



Fueling Hope in Europe

Shale gas discoveries hold potential for energy independence

Photos by The Associated Press

For European nations forced to buy natural gas from unpredictable foreign suppliers, revolutionary new technologies for extracting gas from shale deposits could rearrange the economic, political and diplomatic landscape. Not only would these new supplies transform world energy markets in Europe's favor, but the discoveries could end the dominance of such producers as Russia's Gazprom, which made headlines in 2005 and 2009 by interrupting gas shipments through Ukrainian pipelines in the dead of winter.

European leaders view diversification of oil and gas supplies as crucial in establishing energy security. According to European Union data, 60 percent of EU natural gas is imported. Among Western and Central European nations, only Norway, Denmark and the Netherlands are net gas exporters. Data from the EU's Eurostat indicate that about one-third of EU gas imports were supplied by Russia in 2009. However, dependency on Russian gas has dropped substantially from 2007, when it constituted 41 percent of the EU's gas imports. Germany received 40 percent of its gas from Russia, while Hungary got 75 percent and Poland 72 percent. Ukraine has little or no domestic gas production and is almost totally dependent on Russia.

However, large potential European shale gas reserves have emerged as a point of optimism. The EU website euractiv.com reports that geological studies indicate "shale gas is presumed to exist in Germany, Poland, Sweden, France, Austria, Hungary and the UK," as well as in current gas producers Denmark and the Netherlands. Non-EU countries Ukraine and Norway also have potentially significant shale gas reserves. Polish leaders, whose country has the most promising shale formations, are optimistic that its shale gas plays will transform it into a net gas exporter, from a country that currently imports 75 percent of its domestic requirement. The Polish Ministry of Economy cites projected shale gas reserves of 1.5 trillion to 3 trillion cubic meters, enough

to supply Poland for more than 200 years at current consumption levels.

New extraction methods

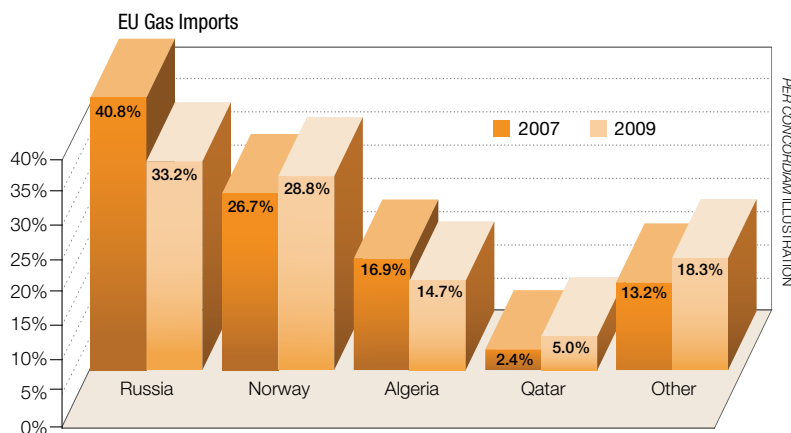
Shale gas has only recently been considered a viable option for large-scale exploration and extraction. As noted by Roderick Kefferpütz of the Centre for European Policy Studies, or CEPS, most major energy companies doubted the value of shale gas because of the difficulties — and associated costs — of extracting the gas from rock formations in which it is trapped. Gases and liquids move poorly through compact shale rock. Large-scale shale gas extraction became more feasible with the development of two new drilling techniques: horizontal drilling and hydraulic fracturing, known in the industry as “fracking.” The process involves drilling down to the gas-rich shale layers and then drilling horizontally to create seams in the rock. Fracking fluid — a mixture of water, sand and various chemicals — is forced into the seams at high pressure, cracking the rock and releasing the trapped gas.

These technologies were developed by American “wildcat” operators, smaller energy companies that stepped into the vacuum created by a lack of interest from the larger companies. Kefferpütz pointed out that continual experimentation and adaptation have improved drilling techniques, reduced costs and created a level of flexibility that is crucial when dealing with the varied geology of shale formations. Shale gas extraction has become so cost effective in North America that the volume of gas production in the U.S. has increased, even as gas prices dropped 67 percent during the international economic downturn.

On the strength of North American shale gas production, the IEA reported that the U.S. passed Russia in 2009 to become the world’s largest gas producer, even though the number of operating wells decreased. In a short period, the U.S. could go from importing gas to exporting it. “The ripple effects of the U.S. ‘shale gale’ are already being felt abroad,” Kefferpütz said in a June 2010 report for CEPS. “With U.S. markets awash with natural gas and prices plummeting to around \$4/mBtu [million British thermal units], LNG

[liquefied natural gas] tankers have been rerouted to more lucrative markets in Europe, upsetting the status quo with Gazprom losing market share.” In fact, European spot market gas prices were down almost 60 percent in the summer of 2009 from those set in Gazprom’s long-term contracts. The combination of lower priced alternatives and reduced demand from the economic downturn resulted in a 50 billion-cubic-meter decrease in European gas imports from Russia.

Gazprom now faces two troublesome prospects: recouping losses for undelivered gas estimated at \$2.5 billion under the terms of “take-or-pay” contracts and potential decoupling of gas prices from high oil prices. North American shale gas production is already contributing to decoupling. Plentiful supplies of gas, cheaply priced relative to oil, are establishing what could soon be a world market with a



single, low price. The decoupling of oil and gas prices reduces profits for all gas-exporting nations, especially Russia, whose pipeline delivery system is not as flexible as liquefied natural gas shipped in tankers.

Although Europe’s emergent shale gas industry offers hope that it may, at least partially, replicate the American shale gas sensation, politics, demography, geology and the environment could intervene. GeoForschungsZentrum, Germany’s research center for Earth sciences, is coordinating geological research. The project, called GASH, consists of an “expert task force drawn from research institutions, geological surveys, universities and consultants,” including members from Germany, the United Kingdom, France, the Netherlands, Denmark, Austria and the United States, according to the project’s website.

A shale drilling rig stands over a natural gas well in the U.S. state of Colorado. In 2009, the U.S. passed Russia to become the world's largest gas producer.



According to GASH's introductory documents, Europe's shale gas, tucked away in deeper, smaller pockets, is harder to reach. That could add to the cost of European gas production. GASH is studying gas concentrations and rock properties ahead of exploratory drilling with the goal of improving efficiency.

Environmental effects

The potential for environmental harm from shale gas extraction is still being debated, but evidence suggests the impact could be substantial. Fracking fluid is overwhelmingly composed of water but includes sand and chemicals. The exact formulas vary depending on the makeup of each shale formation. "The top secret solutions used in hydro-fracking are highly toxic. The contamination of local water wells and underground aquifers — although much of the drilling occurs far below the water table — remains a concern," the Swiss International Relations and Security Network reported.

There are also questions about how to dispose of the fluid after it is extracted from the wellheads. Leaks from waste containment ponds on drill sites have caused localized contamination. Energy companies insist the dangers are overstated and the incidence of environmental contamination are rare. Another concern is where to find water for hydraulic fracturing in environments where water is scarce. However, in terms of air quality, the use of cleaner-burning, carbon-efficient natural gas could reduce pollution in nations, such as Poland, that rely on coal for power.

In more densely populated and highly regulated Europe, the costs of meeting regulatory requirements will be greater, and many promising shale gas sites may be blocked to drilling. Many property owners in the U.S. profited handsomely by selling mineral rights, but in many EU countries those rights are owned by the state, "which leaves local residents with all of the trouble and few of the benefits," Kefferpütz said. Europe will also have to overcome substantial equipment shortages, according to a report in the *Financial Times*. The U.S. has thousands of gas-drilling rigs and an experienced work force, whereas in the EU, there are only about 50 rigs, resulting in a shortage that requires partnerships with major foreign energy companies with experience in North American gas fields.

Gas breeds independence

However, successful exploitation of European shale gas reserves could drastically improve energy security and revolutionize relationships between EU countries and traditional gas-supplying nations. EU nations currently consume almost 550 billion cubic meters annually. "Europe could have as much as 14 trillion cubic meters," reports *Business New Europe*, enough to meet current demand for 25 years.

European policy choices regarding Russia and Middle Eastern energy producers such as Iran, Saudi Arabia and Algeria are based on the reality of European dependence on energy supplied by those nations. Excluding recent shale gas discoveries, more than half the world's natural gas resources are concentrated in Russia, Iran and Qatar.

The international community's attempts to stop Iran's nuclear program through diplomacy and sanctions have suffered from the recognition that many nations depend on Iran's oil and gas. Russia has also demonstrated a willingness to use energy as a foreign relations bargaining chip, shutting off gas supplies to Belarus in 2004 and again in June 2010, as well as Ukraine in 2005 and 2009. The Russo-Ukrainian gas crises extended to all of Europe as 80 percent of Russian gas exports to Europe flow through Ukrainian pipelines. Although Gazprom claimed the stoppages were due to payment disputes, EU analysts said Russia was using energy as a cudgel to prevent the pro-Western government of Viktor Yushchenko from establishing closer relations with the EU and NATO. The new pro-Russian Ukrainian government of Viktor Yanukovich recently negotiated discounts on Russian natural gas. The price: Ukraine extended the lease on Russia's Crimean naval base by an additional 25 years.

European energy security could improve relations between Russia and Ukraine and other countries dependent on Russian gas. Regarding the often-strained Russo-Polish relations, Jane's Intelligence Review speculates that "the possible end to the supplier-client relationship could actually help reduce bilateral tensions between the two states," as a more cooperative approach takes hold.

Greater energy independence for Europe could also improve Russia's political system. Russia's dependence on energy earnings has inhibited economic modernization and political



reform, Anders Åslund of the Peterson Institute for International Economics wrote in an opinion piece for the *Moscow Times*. Huge energy profits improved the standard of living for Russia's middle class, blunting the appetite for political rights. At the same time, those profits fed a culture of corruption and legal nihilism and "revived the old Soviet schizophrenia between inferiority complex and megalomania." Åslund sees signs that Russia will emerge from the global financial crisis with a focus on economic modernization and better relations with Europe and the West.

It will take time before Europe realizes the full potential of its shale gas reserves. For example, Poland's first exploratory well, in the southeastern town of Markowola, was first drilled in April 2010. According to estimates in *Business New Europe*, exploratory drilling could last up to four years, with no appreciable impact on natural gas supplies until at least 2020. Results, however, have been encouraging. If European shale gas production is partly as prolific as in North America, Europe will gain much-improved energy security. Greater energy independence would contribute to political and economic independence for Poland, Ukraine, and other Central and Eastern European countries that are currently vulnerable to the whims of international energy policy. □

Rem Vyakhiriev, president of Russia's Gazprom company, applauds workers finishing the Polish section of a gas pipeline that links Russia with Western Europe. Polish businessman Aleksander Gudzowaty, right, whose company is involved in the construction, joined Vyakhiriev for the ceremony.