Fossil Energy Research Benefits

Natural Gas from Shale

Shale gas is natural gas trapped inside formations of shale — fine grained sedimentary rocks that can be rich sources of petroleum and natural gas. Just a few years ago, much of this resource was considered uneconomical to produce. But **Office of Fossil Energy (FE) research** helped refine cost-effective **horizontal drilling** and **hydraulic fracturing** technologies, protective environmental practices and data development, making hundreds of trillions of cubic feet of gas technically recoverable where they once were not.

> ***FE's Eastern Gas Shale Research Program "is one of the great examples of value-added work led by the DOE."***
>
> Dr. Terry Engelder
> Professor of Geosciences
> Penn State University, 2011

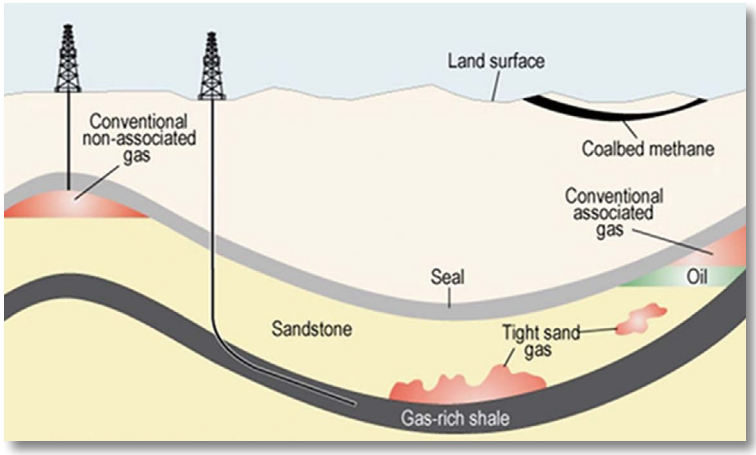
Consequently, shale resources are contributing to a **rejuvenation of domestic natural gas supply** in the United States. The U.S. Energy Information Administration (EIA) reports that U.S. shale gas production has increased 12-fold over the last decade and reserves have increased substantially, and now constitute about 19 percent of technically recoverable domestic natural gas. Shale gas (**23 percent** of the total), coalbed methane and tight gas combined now account for **58 percent of U.S. production**. This increased domestic supply has helped reduce the need for imports while enhancing U.S. energy security.

Natural gas is sometimes trapped inside of organic rich black shale (source: http://geology.com/energy/shale-gas/). Photo courtesy of ALL Consulting.

FE's early investments in shale research in the 1970s matched technology to complex geology for various settings. In 1986, FE collaborated with industry on the first air-drilled, 2,000-foot-long horizontal shale well in the Appalachian Basin.

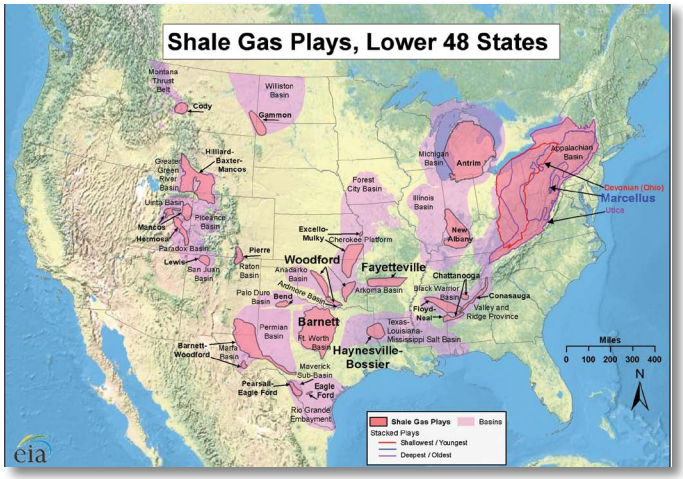
Through its **National Energy Technology Laboratory (NETL)**, FE pioneered **directional wells** (drilling at an angle other than vertical), **hydraulic fracturing** (using pressurized liquids to fracture subsurface rock) and other technologies.

Natural Gas Schematic



Source: U.S. Energy Information Administration and U.S. Geological Survey

Building on past R&D successes, new technologies are being applied to make certain that the process of drilling for this valuable resource minimizes environmental impacts.



Source: Energy Information Administration based on data from various published studies. Updated March 10, 2010

According to EIA, the technically recoverable unproved shale gas resource is **482 trillion cubic feet.** By 2035, shale is projected to account for **49 percent** of U.S. gas production.