

OIL AND GAS MAP OF TEXAS

2018

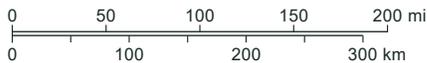
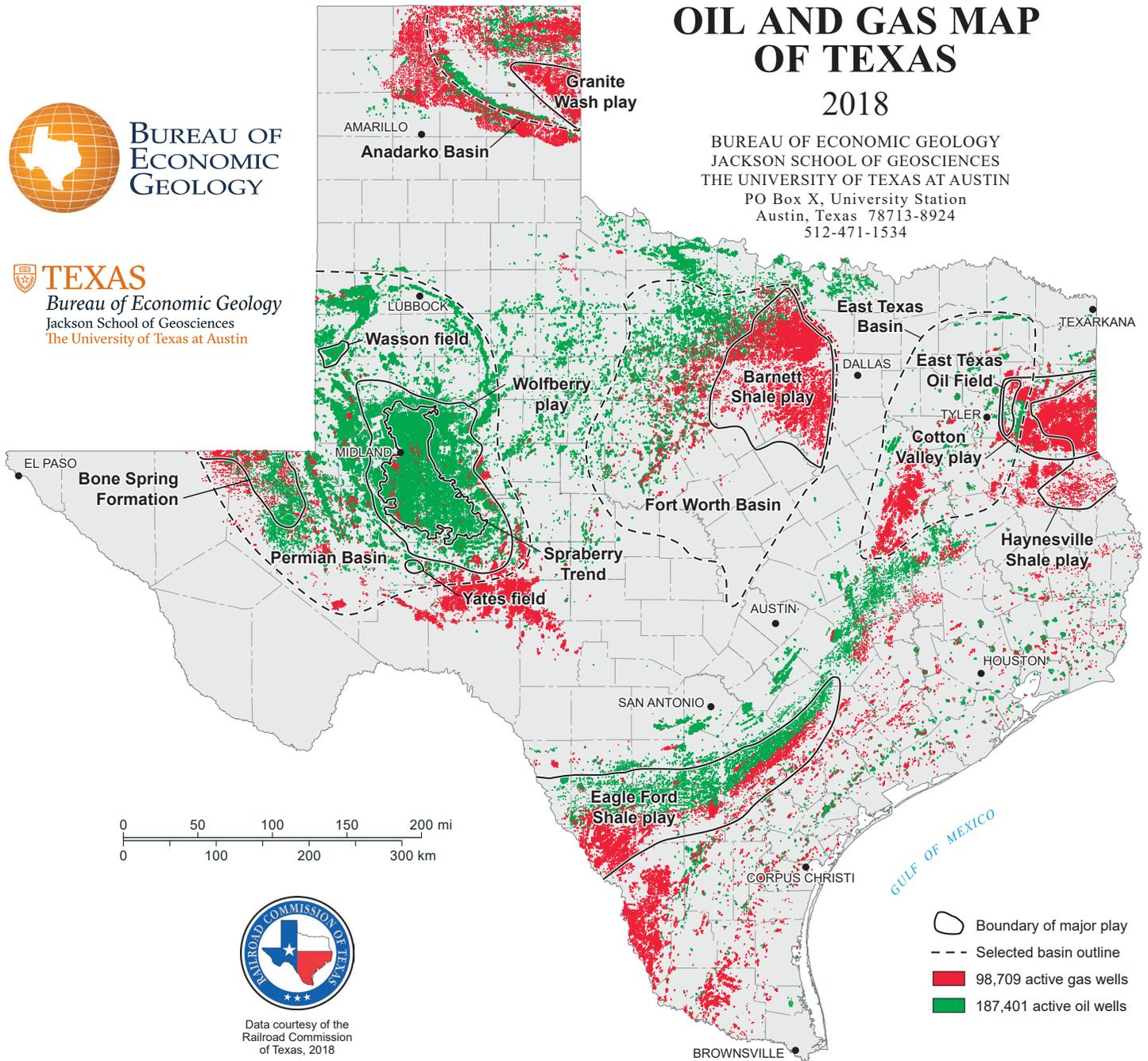
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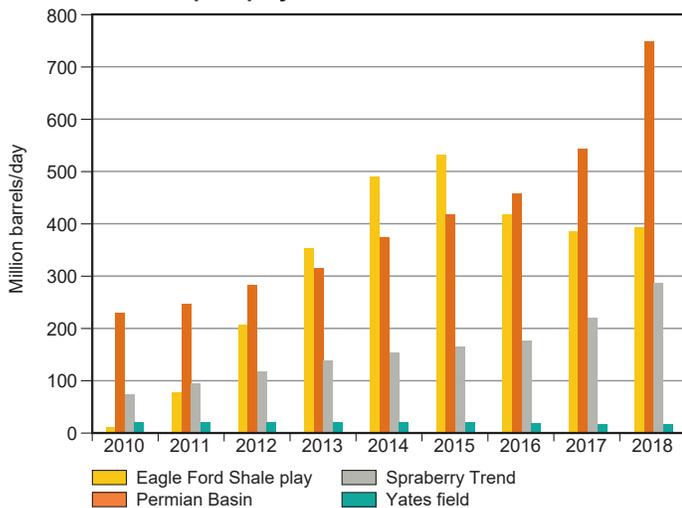


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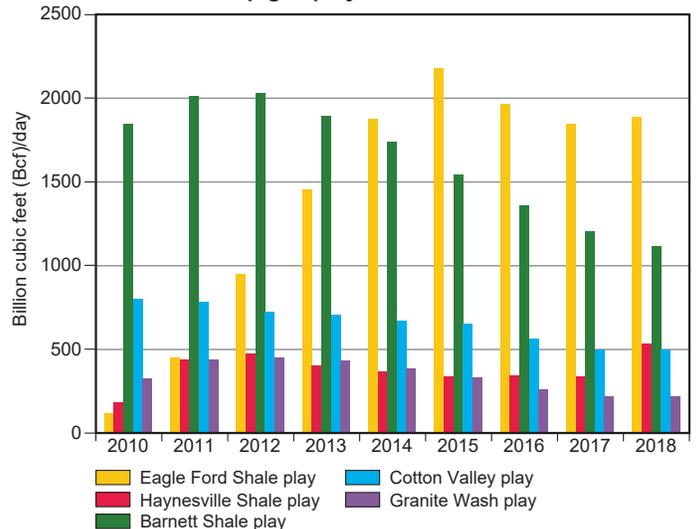


Data courtesy of the Railroad Commission of Texas, 2018

Top oil plays and fields in Texas 2010–18



Top gas plays in Texas 2010–18



Oil and Gas Production in Texas

Texas has produced more oil and natural gas than any other state and remains the largest daily producer, with ~4 million barrels per day (MMbbl/d) of oil and more than 20 billion cubic feet per day (Bcf/d) of gas in 2019. No other state or region worldwide has been as heavily explored or drilled for oil and natural gas as Texas. Currently (as of December 2018), 187,401 active oil wells and 98,709 active gas wells produce oil and natural gas in the state, according to the Railroad Commission of Texas.

Historic Oil and Gas Production and Recent Significant Developments

Oil drilling in Texas first occurred at Oil Springs, near Nacogdoches in East Texas, in 1866, less than a decade after Colonel Edwin Drake's 1859 well in Titusville, Pennsylvania. In 1894, the Texas age of oil began with the first major discovery, Corsicana field, in East Texas. The first boom came in 1901 with Spindletop field in the Gulf Coast Basin. Thousands of other discoveries have followed. East Texas Oil Field, the largest oil field in Texas or in any of the U.S. Lower 48 states as measured by cumulative production, was discovered in 1930. Texas oil production peaked in 1972 at 3.5 MMbbl/d, and thereafter production declined to 1.1 MMbbl/d by 2009. Successes in Enhanced Oil Recovery (EOR) projects from the 1990's to the present in mature fields in West Texas were insufficient to offset the overall statewide decline trend in oil production. Since 2009, oil production has increased dramatically, reaching ~4 MMbbl/d in 2019. Nearly all of this increase is from unconventional reservoirs. Unlike conventional reservoirs where hydrocarbons flow readily into the wellbore, unconventional reservoirs (including shales) require hydraulic fracturing, which creates cracks in the reservoir and enables oil and gas to flow into the well.

In the past 10 years, the combination of horizontal wells and multistage hydraulic fracturing technologies has revitalized both oil and natural gas production in Texas and in the United States. Historically, natural gas in Texas was produced as a byproduct of oil. This form of natural gas, which is in contact with crude oil in the reservoir, is termed *associated gas*, and in earlier years it was wastefully flared and vented off without being captured and utilized. With increased oil exploration and production in Texas, and the growth of *nonassociated gas* production, annual natural gas production steadily rose and peaked in

1972 at 9.6 trillion cubic feet (Tcf). However, unlike oil production, Texas gas production remained fairly flat from 1984 to 2005, mainly as a result of hydraulic fracturing technology in tight-gas sand reservoirs in the Gulf Coast, Permian, and East Texas Basins. Since 2005, gas production has increased more than 40% to 8.5 Tcf in 2018, with most of the increase coming from the Wolfberry, Barnett, Eagle Ford, and Haynesville Shale plays.

Major Texas Oil and Gas Fields

The top oil plays in Texas in 2019 include the Eagle Ford Shale in South Texas, the Wolfberry (combined Spraberry and Wolfcamp Formations), and the Wasson and Yates fields in the Permian Basin, which currently account for 15% of U.S. oil production. Unconventional oil production from shales and other tight reservoirs in the Permian Basin is expected to grow dramatically because of the recent sharp increase in successful horizontal drilling and hydraulic fracturing activity there. Mature conventional fields (Wasson, Yates) with access to carbon dioxide for EOR operations continue to be major producers. Major natural gas fields in Texas, measured by current production rate, include the Newark East field (Barnett Shale) in North Texas, the Eagle Ford Shale, and two tight gas sands—Granite Wash (northern Panhandle) and Cotton Valley (East Texas). These large gas fields in Texas are all products of application of advanced technologies, mainly hydraulic fracturing and horizontal drilling, that have enabled economically viable gas production from very impermeable (tight) reservoir rocks. The Gulf Coast also continues to produce significant volumes of gas from Tertiary-age conventional sandstone reservoirs.

U.S. and World Ranking

The application of advanced technologies continues to make Texas the leading state in oil production. Texas produced 1,275 MMbbl of oil, or ~35% of the U.S. total, in 2018, and 8.5 Tcf of gas, or ~25% of the U.S. total, in 2017. If Texas were a nation, it would rank as one of the top 10 producers in the world. In terms of proven oil and natural gas reserves, Texas has 33% (11.1 billion bbl), and 29% (93.5 Tcf), respectively, of the U.S. total (source: Energy Information Administration [EIA]). Proven reserves are the estimated quantities that analysis of geologic and engineering data demonstrate with reasonable certainty will be

recoverable in future years from known reservoirs, under existing economic and operating conditions.

Economic Impact

The major resurgence of oil and natural gas production in Texas makes these commodities an important source of economic benefit in terms of value, jobs created, and tax revenue. According to the Texas Comptroller's input-output model of Texas' economy, the total economic value of oil and gas is 2.91 times the value of production. Additionally, 19.1 jobs are created per million dollars of oil and gas production. Assuming oil and natural gas prices of \$100/bbl and \$3.5/Mcf, and year 2018 annual production of 1,275 MMbbl and 8.5 Tcf, the wellhead value was \$127.5 billion for oil and \$29.8 billion for gas. Severance, *ad valorem*, and indirect taxes provide additional economic benefits of more than \$4.5 billion to Texas. The leasing of mineral rights to State- and University-owned lands statewide, moreover, provides royalty and leasing revenue that replenishes the Permanent University and School Funds, important sources of revenue for public education in Texas.

Railroad Commission of Texas

The Railroad Commission of Texas, established in 1891, is the oldest regulatory agency in the state and one of the oldest of its kind in the nation. The Railroad Commission has regulatory divisions that oversee Texas' oil and natural gas industry, gas utilities, pipeline safety, safety in the liquefied petroleum gas industry, and surface mining of coal and uranium. As the regulatory agency for the oil and gas industry, it provides extensive drilling and production statistics. The Railroad Commission continues to serve Texas in its stewardship of natural resources and the environment, its concern for the individual and communal safety of citizens, and its support of enhancing development and economic vitality for the betterment of Texas as a whole.

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Bureau of Economic Geology

The **Bureau of Economic Geology**, established in 1909, is the oldest research unit at The University of Texas at Austin. The Bureau is the State Geological Survey of Texas, and Director Scott W. Tinker is the State Geologist. The Bureau conducts basic and applied research programs in energy resources and economics, coastal and environmental studies, land resources and use, geologic and mineral mapping, hydrogeology, geochemistry, and subsurface nanotechnology.