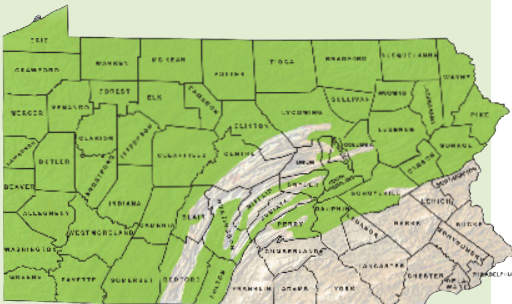


Learn About the Marcellus and Utica Shale

The Marcellus and Utica shale formations represent tremendous opportunities for Pennsylvania: clean-burning, domestically produced energy; jobs in the natural gas industry and associated businesses; and economic benefits to individuals and communities across the Commonwealth.



■ Utica/Marcellus formations

What are Shale Formations?

Formed about 380 million years ago, the Marcellus Shale is a deep geologic formation that covers more than 95,000 square miles through parts of New York, Pennsylvania, Ohio and West Virginia. Pennsylvania is at the heart of the Marcellus Shale, with the formation underlying about 60 percent of the state.

The Marcellus is found between 4,000 and 8,500 feet below the surface and is 50-200 feet thick. This shale formation is rich in organic materials from plants and animals. As these organics were compressed by millions of years of geologic pressures, natural gas was trapped in the shale's fractures. The Marcellus Shale is estimated to hold over 500 trillion cubic feet of natural gas. Even if only 10 percent of the gas is recovered, it would be enough to fuel the entire United States for two years and would be worth over \$1 trillion.

The Utica Shale lies beneath the Marcellus formation, and efforts to explore its potential began several years after the Marcellus was proven to have significant natural gas reserves. The Utica formation, which lies between 4,000-6,000 feet beneath the Marcellus, has been found to be productive in a number of counties, and additional geological research is being conducted to evaluate its potential in other parts of Pennsylvania.

A resource for today and the future

Geologists and petroleum engineers have long known about the potential for shale formations to hold significant amounts of hydrocarbons, and worked for many years to determine how to access those reserves safely and economically. Recent improvements in technologies such as three-dimensional imaging and horizontal drilling have allowed for the production of oil and natural gas from a number of shale formations in the United States, with the Marcellus and Utica shales being two of them. A benefit to these formations in Pennsylvania lies in the fact that they are in close proximity to major Northeastern consumer markets, which have increased their financial viability.

Natural gas is a key bridge fuel to the renewable-energy technologies of the future. Natural gas from the Marcellus and Utica shales are important because they provide a clean-burning energy source found right here in Pennsylvania, and an energy source that can be produced in an environmentally sound manner. The exploration, production and transmission of this resource is providing jobs in the natural gas industry and associated businesses – and will for years to come.

Opportunities abound

But the benefits don't stop there. Natural gas producers already have invested billions in lease and land acquisitions, new well drilling, infrastructure development and community partnerships. Here are just a few examples:

A study conducted by PriceWaterhouse Coopers for the American Petroleum Institute in 2017 points to the economic potential of shale in Pennsylvania. It estimated that 322,600 jobs in the Commonwealth were directly or indirectly linked to drilling and producing natural gas as of 2015, and that the industry contributed \$44.4 billion of economic impact in the state.

The state Public Utility Commission has distributed more than \$1.5 billion in Impact Taxes to counties across the state since 2012, supporting hundreds of improvement projects that are driven by local communities and counties. Impact Tax payments will continue far into the future as additional wells are drilled.



The PUC also estimates that the average Pennsylvania family is saving \$1,200 each year due to lower heating and electricity costs, which has also reduced the potential for utility shut-offs among low-income residents.

Pennsylvania was able to produce only 25 percent of the natural gas needed to meet its own demand in 2007; it now meets 20 percent of the entire nation's demand for natural gas.

Pennsylvania's air quality is improving greatly due to the use of natural gas to produce electricity, with significant reductions in all of the priority pollutants measured by the U.S. Environmental Protection Agency.

Another major economic contribution generated from natural gas production is found in the industry's payments to landowners who lease property for drilling activity. More than \$200 million is paid each year to landowners in the form of lease payments. Once a well is drilled and producing gas, landowners share in the benefits from royalty payments paid over the life of the well. These payments, made directly to property owners, are a dominant source of wealth and economic sustainability for property owners, particularly in rural counties. The payments have grown tremendously in recent years as natural gas production grows.

CAREER CHOICES

The demand for workers to support oil and gas development in Pennsylvania continues to grow, with new opportunities in areas such as plastic and general manufacturing as existing facilities grow and new ones are constructed. In addition to all of the jobs that go into directly operating gas drilling rigs, opportunities are also available in a number of professional and skilled areas, including:

- Engineering and surveying
- Construction and earthmoving
- Equipment manufacturing, service and repair
- Environmental permitting
- Water transport/wastewater management
- Well servicing
- General labor
- Legal, accounting and other professional services

PIOGA and its education and training partners are working to bring interested students into these high-paying fields, as the need is significant and will continue for many years, even decades, as the Marcellus and Utica Shale resources are fully developed.

