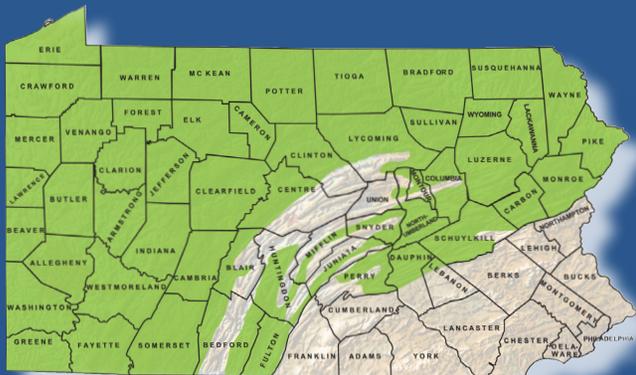


Pennsylvania's many natural resources include natural gas from the Marcellus Shale, a deep geologic formation stretching more than 95,000 square miles through parts of Pennsylvania, Ohio, West Virginia and New York. Found between 4,000 and 8,000 feet below ground surface, the Marcellus Shale lies beneath approximately 60 percent of Pennsylvania's land mass. Rich in organic material, the Marcellus Shale is expected to contain enough natural gas to fuel our nation with clean-burning energy for decades.



The Marcellus Shale formation, shaded green in the above map, lies beneath about 60 percent of Pennsylvania's land mass.



[www.pioga.org](http://www.pioga.org)

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# The Marcellus Shale: Pennsylvania's Home- Grown Energy Source



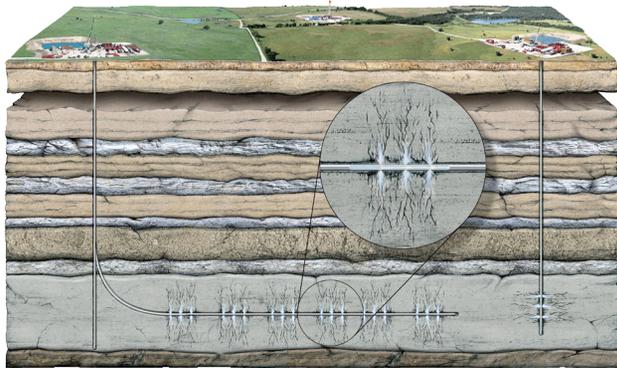
Pennsylvania: *The Keystone to America's Energy Future*



## Natural gas exploration and production in Pennsylvania

Pennsylvania has produced oil and gas since 1859, when Col. Edwin Drake successfully drilled the first 70-foot deep oil well in Venango County. Since then, more than 350,000 oil and gas wells have been drilled in Pennsylvania. Today, natural gas producers use the latest technologies in the exploration and production of natural gas, providing good-paying jobs and significant economic benefits to individuals, families and entire communities across Pennsylvania.

Extracting natural gas from the Marcellus Shale formation is accomplished through several steps. First, gas producers must obtain mineral and gas rights to begin exploration. Next, geologists use seismic data to determine the best location to drill into the formation. Drilling is accomplished with a series of long drilling pipes that push vertically into the earth. The drill bit can also be turned to push its way horizontally through the geologic formation, which allows larger quantities of gas to be extracted from a single well pad. Once production is complete, only a small amount of equipment remains, and the surrounding land is fully restored.



**Marcellus Shale wells can be drilled both horizontally (on left) and vertically (on right). Hydraulic fracturing, a process that has been used in oil and natural gas drilling since 1949, takes place thousands of feet below the groundwater table. Every aspect of developing a natural gas well is regulated by state and federal environmental agencies.**

## The benefits of natural gas

Natural gas has many uses and is recognized as an important “bridge fuel” for the future. It is perhaps best known as the fuel that heats our food, water, homes and businesses. Natural gas:

- used in more than 60 million homes nationwide;
- heats 51 percent of U.S. households, cools homes and provides fuel for cooking;
- generates electricity; and
- provides the raw material for many of the products we use every day.

Natural gas produced from the Marcellus Shale formation is a clean-burning, Pennsylvania-based energy resource safely extracted in an environmentally sound manner. The abundance of natural gas contained within the Marcellus Shale can energize Pennsylvania’s economy and produce thousands of new jobs. Pennsylvania residents and municipalities currently are experiencing the direct economic benefits that are expected to continue as development of the Marcellus Shale formation expands.

## Learn More

Learn the whole story about the opportunity and potential of the Marcellus Shale by visiting [www.pioga.org](http://www.pioga.org).



**Horizontal drilling technology allows multiple wells to be drilled from a single pad, reducing the total amount of land impact and increasing the amount of energy produced.**

**The process of drilling and fracturing a Marcellus Shale well is typically completed in several stages that can last 3 to 4 weeks.**



**Once drilling is completed, the well pad is reclaimed and revegetated as shown above. Equipment about the size of a two-car garage remains, including the wellhead, water storage tanks and a monitoring system to ensure the long-term operation and safety of the well.**

## The Marcellus Shale: An Emerging Giant

A study conducted by researchers from Penn State University in 2010 points to the economic potential of the Marcellus Shale in Pennsylvania. Using conservative assumptions for natural gas production, commodity prices and other factors, the study reached the following conclusions:

- The production of natural gas is expected to contribute \$10.1 billion in total economic output and nearly \$1 billion in state and local tax revenues to the Commonwealth in 2011.
- By 2020, the industry will provide a total economic impact of \$18.8 billion and 211,000 jobs for the Commonwealth, along with nearly \$1.8 billion in state and local tax revenues.
- Pennsylvania is projected to become a net exporter of natural gas by 2014, a stark contrast to 2008, when the state imported 75 percent of the natural gas consumed by businesses and consumers.