

U.S Natural gas shale amazes the world

Gas shale has become an important source of natural gas in the United States over the past decade, and interest has spread to potential gas shale in Canada, Europe, Asia, and Australia. One analyst expects gas shale to supply as much as half the natural gas production in North America by 2020

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Some analysts expect that gas shale will greatly expand the energy supply worldwide. A study by the Baker Institute of Public Policy concluded that increased gas shale production in the U.S and Canada could help prevent Russia and Persian Gulf countries from dictating higher prices for the gas they export to European countries. U.S experts believe that increased gas shale development will help reduce greenhouse gas emissions. Gas shale areas are often known as resource play.

The U.S Department of Energy (DOE) stated that the natural gas production rates in 2007 was about 19.3 trillion cubic feet (tcf), the current recoverable resource estimate provides enough natural gas to supply the U.S for the next 90 years. Separate estimates of the gas shale resource extend this supply to 116 years. Production of gas shale is expected to increase from the 2007 U.S total of 1.4 tcf to 4.8 tcf in 2020. The DOE report states that gas shale production potential of 3 to 4 tcf per year may be sustainable for decades.

Shale gas blasts open world's energy market

In terms of supply, the gas shale revolution has had a huge impact, in less than five years; the U.S has gone from seeking new sources of gas from overseas to being self-sufficient. A stretch of coastline on the Texas-Louisiana border provides a startling glimpse of Europe's energy future. There, where Lake Sabine empties into the Gulf of Mexico, a giant port was completed last year. Built at a cost of \$1.5 billion, it was meant to be a vital new part of America's energy infrastructure. Giant tankers from places such as Qatar and Sakhalin Island in Russia's far east were meant to dock there to inject their cargoes of liquefied natural gas (LNG) straight into the national pipeline network.

Oil companies have known about it for decades but always dismissed it because it was too expensive and difficult to extract. In the past few years, new technologies that pump water underground to fracture the rock and free the gas have been perfected. The breakthrough has opened a new frontier for the energy industry and turned long-held assumptions about the world's dwindling supplies on their head.

Chief executive of BP, said "a revolution in the gas fields of North America". In a report this summer, the U.S potential gas committee increased its estimates of American reserves by a third. The Department of Energy now predicts that shale gas could meet half America's demand within two decades and turns the country into a net exporter.

Population density is also a factor. Drilling into shale is a large, invasive operation and Europe does not have as much wide-open space as North America.

The shale is cracked by rigs that drill down thousands of feet. They are able to turn 90 degrees and continue horizontally to follow gas-rich seams. Once a hole is drilled, explosive charges are inserted and detonated to create a series of openings in pipes laid to keep the well open. A mixture of water and sand is then shot down at high pressure. When it spurts through the open-

ings in the pipes, it shatters the surrounding rock and the gas is released.

The process uses vast quantities of water and American regulators are only now coming to grips with the environmental impact. The prize, though, is huge. Burning gas produces far lower carbon emissions than oil or coal. For governments struggling to hit pollution targets, that is important. So is security of supply. Countries are scrambling to get new supplies. Companies in Britain have spent billions on new LNG terminals on the Isle of Grain in Kent and at Milford Haven in Wales to make up for the North Sea's decline. Croatia and Poland are also working on plans to build new port capacity. Construction on the £7 billion Nabucco pipeline from Turkey to Austria — meant to reduce Europe's dependence on Russia — is set to begin next year. Researchers at Texas University estimate world reserves could increase ninefold. U.S natural gas shale could serve a critical role in supplying domestic gas needs if offshore drilling in the U.S. Gulf of Mexico remains at a standstill due to the ongoing oil spill and debate over whether drilling should continue.

However, the rise in shale production and level of gas in U.S. storage, coupled with decline in energy demand in recent time, has depressed domestic gas prices from levels seen a few years ago. As a result, companies focused on shale are switching to shale plays such as Eagle Ford in Texas, which have associated condensate production to improve project economics. Industry observers remain cautious on the natural gas price outlook, noting that supply has not fallen due to E&P companies having hedged a significant amount of this year's gas production to reduce volatility.

Chesapeake, which holds significant positions in gas shale plays such as Barnett, Haynesville, Marcellus and Bossier, has begun to focus primarily on oil and liquids-rich areas when seeking new plays, although the company said in 2008 it would seek to develop new unconventional oil plays. Chesapeake CEO said the company would redirect capital from its gas shale plays to focus more on oil due to continued low natural gas prices and the ongoing success in the company's liquids-rich play.

Despite the short-term plummet, the long-term outlook for U.S. shale gas remains optimistic, with U.S. shale gas still expected to draw attention of additional foreign companies and domestic majors. While the exact number of shale reserves in the U.S. is still being debated, industry consensus is that a large number of shale gas reserves exist that could fuel the U.S. for decades.

It was noticed that shale gas resources could play a critical role in the U.S. economy going forward in terms of power generation, transportation and job creation, but that tremendous investment in mid-stream infrastructure and storage capability is required.

The wave of U.S shale development has started to ripple across the world as shale gas resources are identified in Europe, Asia, Africa, and other parts of the world. European governments are seeing shale gas as a means of breaking dependence on Russian

and other sources of gas.

U.S Shale Gas could play considerable role in future production

U.S onshore shale natural gas could potentially become a large portion of future U.S. gas production with an assumed 347 tcf of technically recoverable shale gas, provided that significant growth occurs in future U.S. gas demand. A few years ago, most analysts anticipated a growing U.S. reliance on imported sources of gas, and significant investments were being made in regasification facilities for imports of liquefied natural gas, EIA said. That outlook has changed as a wave of exploration and production companies over the past five years have sought to explore for and produce U.S. shale gas, which has been described as a clean-burning, secure energy source that can meet future U.S. energy demand. In 2009, ExxonMobil agreed to buy XTO Energy to enhance ExxonMobil's position in unconventional gas resources. Earlier this year, Chesapeake Energy formed a \$2.25 billion joint venture with Total E&P USA, a subsidiary of Total S.A to develop Chesapeake's upstream Barnett Shale assets. Overall, U.S natural gas production is

expected to grow from 20.6 tcf in 2008 to 23.3 tcf in 2035. With technology improvements and rising gas prices, gas production from shale formations is expected to grow to 6 tcf in 2035, more than offsetting declines in other production and representing the largest contributor to production growth. Shale gas is expected to provide 24 percent of total U.S. gas production in 2035, according to the EIA. While U.S shale gas production increases, total onshore gas production declines slightly in the Gulf Coast region, by 27% in the mid-continent region, and by nine % in the Southwest from 2008 through 2035. Total gas production in the Rocky Mountain region is expected to increase by 8%, largely from tight sands formations, while West Coast regional production will see the largest decline of 63%.

The true potential of U.S shale gas resource remains

uncertain, however, as estimates vary and experience continues to provide new information on the seven shale plays in the U.S., which include the Antrim, Barnett, Devonian, Fayetteville, Woodford, Haynesville, and Marcellus plays. Growth in gas production from shale formations will offset declines in other supply sources nationwide, and is expected to grow significantly in the Northeast, Gulf Coast and Midcontinent regions.

The Antrim shale play, a formation of the Upper Devonian age found in Michigan and parts of Ohio and Indiana, has produced gas since the 1940s, but was not active until the 1980s. Drilling activity picked up significantly in the 1990s; to date, the shale has produced over 2.5 tcf from over 9,000 wells.

Prior to 2000, low production gas wells were completed in the Marcellus shale, which is found in New York, Pennsylvania and other states that are part of the Appalachian Basin. Several companies that successfully drilled the Barnett shale play near Fort Worth, Texas, several companies are applying this technology and experience to drill the Marcellus shale. While initial drilling costs are higher, horizontal wells being drilled here are producing at twice the

rate of vertical wells and at a slightly lower overall cost.

In 2008, the Haynesville shale made headlines after Chesapeake Energy reported it had made a significant Haynesville shale gas discovery in northwest Louisiana, leading to a rush of activity as energy exploration companies began to lease property in north Louisiana for possible drilling and production. The formation was once considered too costly to explore, but rising energy costs and newer technology and processes changed this situation.

The Haynesville play is expected to become a major contributor in the Gulf Coast region, and shale gas production here compensates for nearly 91 % of the decline in other gas production. Other shale plays found in this region include Eagle Ford, which has become active due to its oil-gas mix, and Barnett shale play.

Although production from the Antrim shale has started declining, and development in parts of the Marcellus shale has been inhibited somewhat by limitations on the issuance of drilling permits, shale gas production in the Northeast region will be more than triple from 2008 to 2035, according to EIA said.

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