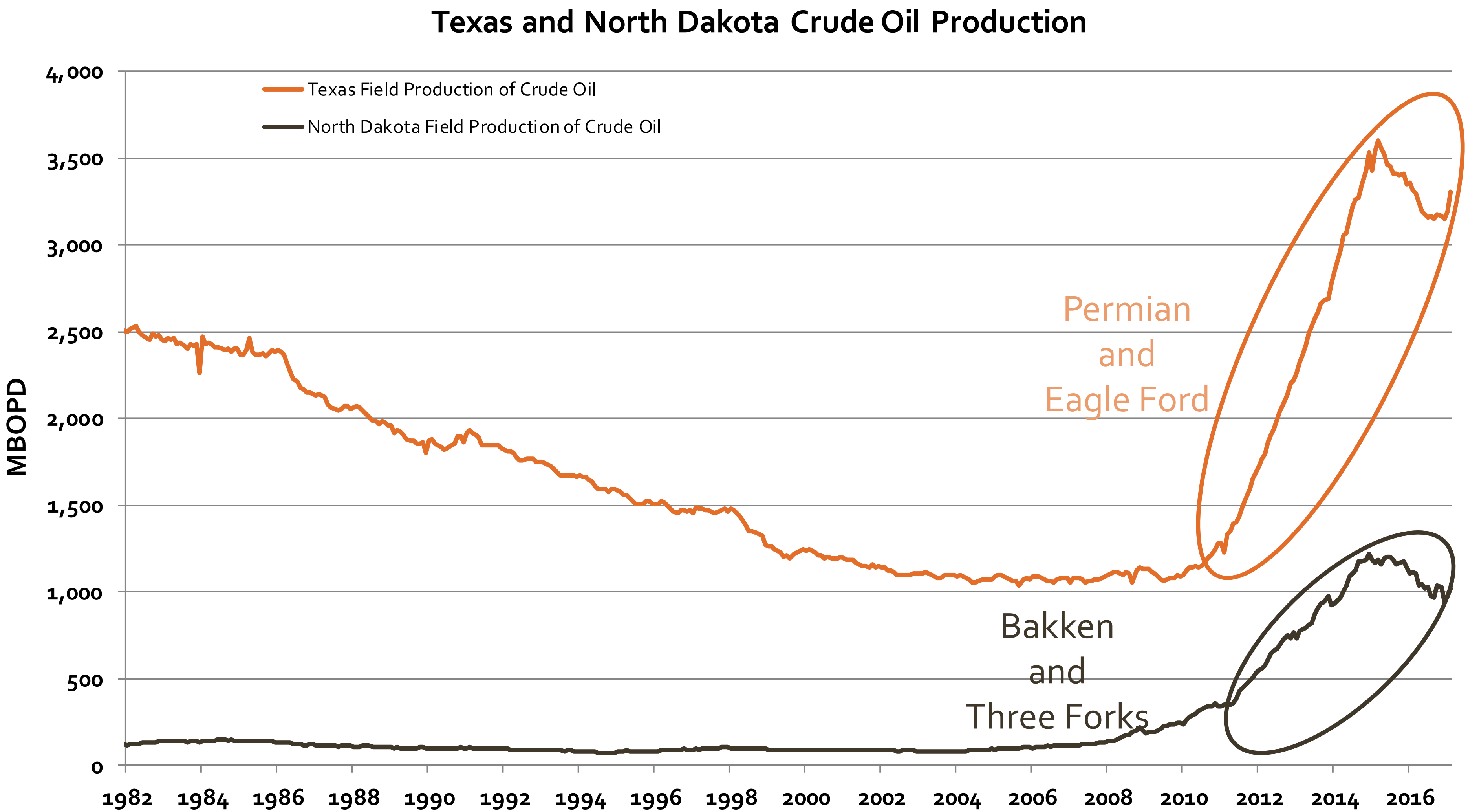
Source: EIA Short Term Energy Outlook

Canadian Imports Rise, Mexico Decreasing



Source: EIA Short Term Energy Outlook

Key Basins Driving Oil Production Growth

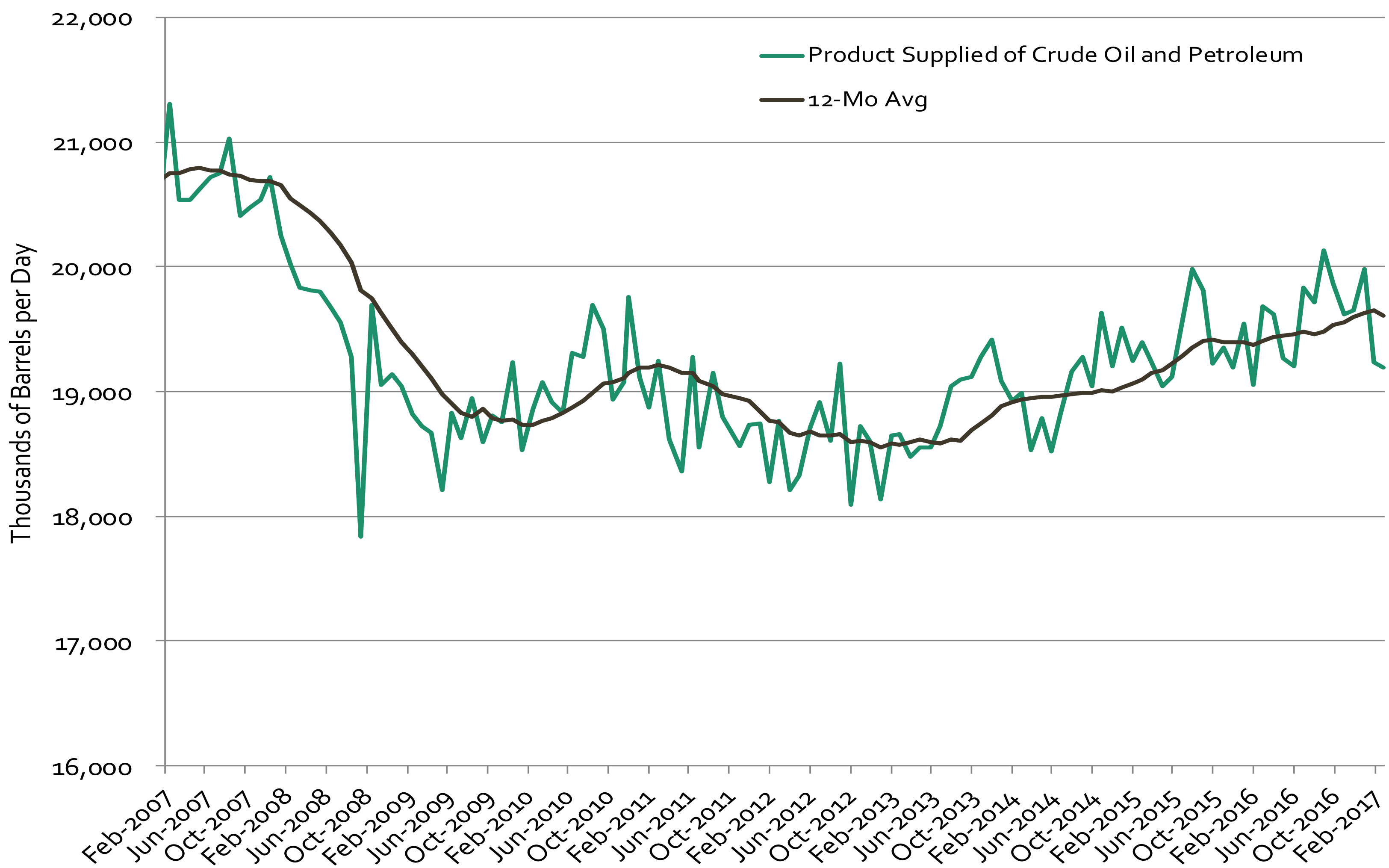


Source: EIA.

U.S. Oil and Petroleum Product Supplied

ENERCOM

Feb-17 U.S. oil demand was down 0.2% from Jan-17 and down 2.5% from Feb-16



Source: EIA, EnerCom

Energy Equivalent Pricing

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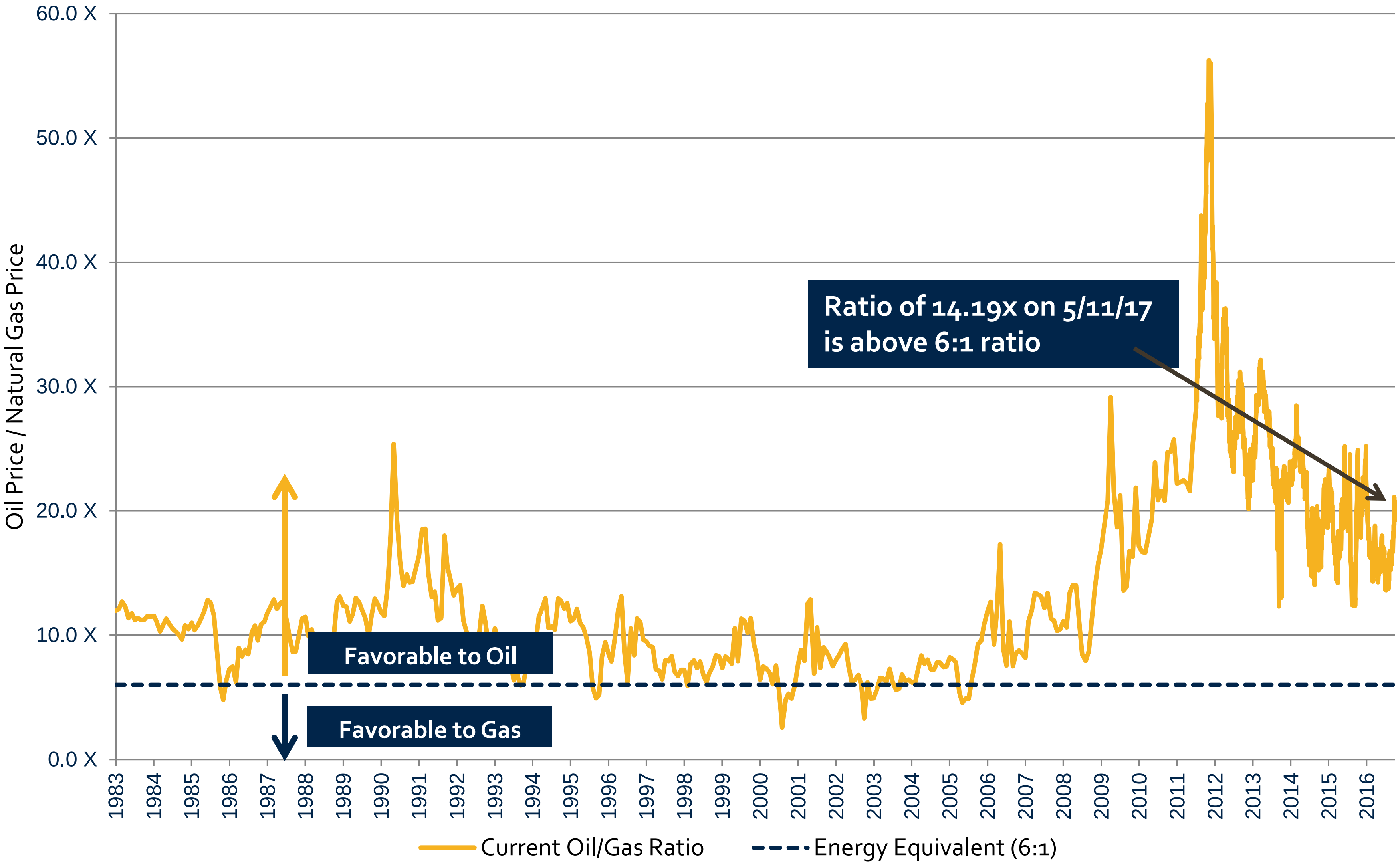
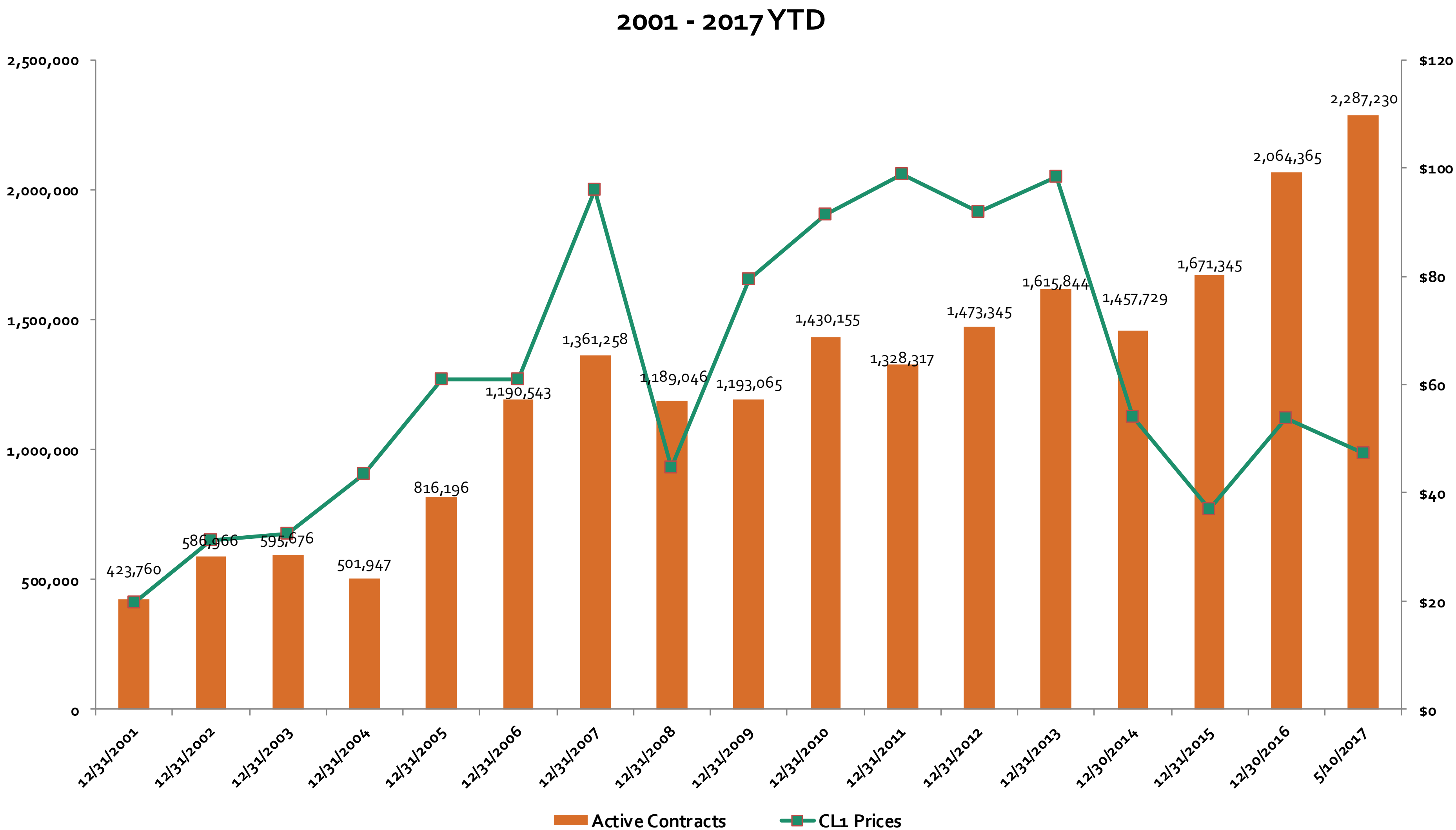


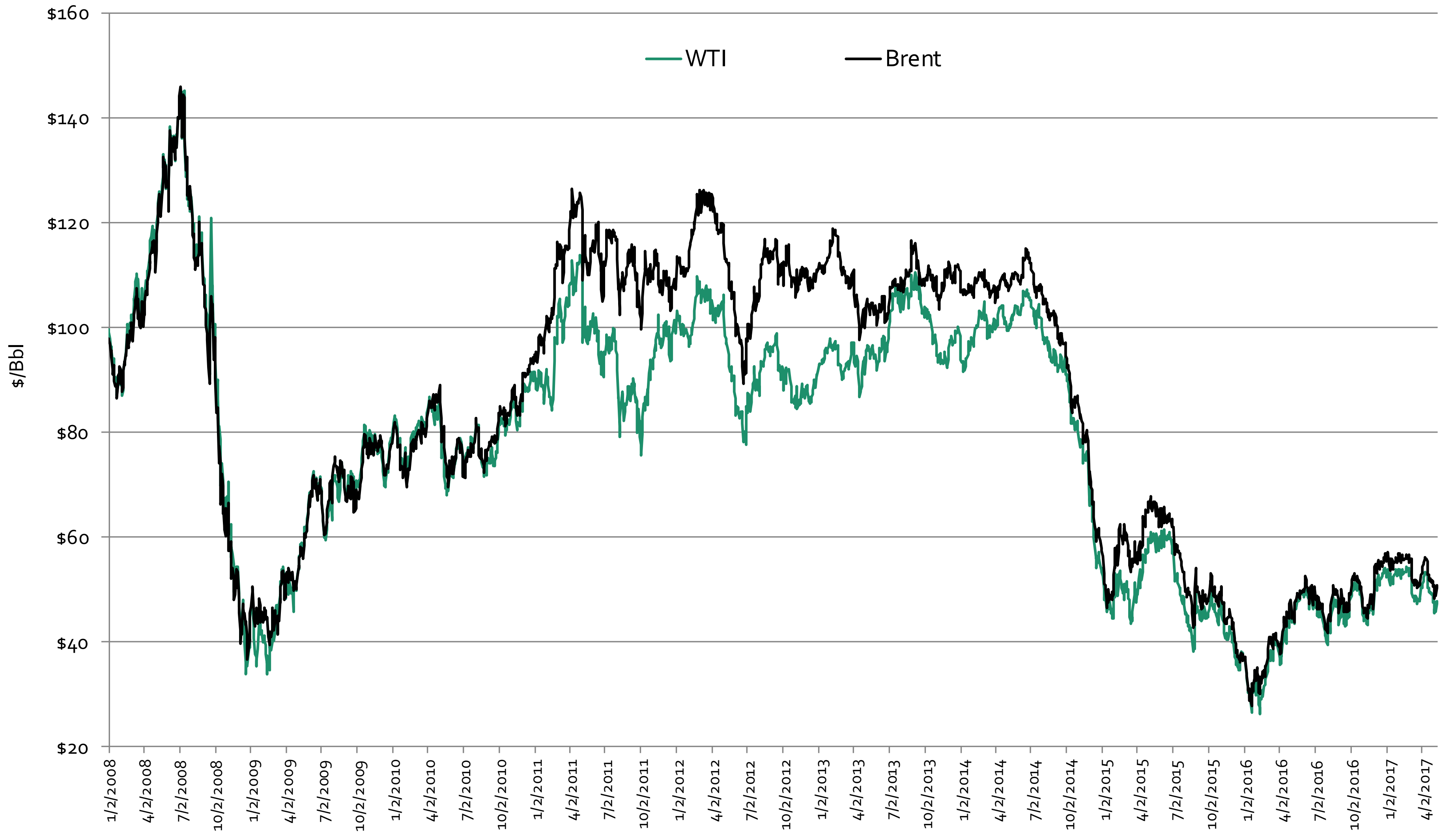
Source: Bloomberg, EIA, EnerCom.

Active NYMEX Crude Oil Contracts



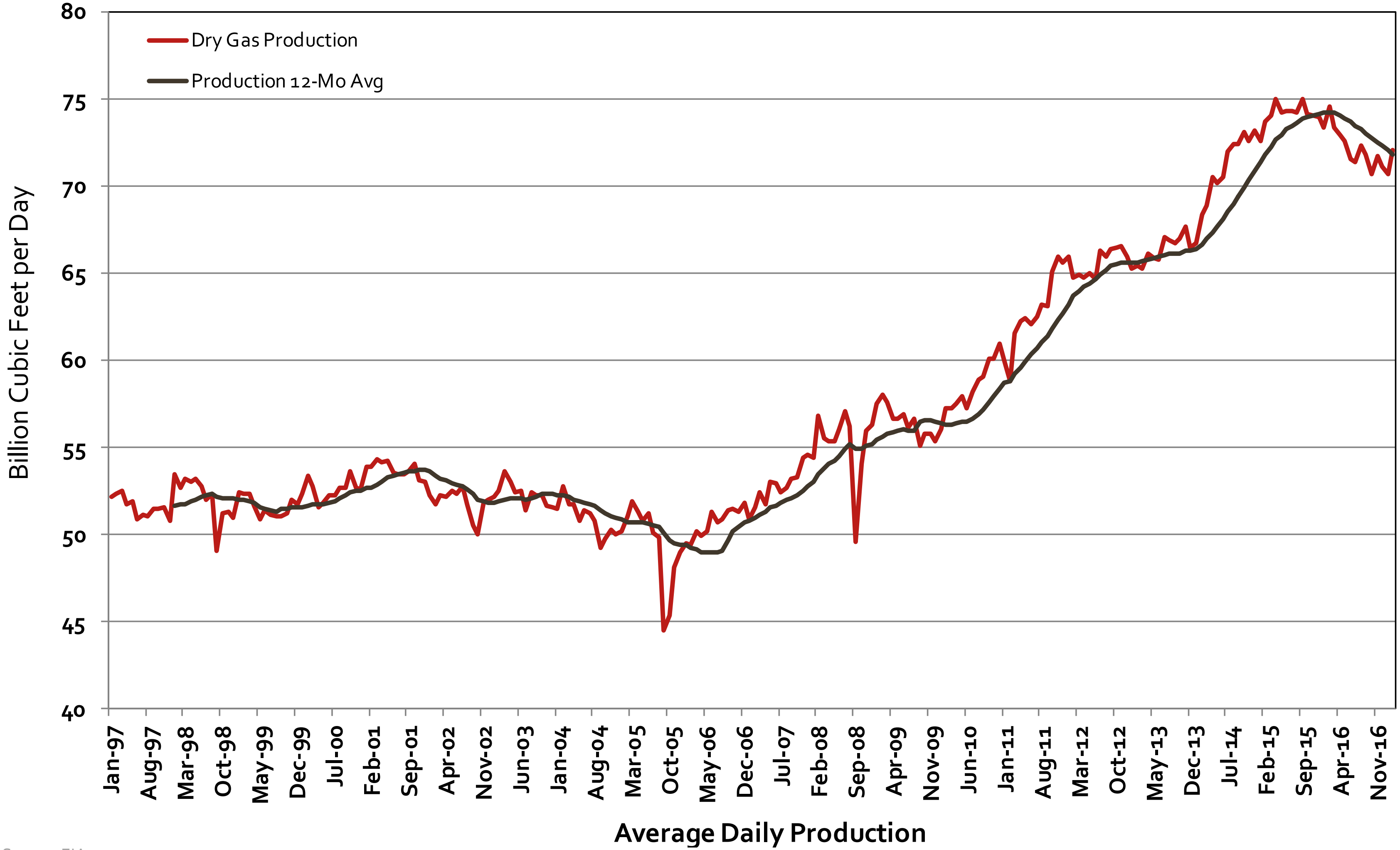
Sources: Bloomberg

Oil Prices – WTI and Brent



Source: Bloomberg.

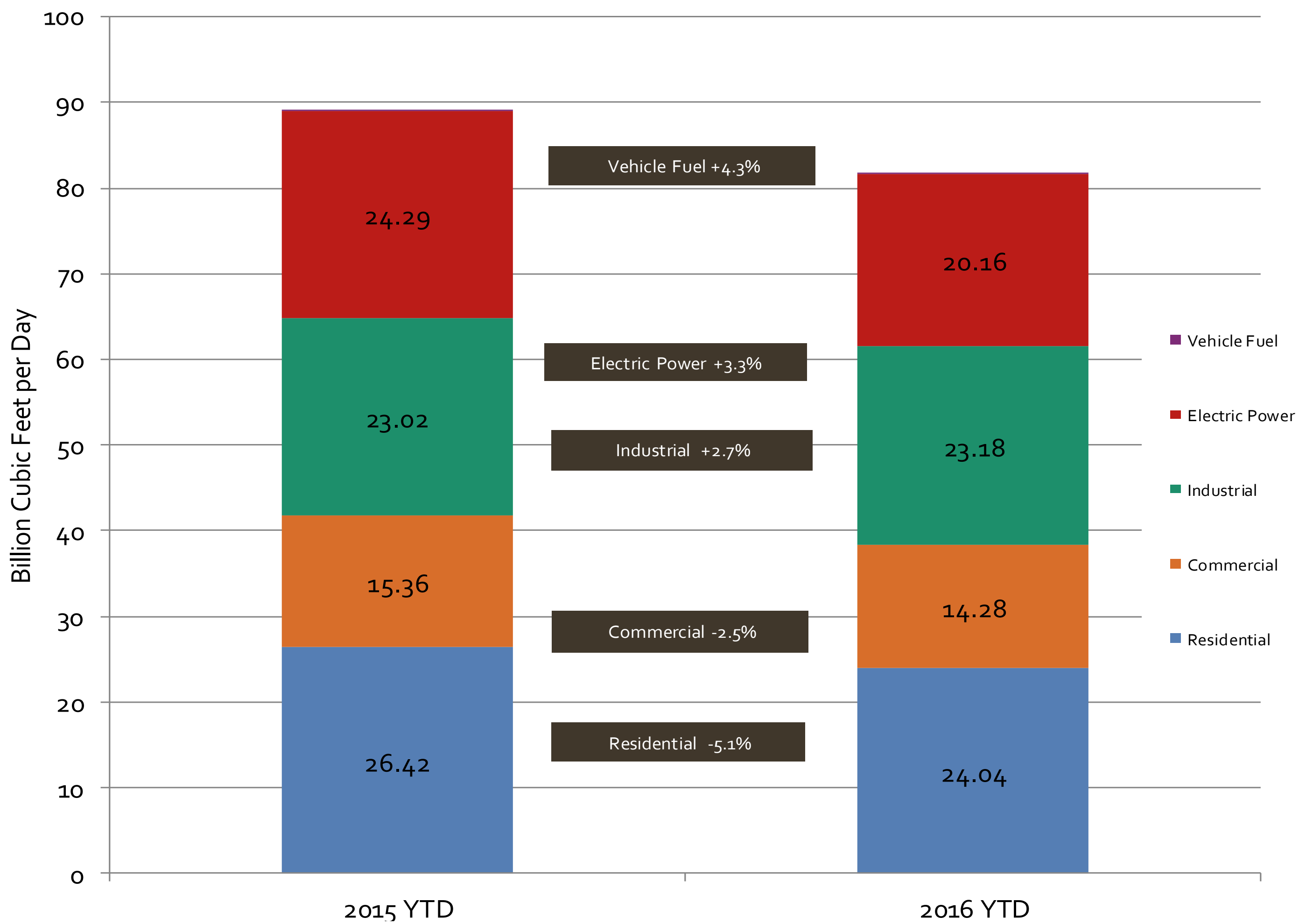
U.S. Natural Gas Production



Source: EIA.

U.S. Natural Gas Consumption

YTD February 2017 Natural Gas Consumption -8.1% over 2016



Source: EIA and EnerCom.

Active Natural Gas Contracts

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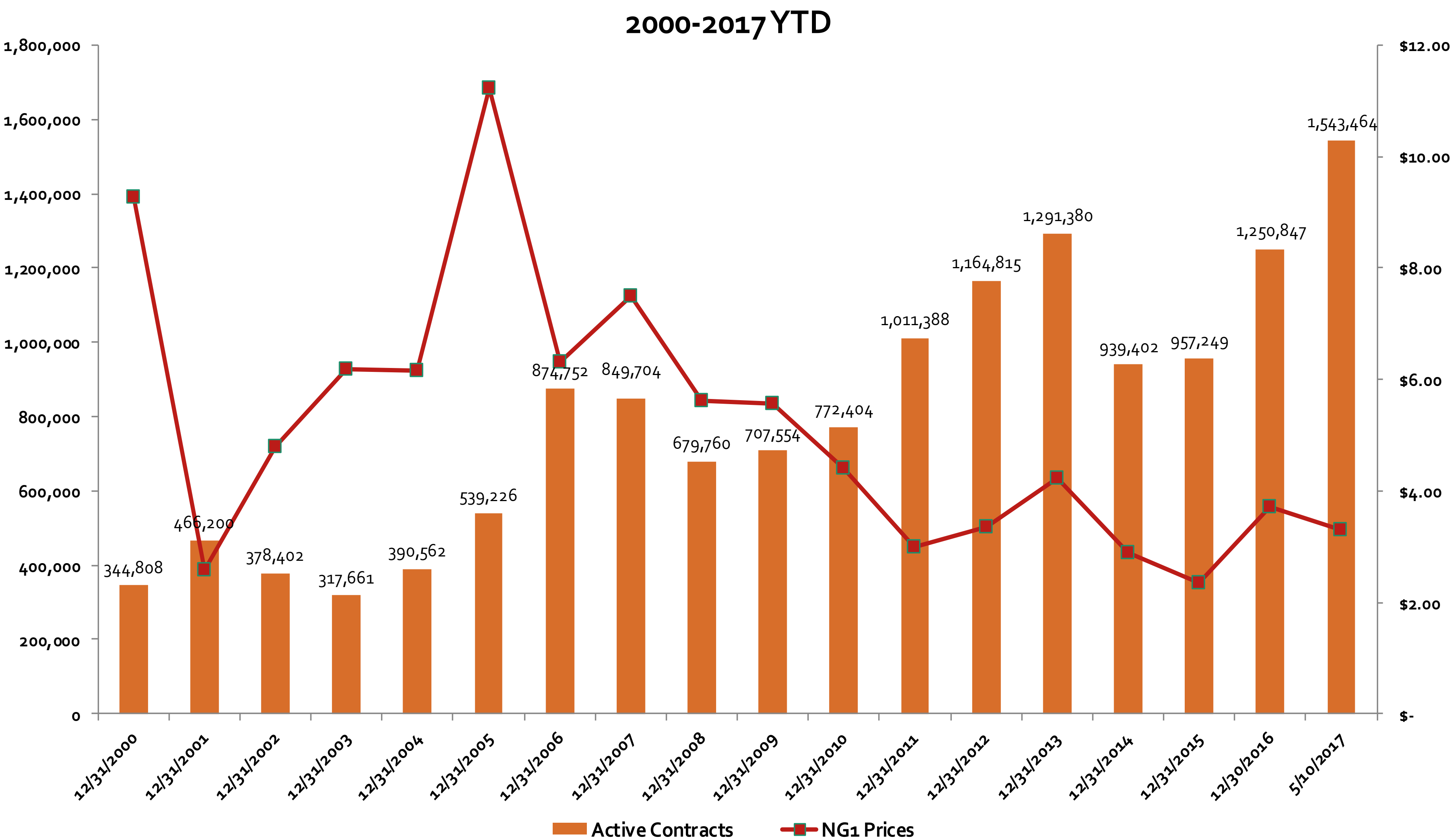
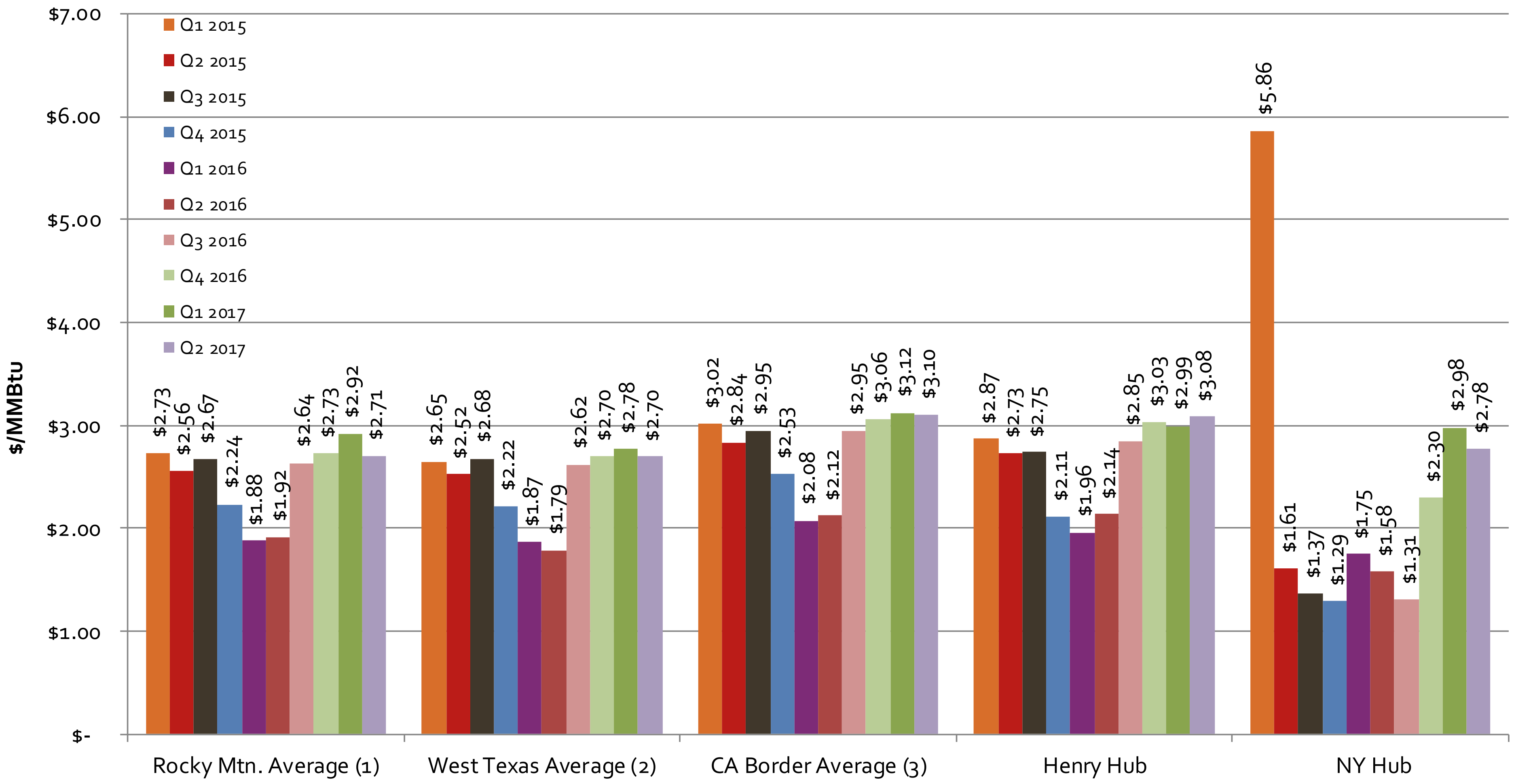


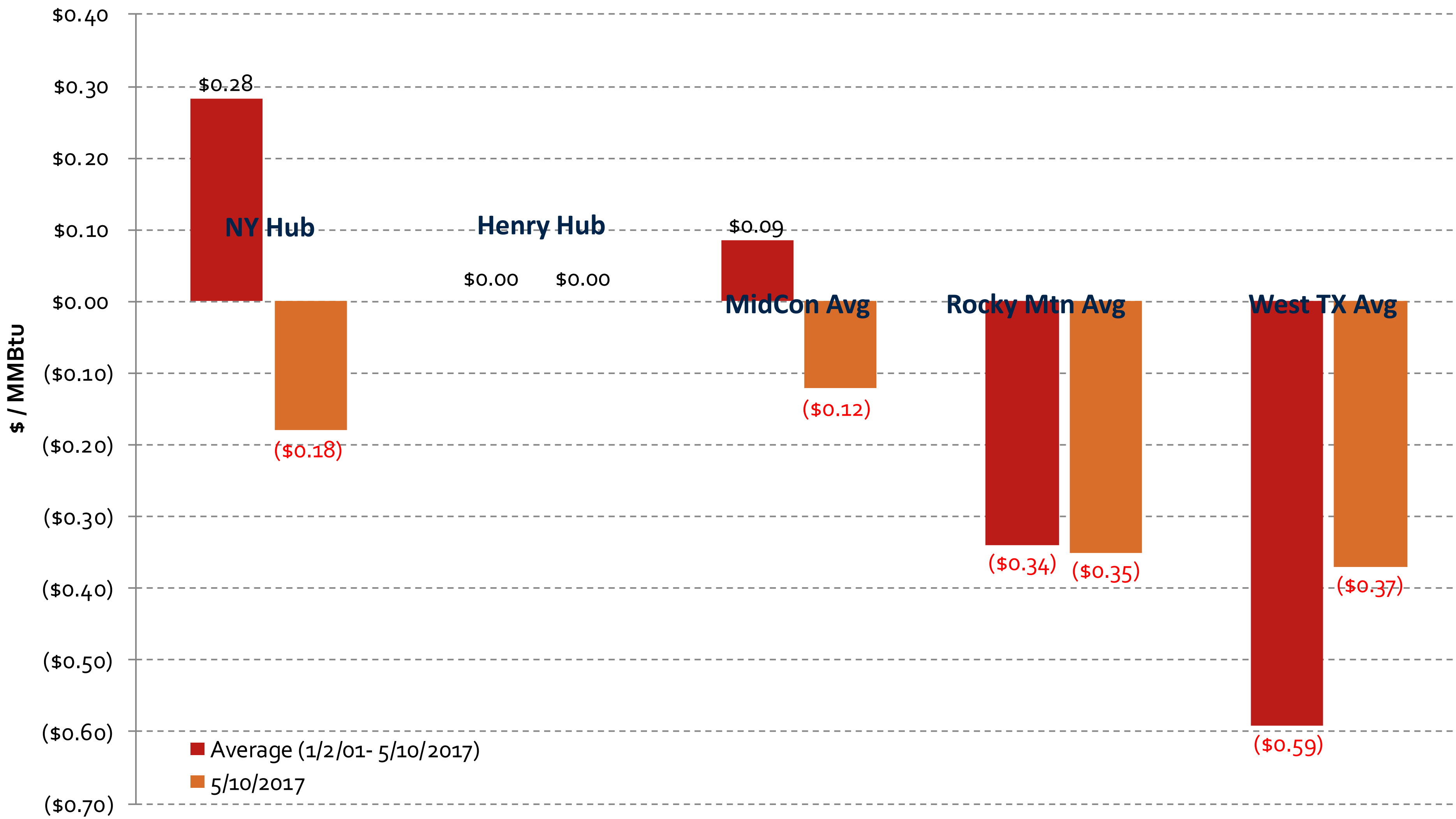
Sources: Bloomberg

U.S. Regional Natural Gas Prices



Notes: (1) Average of 3 Rocky Mountain hubs (2) Average of 2 West Texas hubs (3) Average of 3 hubs delivering gas to California border

Regional Gas Price Differentials



Source: Bloomberg, EnerCom.