

Marcellus Shale: An Overview

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Introduction

In the United States and around the world, demand for energy is growing significantly. Climate change and environmental regulations continue to push against the need for increasing energy generation. In the U.S., natural gas has become a popular alternative fuel source for power plants. It is also recognized for its ability to heat homes and serve as fuel for motor vehicles. Natural gas could greatly reduce the United States reliance on oil and coal.

Natural gas plants produce about half the CO₂ pollution of a typical coal plant, and modern facilities greatly reduce pollution from nitrogen oxide and sulfur dioxide, which contribute to acid rain. In addition to the environmental argument for natural gas, reserves have been found throughout the United States, decreasing our reliance on other countries for energy.

Much of natural gas' potential lies in our ability to capture it affordably and safely from deep shale formations throughout the U.S. (see image below). One formation recently receiving a great deal of attention is the Marcellus Shale formation beneath large portions of New York.

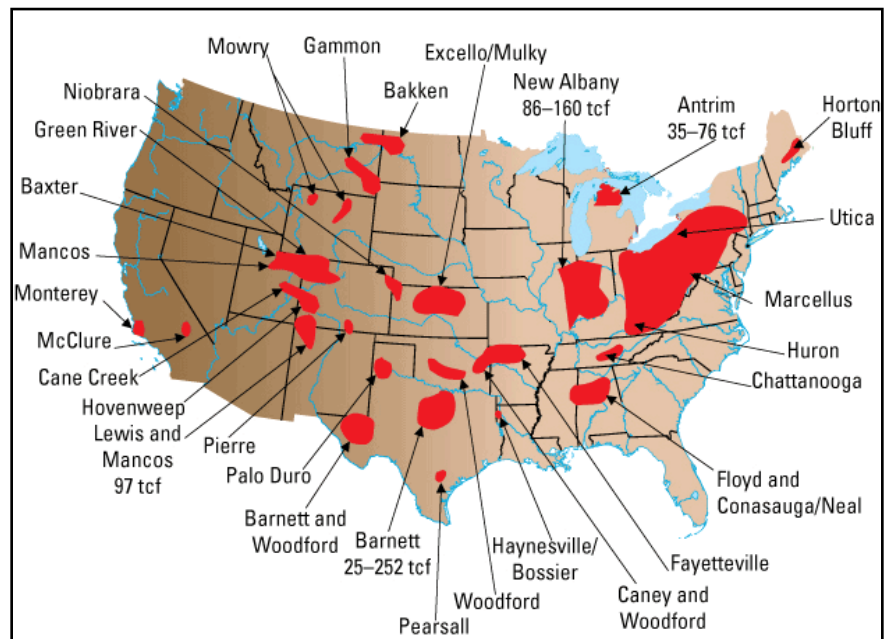
In this issue brief, New York AREA provides an overview of the Marcellus Shale formation, noting advantages, disadvantages and potential financial impacts of developing this energy source.

Overview

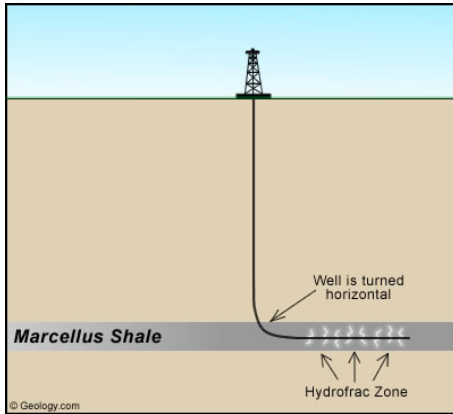
Marcellus Shale is marine sedimentary rock in eastern North America. The shale has natural gas distributed throughout the rock and is identified as an unconventional reservoir of hydrocarbons or natural gas, because most oil and gas come from sandstone and limestone formations.

The Marcellus formation spans about 600 square miles, beneath much of New York, Pennsylvania, Ohio, Maryland and West Virginia. It also

extends under the Great Lakes and into Ontario, Canada. Until recently, it had been overlooked because a vertical gas well drilled through the shale would not yield enough to be economically feasible. The Marcellus Shale is nearly a mile or more below the surface, making it a very expensive target. Geologists estimate that the formation contains between 168 and 516 trillion cubic feet (tcf) of natural gas. For comparison, New York uses approximately 1.1 tcf per year, according to the Department of Environmental



Conservation (DEC). One estimate predicts Marcellus could supply the entire U.S. for 30 years at its current rate of consumption.



Several factors stimulated interest in developing the Marcellus formation. First, prices for natural gas spiked recently, from about \$3 per thousand cubic feet in 2002 to over \$11 in summer 2008. Secondly, improvements in drilling technology referred to as hydraulic fracturing (or “fracking”) make the shale more accessible and affordable to develop. The proximity of high natural gas demand markets in New York, New Jersey and New England and the construction of the Millennium Pipeline added to the interest in developing the Marcellus Shale. Finally, movement on climate legislation made natural gas an attractive fuel for investment.

Advantages

The development of the Marcellus formation has several potential advantages. Currently, New York imports nearly all its natural gas. By developing the Marcellus formation, the state could reap significant economic benefits and become a natural gas exporter.

Developing the Marcellus formation could pump billions into the upstate economy, creating jobs and stimulating investment throughout the state. This investment would undoubtedly have substantial downstream economic benefits for local businesses, landowners and workers in New York and provide new tax revenue.

The Independent Oil and Gas Association of New York (IOGNY) projects that the discovery and potential use of natural gas could generate \$11 billion in economic activity and \$2 billion in tax revenue by 2020. It would also be a source of hundreds of jobs for a region that has suffered greatly from the recession. A study done by IHS Global Insight determined that in 2008 the natural gas industry created more than 36,000 New York jobs and \$8 billion in economic activity.

From an environmental standpoint, the U.S. Environmental Protection Agency (EPA) says that natural gas is a relatively clean fossil fuel for electric generation, because it emits less nitrogen oxide, about half the CO₂ of coal-fired electricity generation, and has negligible amounts of mercury and sulfur dioxide emissions. Although not as clean as baseload hydro-electric or nuclear power sources, natural gas does have environmental advantages over coal, oil and other fossil fuels as a source of energy.

New York is the nation’s fourth biggest natural gas consumer and imports 95% of its supply, so prices are mostly outside of the state’s control and can fluctuate greatly. In a competitive market the over-reliance on an out of state fuel can lead to higher electric and heating prices. If New York had a reliable supply of natural gas, in-state electric prices and heating costs could be predicted better and potentially lowered.

Disadvantages

Environmentalists and upstate landowners have raised concerns about the effects of extracting natural gas from the Marcellus formation. A primary concern is the impact of the hydraulic fracturing drilling

technique, which accelerates the extraction rate by injecting a combination of water, sand and chemicals into rock formations at high pressures to expel natural gas.

One issue associated with hydraulic fracturing is water use. Three to nine million gallons of water are needed for each well to dissolve salts, metals and radioactive substances found within the Marcellus Shale. The contaminated water is returned to the surface to be properly treated and dispensed. However, previous hydraulic fracturing sites have not handled contaminated water appropriately, resulting in contamination to surface and groundwater.

Studies from the DEC show that contaminated water from hydraulic fracturing has polluted groundwater in Alabama, Arkansas, New Mexico, Colorado, Kansas, Montana, Virginia, Washington, West Virginia and Wyoming. Developers are currently looking at the western edge of the Marcellus formation, but a significant portion of New York City's drinking water comes from reservoirs within this geographic area. Should reservoirs and groundwater become contaminated, New York would need to build a costly filtration plant.

Another issue that has arisen in the Marcellus Shale region is the potential for radioactive materials to be brought to the surface in the wastewater. Radioactive materials are common in oil and gas drilling waste. According to geologists, radioactivity levels vary across the Marcellus formation, but in some areas the amount of radioactive material measured is higher than in many other places. This wastewater would have to be monitored and treated at a facility capable of filtering the radioactive substances. Currently, none of those facilities exist in New York and few are nearby, possibly requiring wastewater to be shipped to plants that are capable of accepting it.

Where Drilling Stands Now

Because of its size, economic impact and controversial "fracking" process of securing the gas, the Marcellus Shale formation is in the spotlight. Recognizing the attention and potential environmental issues, the DEC conducted a Generic Environmental Impact Statement (GEIS) on potential impacts of oil and gas drilling. The DEC is also preparing another report, a Supplemental GEIS. New York is taking a much slower and relative steady pace in reviewing and approving drilling. The DEC says that because of New York's rigorous regulatory process, the state has had no known instances of groundwater contamination and is confident there will be none.

Despite the heavy regulations, many are still concerned or adamantly opposed to hydraulic fracturing for drilling in the Marcellus Shale. Others oppose any drilling in reservoirs that provide New York City its drinking water. The rapid development in other states led to the EPA's involvement. In March of 2010, the EPA announced plans for a \$1.9 million study to investigate "the potential adverse impact that hydraulic fracturing may have on water quality and public health." In August of 2010, the EPA conducted hearings to tap the opinions of residents in the Marcellus formation as a part of its study.

The New York Senate has passed legislation, if signed into law, would ban hydraulic fracturing until May of 2011. The proposed ban has numerous opponents as well as proponents. Drilling in the Marcellus formation in New York remains uncertain at this time.

About New York AREA: Founded in November 2003, the New York Affordable Reliable Electricity Alliance (New York AREA) is a diverse group of more than 150 business, labor, and community groups whose mission and purpose is to ensure that New York has an ample and reliable electricity supply, and economic prosperity for years to come. New York AREA helps to educate policy makers, businesses, and the general public regarding the necessity and importance of safe, low-cost and reliable electricity.

For additional information visit: www.area-alliance.org.

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