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### Natural gas industry in Pennsylvania remains strong

**Overview:** Pennsylvania has always been a state with abundant natural resources, including oil, coal and natural gas. Natural gas wells have dotted the Pennsylvania landscape since the 1870s. In the early 2000s, the discovery of natural gas in the state's Marcellus and Utica Shale formations and the ability to use the method of hydraulic fracturing to retrieve the gas has made Pennsylvania the second largest natural gas producer in the U.S. just behind Texas (23.9 percent vs. 21.1 percent of total U.S. production).

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This *Brief* examines the drilling of natural gas rigs, both conventional and unconventional (hydraulic fracturing or fracking) from 2005 through 2021. All data comes from the Pennsylvania Department of Environmental Protection (DEP). The data is confined to just wells drilled for the purpose of removing natural gas. Wells that are drilled into coalbed seams (methane), oil wells, combined oil and gas wells and other well types were removed from the sample.

#### *New wells being drilled*

The number of new wells being drilled in 2005 was nearly 4,000 with 3,985 conventional wells and just nine unconventional wells (1 in both Elk and Westmoreland Counties; 2 in Bradford County and 5 in Washington County). Twenty-eight counties had conventional wells drilled within their borders that year.

In this 17-year sample, the peak year for drilling conventional wells occurred just two years later in 2007 when 4,824 wells were drilled. The decline began in 2008 when 4,646 were drilled, and then in 2009 that amount was slashed by more than half to just 2,013. In 2019 the pre-pandemic count of new conventional wells drilled fell to just 172, a drop of 96.4 percent since 2007. The pandemic year of 2020 saw only 48 new conventional rigs drilled and in 2021 there was a small rebound in drilling with 128 rigs breaking ground.

The accessibility of the Marcellus and Utica Shale formations played an important role in the decline in the number of new conventional wells being drilled as drillers switched over to unconventional wells.

As mentioned, in 2005 there were just nine new unconventional wells drilled. By 2010 that number reached 1,601. The peak for new unconventional wells was in 2011 when 1,958 were drilled. In 2019 that number had fallen to 576 and in 2020 fell further to 467 before bouncing back up to 519 in 2021.

### *Price of natural gas*

The U.S. Energy Information Association keeps track of the price of natural gas as sold on the New York Mercantile Exchange (NYMEX) also known as the Henry Hub Natural Gas Spot Price. The trading price of natural gas will either encourage drillers when the price is high or discourage them otherwise.

In 2005 the average annual price for natural gas was \$8.69 per million British Thermal Units (BTUs). That price dipped below \$7.00 in 2006 and 2007 before reaching \$8.86 in 2008. In 2009 the price fell to \$3.94. From 2010 to 2019 the annual average price of natural gas ranged from a low of \$2.56 (2019) to \$4.37 (2010 and 2014). In 2020 it bottomed out at \$2.03 before rising to \$3.89 in 2021.

### *Total natural gas wells in the Commonwealth*

While the falling price of natural gas may have discouraged producers from drilling too many new rigs each year, the total number of wells producing continued to climb. It is also worth noting that not every rig that is drilled becomes a productive well. Whether or not a well is productive, or for how long it will produce, depends on the size of the gas pool it has tapped into.

In 2005 there were a total of 35,428 natural gas wells actively producing in the state with just eight of those being unconventional wells. The peak during the sample was in 2018 when 55,036 wells were producing natural gas. Of this total 46,638 were conventional and nearly 8,400 were unconventional. The number of producing conventional wells increased by 32 percent while the number of unconventional wells increased dramatically.

The number of producing conventional wells fell a bit in 2019 to 45,225 and then slid further to 38,751 in 2020 before rebounding slightly in 2021 to 43,207. In contrast the total number of producing unconventional wells kept rising, reaching 10,366 in 2021.

This despite the falling price of natural gas as traded on NYMEX.

### *Total amount of natural gas produced*

In 2005 there were 141.33 million MCF (thousand cubic feet) worth of natural gas pulled from gas wells in the commonwealth. Just 88,970 MCF (0.06 percent) of the total came from unconventional gas wells. After a small increase to 164.56 million MCF in 2008, the total production from conventional wells began to decline. It slipped below 100 million MCF in 2019 (97.46 million) and ultimately fell to 38.82 million in 2020 before rising to 66.61 million MCF in 2021.

Production from unconventional natural gas wells jumped quickly reaching 1,063 million MCF in 2011. It continued to jump rapidly, hitting 5,057 million MCF in 2016 before reaching 7,506 million MCF in 2021. The total statewide output of natural gas reached 7,573 million MCF. Of that total 99.12 percent came from unconventional wells.

### *Policy implications*

At a time when energy has become a focal point in the U.S. economy, Pennsylvania's production of natural gas can be a tremendous benefit to the state and nation. Natural gas is used in the manufacture of many products such as plastics, fertilizers, synthetic fibers, cosmetics and medicines. The cracker plants, like the one under construction in Beaver County, can process the gas to facilitate this type of production.

Manufacturers need a cheap, reliable source of energy to power their plants and help in the manufacturing process. With a more than abundant supply, Pennsylvania could be attractive to manufacturing firms looking to relocate.

With a focus on energy production, natural gas can provide a clean burning solution to electricity generation. Many countries rely on natural gas to power electricity plants. Pennsylvania could be a major exporter of natural gas.

The key to maximizing the potential of natural gas coming from Pennsylvania is to foster it and not impede it. That includes allowing the pipeline infrastructure to move the gas from field to hub to market.

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