



TEXAS OIL & GAS ASSOCIATION | SINCE 1919

U.S. Energy Dominance Starts In Texas



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**Oil and Natural Gas Capital
Investment in Texas**

Key findings of the report:

- According to IHS, total M&A investment in the Permian Basin of West Texas and Southern New Mexico was around **\$25.6 billion** in 2016, accounting for about **41 percent of the total upstream deal value**
- Production from the Permian accounts for about **45 percent of total onshore oil production** in the lower 48 states
- Texas accounted for 24% of U.S. daily natural gas production in May 2017. And a single day of natural gas production in the Eagle Ford could meet the natural gas needs of over 230,000 U.S. homes for one month
- The total number of rigs currently active in the Permian represents almost **half of all active onshore oil rigs** in the United States
- IHS Markit estimates that total capital expenditures for the Permian will **increase by 400 percent** over the next five years – from **\$8 billion in 2016 to over \$40 billion in 2021**
- Just two Permian midstream deals in April 2017 alone were worth **nearly \$3.5 billion**
- The new pipelines planned to connect the Permian Basin with Corpus Christi and the Texas Gulf Coast account for **over \$6 billion in investment**, if all are completed
- These planned pipelines from the Permian to Corpus Christi and the Texas Gulf Coast would support **more than 60,000 jobs**, if all projects are completed
- Since October 2016, over **3 billion cubic feet of natural gas** pipeline capacity originating in the Permian has come online
- As of June 2017, companies have announced **134 projects** totaling **\$71 billion of potential investment** to build new chemical manufacturing facilities or expand capacity along the Texas Gulf Coast
- Petrochemical manufacturing and refining represent **\$240 billion in investment in the full Gulf Coast** region, with a majority of that investment occurring in Texas and Louisiana
- U.S. oil exports have increased **to 1.3 million barrels a day** – that's worth more than \$1.5 billion a month
- Ships carrying about 22 million barrels of oil for export left the Port of Corpus Christi in the first quarter of 2017, meaning Corpus accounted for about **30 percent of the country's total crude exports**ⁱ
- Sourcing natural gas from the rich Permian, Eagle Ford, Barnett and Haynesville Shales, Texas currently has seven LNG facilities planned or under construction including: Texas LNG, Rio Grande LNG, Golden Pass LNG, Freeport LNG, Port Arthur LNG, Annova LNG and Corpus Christi LNG.

Executive Summary

There is no better example of America's new energy dominance than the unprecedented investment in oil and natural gas taking place in Texas. From billions of dollars in petrochemical manufacturing on the Texas Gulf Coast to the upstream activity in West Texas' Permian Basin to the concentration of refining capacity across the state – and the thousands of miles of new pipeline connecting it all – it's clear that the Lone Star State will continue to play a vital role in ensuring our nation's energy security.

The findings of this paper strip bare arguments from oil and natural gas critics who, at first, inaccurately pushed a "peak oil" theory that was to have been the downfall of American energy development. Critics have since pivoted to equally hollow arguments that question the sustainability and national economic benefit of domestic energy production.

This report examines the massive amount of energy investment taking place in Texas, with a special focus on the crown jewel of shale plays: the Permian Basin, located in West Texas and Southern New Mexico. In 2016, deals worth over \$25 billion occurred in the Permian, delivering ripple effects throughout the state's economy, including additional pipeline buildouts and expanded opportunities in trading hubs like the Port of Corpus Christi.

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Employment

According to an August 2017 study by PricewaterhouseCoopers (PwC), the U.S. oil and natural gas industry supported 10.3 million U.S. jobs in 2015. Texas leads the nation by far with nearly 2 million direct and indirect jobs supported by the oil and natural gas industry.ⁱⁱ In 2016, the Texas oil and natural gas industry supported more than 325,500 direct jobs that pay an average of \$130,000 a year. Texas added new oil and natural gas jobs for nine consecutive months through June 2017, when Texas added 5,000 new upstream jobsⁱⁱⁱ – the highest monthly gain in at least five years. Such impressive job growth demonstrates the resilience of the Texas oil and natural gas industry and is indicative of a state with abundant resources and a pro-investment, pro-innovation business climate.

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Upstream Investment

PERMIAN

Currently the most sought after and exciting area of upstream activity in North America is the Permian Basin, which saw an astounding 60 percent drop in breakeven oil prices between 2013 and 2016.^{iv} Despite the collapse in prices, since 2013 total production from the basin increased from roughly 1.35 million barrels^v per day to over 2.4 million barrels per day in July 2017.^{vi} 2.4 million barrels per day equates to about 45 percent of the total oil production for all onshore wells in the lower 48 states.^{vii} From a global perspective, the Permian's production of 2.4 million barrels per day is greater than the average individual crude oil production from nine of the 14 OPEC countries – Algeria, Angola, Ecuador, Equatorial Guinea, Gabon, Libya, Nigeria, Qatar and Venezuela – in 2016.^{viii}

In 2016, the Permian Basin generated over \$25.6 billion in deals according to IHS Markit, accounting for roughly 41 percent of all upstream deal value in 2016.^{ix} The bulk of those deals were in the region's Delaware Basin, which research firm PLS reports attracted \$18 billion in investment, while the Midland Basin generated over \$9 billion.^x To put those numbers into perspective, AT&T Stadium – where the Dallas Cowboys play – cost \$1.2 billion to build. In other words, you could build 22 AT&T Stadiums with the amount spent on acquisitions in the Permian in 2016 and still have hundreds of millions of dollars to spare.^{xi}

Compared to other shale plays in the United States, the Permian saw far more investment in 2016 than any other play in the country. The Permian had more than \$25 billion in M&A activity, compared to \$5.1 billion in the SCOOP/STACK of Oklahoma; \$1.9 billion in the Niobrara of Colorado and Wyoming; and \$2.1 billion in the Bakken of North Dakota and Montana.

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In terms of capital expenditures or capex – the funds a company uses to acquire or upgrade their physical assets such as equipment, property or facilities – the money flowing into the Permian is substantial.^{xii} According to an IHS Markit report, capex in the Permian reached \$8 billion in 2016. This figure includes over \$900 million in investment

from Apache,^{xiii} and over \$1.2 billion from producer Occidental^{xiv} – an investment so large it accounts for about 60 percent of the company's total capital expenditure in 2016. More impressive still, capex in the Permian is expected to increase to over \$40 billion in 2021.^{xv}

By most indications, we're still in the early innings of these developments. According to a report released in 2016 by the U.S. Geological Survey (USGS), the Wolfcamp shale located in the Permian's Midland Basin is estimated to contain 20 billion barrels of oil, along with 16 trillion cubic feet of natural gas and 1.6 billion barrels of natural gas liquids.^{xvi} In fact, the Wolfcamp shale represents the largest estimate of continuous oil that the USGS has ever assessed in the United States.^{xvii} Importantly, the Wolfcamp extends into the Delaware Basin, but 2016's assessment did not include that portion, meaning the largest continuous oil estimate is actually larger than what the USGS estimated.

U.S. Energy Dominance Starts In Texas

According to the latest rig count data from Baker Hughes, the number of active rigs in the Permian more than doubled between 2016 and July 2017, increasing by 211 to a total of 369.^{xviii} Nearly half of all active domestic onshore oil rigs, currently 763, are operating in the Permian.^{xix}

Oil field service companies are seeing a rebound in activity as a result of an increased rig count. For example, Halliburton recently announced that it was hiring about 100 employees per month in 2017 to keep up with demand in West Texas.^{xx} Additionally, the company announced it has expanded its fleet of trucks and pumps by roughly 30 percent, as its workforce in the region has grown by almost the same margin to 2,700 employees.^{xxi}

Looking forward, the red-hot activity in the Permian shows little signs of slowing. In terms of capital expenditure, Chevron announced that it plans to spend \$2.5 billion to develop its shale assets in the Permian in 2017.^{xxii} Apache plans to allocate about 63 percent of its oil and natural gas capital to the Permian, or approximately \$1.9 billion of its \$3.1 billion total budget.^{xxiii}

Impressive, too, are the nine-figure deals still underway. In February 2017, Parsley Energy invested \$2.8 billion to acquire 71,000 acres of land,^{xxiv} and Marathon Oil completed a 70,000-acre purchase in the Permian for \$1.1 billion.^{xxv} The largest deal in the region in 2017 so far, however, was ExxonMobil's 250,000 acre, \$6.6 billion (\$5.6 billion in stock, up to \$1 billion in cash) acquisition in January.^{xxvi}

EAGLE FORD

Aside from the Permian, the Eagle Ford shale in South Texas is the state's second most productive shale play. As of June 2017, crude production in the Eagle Ford was more than 1.3 million barrels per day, with the U.S. Energy Information Administration (EIA) estimating that production in July will further increase by 43,000 barrels per day.^{xxvii} To put this in perspective, that's an increase of 300,000 barrels per day in just four years from June 2013 to June 2017.^{xxviii}

As the nation's number one natural gas producer, Texas accounted for 24% of daily U.S. production in May 2017^{xxix} and the Eagle Ford is one of the top producing natural gas shale plays in the country. On par with the Haynesville Shale in East Texas, Louisiana and Arkansas, the Eagle Ford is among the top three most productive shales for natural gas located in Texas.^{xxx} The region produced over 6.2 billion cubic feet of gas per day in June, with production projection to increase another 140 million cubic feet per day in July.^{xxxi} Putting this in perspective, the average U.S. household uses about 168 cubic feet of natural gas per day and a single day of production in the Eagle Ford could meet the natural gas needs of over 230,000 U.S. homes for one month.^{xxxii}

M&A activity in South Texas in 2017 started out strong, as Sanchez Energy and Blackstone Energy Partners acquired assets in the Western Eagle Ford for approximately \$2.3 billion at the beginning of the year.

Robust production from the Eagle Ford has meant renewed interest in the region, especially with its close proximity to petrochemical facilities and ports along the Texas Gulf Coast. According to oil and natural gas research firm PLS Inc., the Eagle Ford attracted \$2.9 billion in upstream merger and acquisition activity in 2016.^{xxxiii} M&A activity in South Texas in 2017 started out strong, as Sanchez Energy and Blackstone Energy Partners acquired assets in the Western Eagle Ford for approximately \$2.3 billion at the beginning of the year.^{xxxiv}

While activity in the Eagle Ford is lower than its record high in 2014, development in the region still generated over 100,000 jobs and \$55 billion in economic output in 2016.^{xxxv} Moreover, oil and gas production in the Eagle Ford still contributed significantly to the regional South Texas economy in 2016, generating \$2.9 billion in state revenues and \$2.8 billion for local governments from just the top 15 producing counties in the region.^{xxxvi}

As development in the Eagle Ford continues to rebound, coupled with ever-expanding production from the Permian, a main barrier to expansion will be transportation of the resources to their final destination – be it refining, consumers, or manufacturing facilities. This growing need for reliable transmission capacity is driving an increase in pipeline investment, as the effects of shale development move down the oil and natural gas supply chain.

Midstream Investment

There are almost 440,000 miles of pipelines providing essential connectivity across the Lone Star State. As shale development continues to expand, demand for infrastructure that can safely and reliably move energy to end users has increased as well.^{xxxvii} Demand for increased pipeline capacity is especially high in the Permian Basin, where production is projected to reach 2.65 million barrels per day by December, but takeaway capacity may only reach 2.54 million barrels per day by the end of 2017.^{xxxviii}

According to a report from the National Association of Manufacturers (NAM), an estimated 24.1 jobs per mile would be created in the United States from crude oil pipeline construction, while an estimated 57.9 jobs per mile would be created from natural gas transmission pipeline construction.

Nationally, investments in expanding natural gas pipelines increased 94 percent, while spending on crude oil pipelines increased by 190 percent from 2015 to 2016, with major projects in the works for Texas.^{xxxix} Planned midstream projects originating in the Permian include Targa Resources' natural gas liquids pipeline, Grand Prix, representing roughly \$1.3 billion in spending through 2019.^{xl}

Other projects planned for expanding takeaway capacity in the Permian include: the expansion of Sunoco's Permian Express, which will add an estimated 100,000 barrels per day; Magellan Midstream and Plains All-American's BridgeTex pipeline with a capacity of 100,000 barrels a day; Buckeye Partners' 400,000 barrel per day South Texas Gateway pipeline; and the largest planned Texas pipeline since 2008, the 730-mile EPIC pipeline from the Permian Basin to Port of Corpus Christi, which is projected to have a maximum capacity of 590,000 barrels per day.^{xli}

While the direct investment for many of these projects has not been publicly released, these massive infrastructure projects represent significant investment and job creation. According to a report from the National Association of Manufacturers (NAM), an estimated 24.1 jobs per mile would be created in the United States from crude oil pipeline construction,^{xlii} while an estimated 57.9 jobs per mile would be created from natural gas transmission pipeline construction.^{xliii} These are not only temporary construction jobs, but also permanent jobs in manufacturing to supply the steel and other resources needed to construct the pipelines. As the NAM report states, roughly 3.2 manufacturing jobs would be created per mile of crude oil pipeline built, and 9.9 manufacturing jobs for every mile of natural gas transmission pipeline built.

Some projects do have publicly available investment information and their economic contribution is astounding. According to a report from the Perryman Group, the Rio Bravo pipeline – which will ship natural gas from the Eagle Ford Shale to the planned Rio Grande LNG terminal in Brownsville, Texas – will have an estimated cumulative economic impact of over \$4.3 billion in Texas during construction and lifetime of the project.^{xliv}

Additionally, the capital used to fund pipeline development, expansion, and maintenance each year is also noteworthy. One midstream company, Enbridge, lists total capital expenditures in Texas of \$359 million in 2016, an amount that includes steel and equipment purchases and other system investments.^{xlv} The company's operating expenditures, which include maintenance costs, equipment leases, and salaries for workers, totaled \$308 million in 2016.^{xlvi}

In addition to planned projects, the increase in demand for pipeline infrastructure from the Permian and Eagle Ford is readily apparent by the number of recently-completed projects and transactions. For example, since October 2016, three natural gas pipeline projects originating in the Permian with a total capacity of over 3 billion cubic feet per day have come online.^{xlvii} Meanwhile, M&A transactions have reached record numbers. In April 2017, the Blackstone Group acquired EagleClaw Midstream in the Permian's Delaware Basin for \$2 billion.^{xlviii} That transaction happened less than a week after pipeline operator NuStar Energy bought Navigator Energy, a Permian Basin midstream company, for about \$1.48 billion.^{xlix}

As these midstream projects continue to come online, many of them are focused towards the Gulf Coast, as abundant shale resources have been a boon for energy consumers and downstream industries such as petrochemical manufacturing, refining and energy exports.

Downstream Investment

Petrochemicals and refining are major economic drivers in Texas. With close proximity to major international ports, shipping channels, and some of the most productive shale plays in the country, the Texas Gulf Coast has become a hotbed for downstream investments totaling in the tens of billions of dollars.

In Texas specifically, the American Chemistry Council estimates that, as of June 2017, \$71 billion of potential investment has been announced, related to 134 projects, including new chemical manufacturing facilities and increasing capacity at existing facilities.

According to a recent Louisiana State Center for Energy Studies report, domestic shale development has spurred an estimated \$240 billion in already completed or announced capital expenditures in chemical manufacturing and refining nationwide, with the majority of this investment in Texas and Louisiana.^l The report notes that abundant and low-cost natural gas has facilitated over \$142 billion in announced capital expenditures in the overall Gulf Coast region.^{li} In Texas specifically, the American Chemistry Council estimates that, as of June 2017, \$71 billion of potential investment has been announced, related to 134 projects,

including new chemical manufacturing facilities and increasing capacity at existing facilities.^{lii}

This tally doesn't include the major additional announcements made so far in 2017. Chevron Phillips Chemical announced in June that it is commissioning two polyethylene units as part of a \$6 billion petrochemical expansion on the Gulf Coast.^{liii} Also in 2017, ExxonMobil announced its \$20 billion "Growing the Gulf" initiative, which

includes ongoing and planned investment in 11 projects over the next 10 years, resulting in an estimated 45,000 jobs.^{liv}

Along with chemical manufacturing, the Gulf Coast of Texas and Louisiana has been the focus of massive new investments in refining facilities to take advantage of new supplies of domestically-produced crude oil. Currently home to 58 petroleum refining facilities, the increase in activity from Gulf Coast refiners is nothing short of incredible.^{lv} In May 2017, global energy company Saudi Aramco announced plans to invest a total of \$30 billion in its U.S. subsidiary Motiva Enterprises' to expand refining capacity in the company's Port Arthur, Texas facility.^{lvi} This expansion would add an estimated 2,500 jobs in Port Arthur in the short-term, with an additional 12,000 jobs created by 2023.^{lvii}

Crude Oil and LNG Exports

In addition to the economic benefits from capital expenditure on chemical manufacturing and refining facilities, Texas benefits from exporting these products, as well as the export of crude oil and liquefied natural gas (LNG). According to the International Trade Administration, the export of petroleum and coal products accounted for over \$37 billion in trade in 2016, while Texas chemical exports totaled over \$36.5 billion in 2016.^{lviii} Net exports from the Gulf Coast have increased by an average of 40 percent annually, with the region becoming a net exporter of petroleum products in late 2008.^{lix}

Thanks to abundant, high-quality crude produced in the Permian and Eagle Ford, exports of crude oil from the Port of Corpus Christi alone accounted for almost \$2 billion in trade in the first half of 2017, making it the number one port for crude exports.^{lx} Putting that figure in perspective, the Port of Corpus Christi has already seen a 593 percent increase in crude oil exports compared to 2016.^{lxi} During the first quarter of 2017, ships carrying about 22 million barrels of oil for export left the Port of Corpus Christi, accounting for about 30 percent of the country's total crude exports.^{lxii} Moreover, the roughly 1.3 million barrels of crude oil per day now being sent to buyers abroad means domestic oil exports accounts for about \$1.5 billion per month.^{lxiii} As the U.S. looks to increase crude exports, a more than \$1 billion capital investment program has begun at the Port of Corpus Christi to allow for greater export capacity.^{lxiv} These investments include dredging and widening the shipping channel to enable larger ships to dock, potentially boosting the port's export capacity to 3 million barrels a day.^{lxv}

Thanks to abundant, high-quality crude produced in the Permian and Eagle Ford, exports of crude oil from the Port of Corpus Christi alone accounted for almost \$2 billion in trade in the first half of 2017, making it the number one port for crude exports.

Exports of liquefied natural gas (LNG) are another major economic catalyst for Texas. There is currently one LNG export project that is operational in the lower 48 states, Cheniere's Sabine Pass terminal. Sourcing natural gas from the rich Permian, Eagle Ford, Barnett and Haynesville Shales, Texas currently has seven more LNG facilities planned or under construction including: Texas LNG, Rio Grande LNG, Golden Pass LNG, Freeport LNG, Port Arthur LNG, Annova LNG and Corpus Christi LNG.^{lxvi} Each of these facilities represents billions of dollars in capital expenditure that will help boost the Texas economy. NextDecade's Rio Grande LNG facility, for example, is expected to generate up to \$20 billion in investment.^{lxvii} One recent report found that the development of LNG facilities in Texas will generate \$145 billion in economic benefit for the state.^{lxviii}

Conclusion

With world-class shale reserves, oil and natural gas development in the Lone Star State has experienced record expansion over the past decade. Even now, with a low-price environment, the wealth of energy capacity in Texas has allowed companies to develop resources at a lower cost, creating more jobs and more tax revenue for Texas.

Texas activity is the reason all global discussions of oil and natural gas include the growing capacity of the United States.

Expanded production from the Permian, as well as the Eagle Ford in South Texas, has resulted in growth throughout the supply chain. Midstream operations are seeing billion-dollar acquisitions, including two deals totaling over \$3.5 billion finalizing in April 2017 alone. Several new pipeline projects will expand takeaway capacity from West Texas, driving even more activity and investment. Already reaching downstream industries, increased domestic oil and natural gas production has prompted over \$71 in potential petrochemical investment along Texas' Gulf Coast. Moreover, exports of petroleum products, crude oil and liquefied natural gas are projected to increase, providing billions of dollars annually to the state.

The oil and natural gas industry continues to be major economic force in Texas, and is the primary reason America is on the threshold of energy dominance. Texas activity is the reason all global discussions of oil and natural gas include the growing capacity of the United States. Unprecedented energy-related investments from the Permian and Eagle Ford, across Texas and along the Gulf Coast are a strong indicator that the United States' status as a global energy power is unlikely to change any time soon.

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