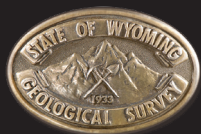


Oil & Natural Gas Resources in Wyoming



January 2022 Summary Report



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Geological Survey**
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Other sources of oil & gas information:

[Wyoming State Geological
Survey](#)

[Wyoming Oil and Gas
Conservation Commission](#)

[Wyoming Energy Authority](#)

[Wyoming Pipeline Corridor
Initiative](#)

[Wyoming Integrated Test
Center](#)

[Petroleum Association of
Wyoming](#)

[Consensus Revenue
Estimating Group \(CREG\)](#)

[EIA Short-Term Outlook](#)

[IEA Analysis](#)

Numerous unforeseen challenges during the last two years—supply and demand fluctuations, regulatory changes, and ongoing economic volatility associated with a global pandemic—led to unanticipated and prolonged stress on a thriving oil and gas industry. These turbulent years also highlighted the importance of connections between people, products, and companies, all of which are vital for Wyoming's oil and natural gas industry and its economic health. This summary report looks at how different industry players are maintaining their current connections and forging new ones to help bolster Wyoming's economic recovery.

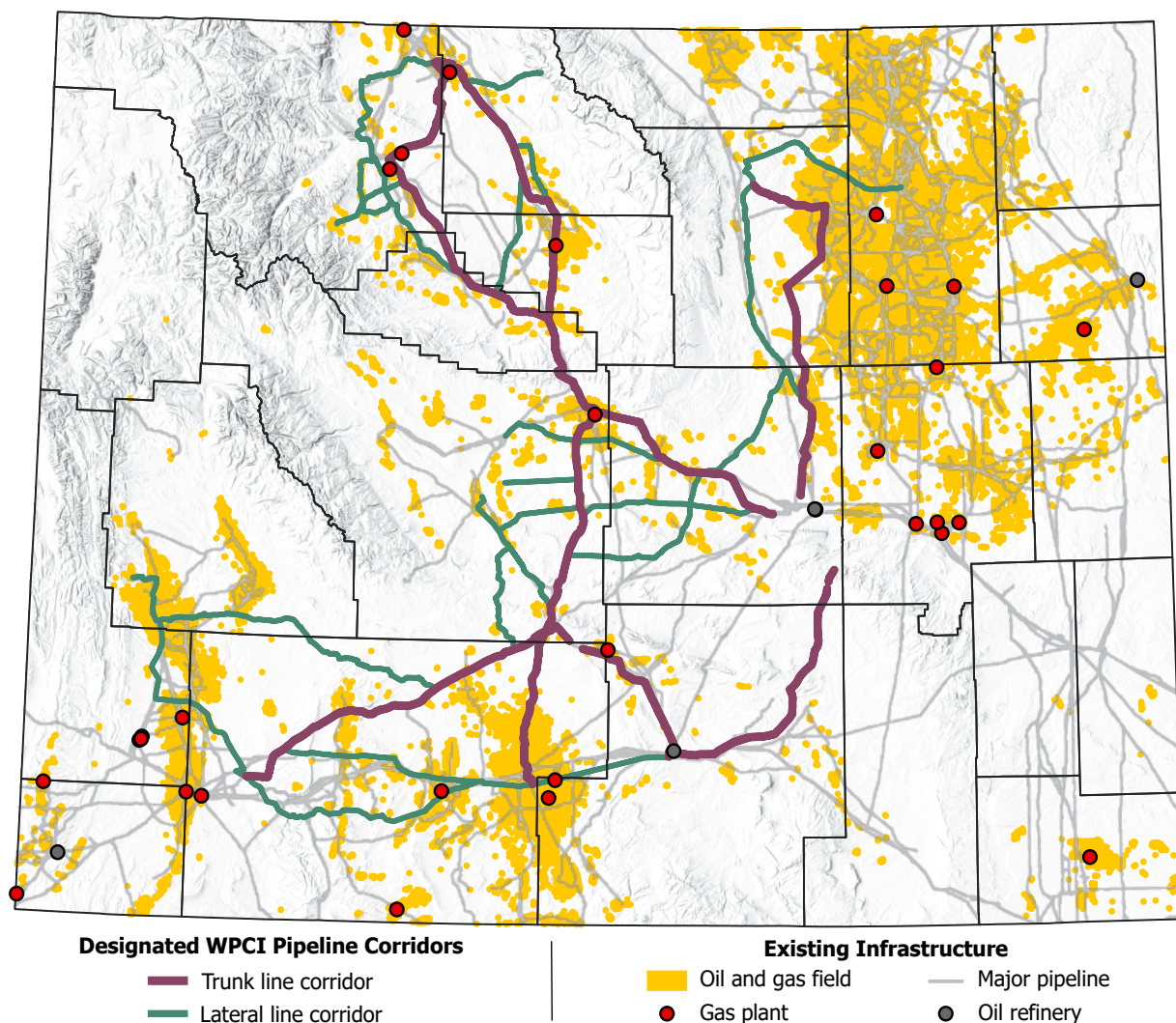
Infrastructure connections

Pipeline infrastructure plays a critical role in connecting oil and natural gas products with refineries and processing plants, and ultimately regional, national, and global markets. It is therefore encouraging that several new Wyoming pipeline projects are in the works.

Recently completed pipeline projects include a 25-mile extension of Tallgrass Energy's Pony Express crude oil pipeline between Carpenter, Wyoming and Hereford, Colorado; an increase to the capacity of the Montana-to-Wyoming Western Corridor Pipeline by 70,000 barrels of light crude oil per day; the completion of True Companies/Bridger Pipeline's Equality Pipeline, which traverses 190 miles from Hulett to Guernsey and can transport up to 200,000 barrels per day; and the Dominion Energy Overthrust Pipeline Point of Rocks West expansion, which increased its capacity by 130 million cubic feet of natural gas per day.

Looking forward, Lower Valley Energy has proposed the Crow Creek Pipeline between Montpelier, Idaho and Afton, Wyoming. This approximately 49-mile-long pipeline would connect Afton with a secure and stable source of natural gas. Liquefied natural gas, or natural gas cooled to a liquid state for easier transport, is currently trucked via highway to Afton, a much less reliable method than a dedicated pipeline. The U.S. Forest Service issued a Record of Decision for the Crow Creek Pipeline in November of 2019, but the project is currently undergoing a legal challenge.

Perhaps the most exciting development for the future of Wyoming's pipeline infrastructure is the approval of the Wyoming Pipeline Corridor Initiative (WPCI). The Wyoming legislature first appropriated funds for the initiative in 2012. In January 2021, the U.S. Bureau of Land Management issued a federal record of decision, designating more than 1,100 miles of federal lands throughout Wyoming as corridors for potential new pipelines. Another 900 miles of corridors have also been identified on private and state lands, but will not be a priority during the initial stages of the project. In addition to transporting oil and natural gas products, the new pipeline corridors were designed to incorporate associated infrastructure, such as enhanced oil recovery, carbon capture, and even broadband technology. The Wyoming Pipeline Corridor Initiative will optimize future pipeline construction timelines through the designated corridors, helping the oil and gas industry capitalize on these new connections to transport products within and out of Wyoming.



In 2021 the U.S. Bureau of Land Management (BLM) identified a nearly 2,000-mile-long network of land corridors in Wyoming as potential sites for future pipeline construction. This initiative, plus the state's already extensive oil and gas infrastructure, put Wyoming in a position to take advantage of new, burgeoning technologies, such as hydrogen production; enhanced oil recovery; and carbon capture, transport, and storage. Data sources: WPCI corridors from BLM; major pipelines from Enhanced Oil Recovery Institute; oil refineries and gas plants from U.S. Energy Information Administration and Wyoming Oil and Gas Conservation Commission.

Associated products connections

When an oil or gas well is permitted by the state, that well's classification is based on the primary production target (oil wells target oil production; gas wells target natural gas production). However, since most wells produce both oil and gas regardless of their classification, production of a commodity that is not the primary production target is known as an "associated" product. Associated gas, or natural gas produced from oil wells, has steadily increased from approximately 11 percent of Wyoming's total natural gas production in 2015 to nearly 19 percent in 2020. Associated gas has helped temper the state's gradual decline in natural gas production from large conventional and coalbed methane fields, which peaked in 2009.

Conversely, some permitted gas wells are considered "wet gas" wells because their product stream has high proportions of

natural gas liquids, or condensate. Condensate is similar to a very light oil, but with higher volatility and BTU than crude oil. The Wyoming Oil and Gas Conservation Commission generally records condensate production as oil production. For this reason, wet gas wells in Wyoming's conventional gas fields contribute significantly to the state's total reported oil production. For example, since 2008, Pinedale has been not only the top gas-producing field in the state but also one of the top three oil-producing fields. Pinedale gas wells have cumulatively produced more than 59,000,000 barrels of condensate. Jonah is another large natural gas field that has consistently been in the top 10 oil-producing fields since 2000, and has produced more than 54,000,000 barrels of condensate. Although Wyoming condensate production continues to decline as total natural gas production declines, it still accounted for nearly 9 percent of the state's total oil production in 2020.

Another associated, but manufactured, product—hydrogen—may also factor into Wyoming’s future. With funds awarded by the Wyoming Energy Resources Council and the Wyoming Energy Authority, several hydrogen projects will soon be underway in Wyoming. Jonah Energy and the National Renewable Energy Laboratory will evaluate the use of biomethanation to convert green hydrogen, which is separated from water using renewable energy sources, into synthetic natural gas. If successful, Jonah Energy plans to develop a pilot power-to-gas facility in Wyoming in 2022. At its Cheyenne Prairie Generating Station, Black Hills Energy will be studying the generation of both green hydrogen and blue hydrogen, or hydrogen produced from natural gas using carbon capture technology. The University of Wyoming’s School of Energy Resources and The Williams Companies, Inc., will partner on green hydrogen production research, using Williams’ extensive natural gas pipeline network to transport the hydrogen. These projects reinforce the enduring importance of Wyoming’s existing natural gas resources and infrastructure.

State economic connections

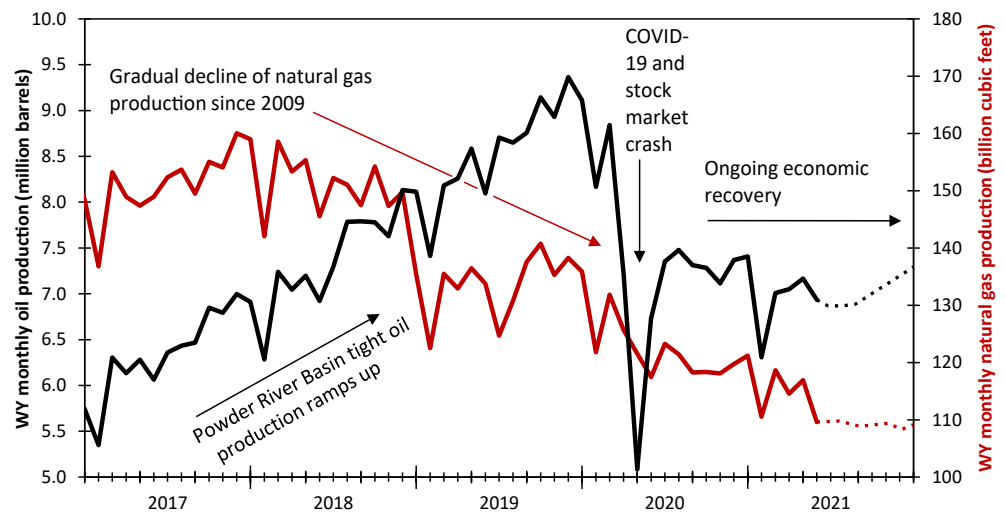
Wyoming’s economy has been and continues to be closely connected to the state’s oil and gas industry. It is encouraging that both the state’s industry and economy appear to be recovering from the pandemic- and market-induced downturn of 2020 sooner than anticipated. The number of rigs operating in the state continues to increase, with a reported 18 rigs as of December 2021. Production coming online from newly drilled wells and from existing wells completed through the Wyoming Energy Rebound Program has boosted the state’s economic outlook. This is especially true for oil production. In fact, in the October 2021 report by the Wyoming Consensus Revenue Estimating Group, the oil production estimate for 2021 improved by 31 percent compared to predictions made a year ago.

These numbers translate to tangible benefits for Wyoming residents. Oil and gas severance taxes and royalties contribute funding to state highway and county road construction and maintenance; water projects; local governments; school districts, scholarships, the University of Wyoming and community colleges; and state-government agencies. Combined, oil and natural gas brought in more than \$372,000,000 in severance taxes for the state coffers during fiscal year 2021, an increase of nearly 14 percent over fiscal

year 2020. Besides these significant contributions to state government, the Wyoming oil and gas industry directly and indirectly employs tens of thousands of workers. In 2019, when Wyoming oil production was at an all-time high, these oil and gas extraction and support workers received upwards of \$1.1 billion in total wages to spend in their communities.

Global economic connections

Wyoming’s landlocked geography and distance from U.S. trade terminals does not insulate the state’s oil and gas industry from global industry dynamics. One of the more recent and influential trends is the significant increase in U.S. exports of liquefied natural gas. Since 2015, U.S. liquefied natural gas exports have surged by a factor of more than 100, to about 9.8 billion cubic feet per day. Asian and European markets are the primary importers of U.S. liquefied natural gas, the demand for which is driven in part by a transition from coal to natural gas power plants. Liquefied natural gas demand, which is expected to accelerate over the next 10 years, will incentivize natural gas production throughout the U.S. and Wyoming. Pipeline capacity and infrastructure expansion projects will be vital to connect Wyoming’s gas to other states and export terminals, and help bolster the state’s gas production.



2020 and 2021 were difficult years for Wyoming’s oil and gas industry, but production has overall stabilized since the spring 2020 crash, and oil production is expected to increase going forward. Data sources: Historical data from Wyoming Oil and Gas Conservation Commission and forecast monthly production based on yearly forecast in October 2021 report by the Consensus Revenue Estimating Group, Wyoming Economic Analysis Division.

Wyoming oil, too, is affected by international players and events. Global oil production has not kept up with rapidly recovering demand, causing oil prices to increase 38 percent in 2021, from the monthly average of \$52 per barrel in January to \$72 in December (WTI benchmark prices). In October 2021, as the gap between supply and demand grew, and as oil prices reached a seven-year high, OPEC+ announced it would not accelerate its plan to gradually increase crude oil production—a decision it reaffirmed in

December. (The Organization of Petroleum Exporting Countries, together with several other petroleum exporting countries, comprise OPEC+. This consortium of petroleum producers regulates global crude oil supply, in turn heavily influencing oil prices.) In Wyoming, however, these higher prices are driving the number of operating rigs upward. When the state's oil production numbers are reported for the final months of 2021, they will likely reflect this rebound in drilling activity.

A look forward

One hundred years ago, in 1921, 331 oil and gas wells were completed in Wyoming. Thirty-five of these wells are still producing in 2021, out of a total of more than 8,400 wells that produced oil or gas this past year. What will oil and gas production look like in Wyoming 100 years from now? Companies and researchers are looking ahead to address this and other future-oriented questions.

Jonah Energy, operator of the large Jonah gas field near Pinedale, is leading the nation in lowering emissions from their natural gas infrastructure. After years of monitoring and working to lower emissions, Jonah Energy was the first in the U.S. to report their data to the Oil and Gas Methane Partnership (OGMP), a UN-backed initiative to reduce global methane emissions. Jonah Energy's leadership in responsible natural gas production has earned the company a "Gold Standard" emission rating from the OGMP.

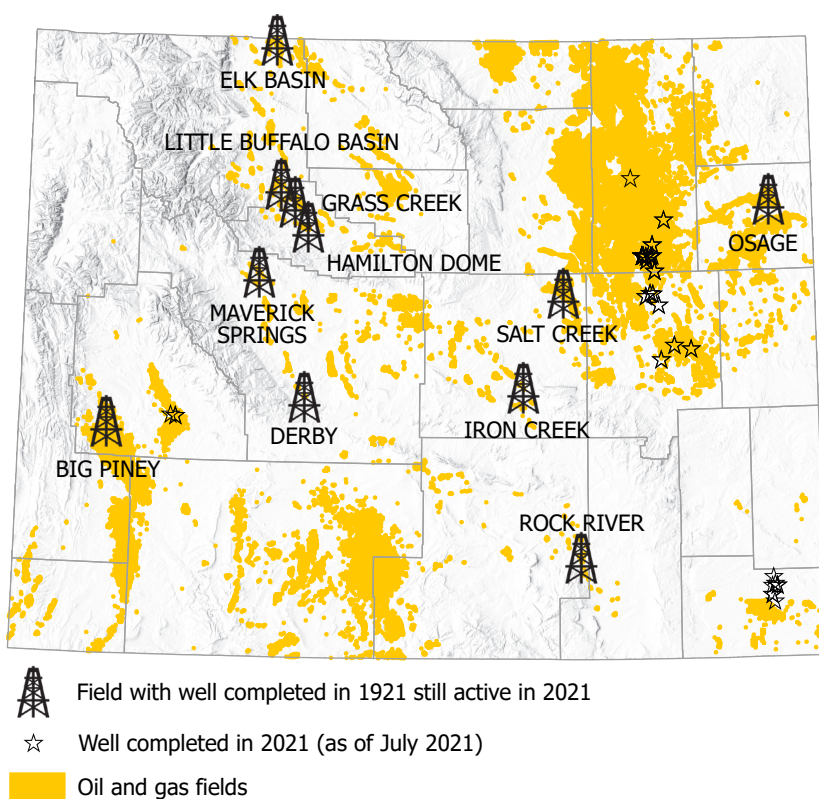
The state's most prolific natural gas producer, PureWest Energy (formerly Ultra Petroleum and UP Energy), is also working to certify their Jonah field and Pinedale Anticline natural gas production as "responsibly sourced." Responsibly sourced gas is gas produced in tandem with reduced emissions, carbon footprints, and land and water impacts. They are partnering with Project Canary, an emission monitoring technology and service provider, to obtain certification on all of their wells by the end of 2022. PureWest was recently honored by with an Environmental, Social, and Governance (ESG) "Top Performers" award for their mitigation efforts.

Another emissions project with ties to Wyoming is being headed by Tallgrass Energy. It will be the first company in the U.S. to monitor and certify emissions along the entire length of its interstate

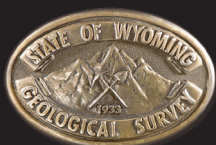
natural gas Rockies Express Pipeline, which runs through south-central and southeast Wyoming.

Wyoming is also positioned to be a leader in the future of carbon capture and storage. New and existing infrastructure, such as the Wyoming Integrated Test Center in Gillette, as well as the Wyoming Pipeline Corridor Initiative, give Wyoming an opportunity to lead in carbon capture from industrial facilities, the geological storage of carbon dioxide (CO₂), and the beneficial use of CO₂ in enhanced oil recovery. Wyoming was among the first states to enact comprehensive carbon capture and storage legislation and is currently one of only two states with a regulatory program for the injection of CO₂ into deep geologic formations for long-term storage.

As the world's energy landscape continues to evolve, Wyoming's robust infrastructure, extensive resources, strong industry connections, and forward-looking innovations will ensure that the state's oil and gas industry remains in the foreground of U.S. energy production well into the future.



Thirty-five wells that were drilled 100 years ago, in 1921, are still operating in some capacity today. Sixteen of these wells are located in the Salt Creek Oil Field, one of the longest continuously operating oil fields in the world. Data source: Wyoming Oil and Gas Conservation Commission.



Interpreting the past, providing for the future

