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# RUSSIA

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Andrey Shadurskiy reports from St Petersburg:

THE SHALE REVOLUTION AND NEW RULES OF THE GAME: ARE RUSSIA'S POSITIONS IN  
EUROPEAN ENERGY MARKETS IN DANGER?

ANNOTATION

*The fact that the so-called "shale revolution" is real can no longer be denied. Natural gas production from new sources, primarily shale rock, continues to grow at a rapid pace.*

*Andrey Shadurskiy, energy policy and security expert and senior lecturer at St Petersburg State University, looks at the scale of the "shale revolution" and analyses the chances for its replication outside North America. He concludes that the numerous indirect effects of that revolution will be of paramount importance. He argues that these effects - especially changes in the geographic landscape and conditions of international trade in natural gas - represent the greatest threat to Russian energy policy.*

## SHALE REVOLUTION AS AN UNDENIABLE FACT

The global potential of the *shale revolution*, its projected duration, and its effects on energy policies of the leading importers and exporters remain a subject of debate. There is no denying, however, that a revolution has genuinely happened on the North American continent, and that it has completely transformed the energy policy of the United States, which still remains a major importer of hydrocarbons.

According to *BP*, U.S. production of natural gas rose from 524bn cu.m. in 2006 to 687.6bn in 2013. America's proved reserves of natural gas have increased by 3.9 trillion cu.m., or 46 per cent. In absolute figures, that unprecedented growth is second only to Turkmenistan's (where proved reserves have risen by 15.2 trillion cu.m., or 87 per cent). In relative figures, the U.S. is third after Turkmenistan and China (which showed an increase of 59 per cent, or 2 trillion cu.m.). There is, however, one signal difference between the situation in the United States and the other two countries. Turkmen and Chinese proved gas reserves have increased thanks to the discovery of new gas fields. In the United States, the increase was generated by the introduction of new production technologies. In fact, even two years ago, in 2012, shale gas accounted for about 40 per cent of the entire U.S. gas production.

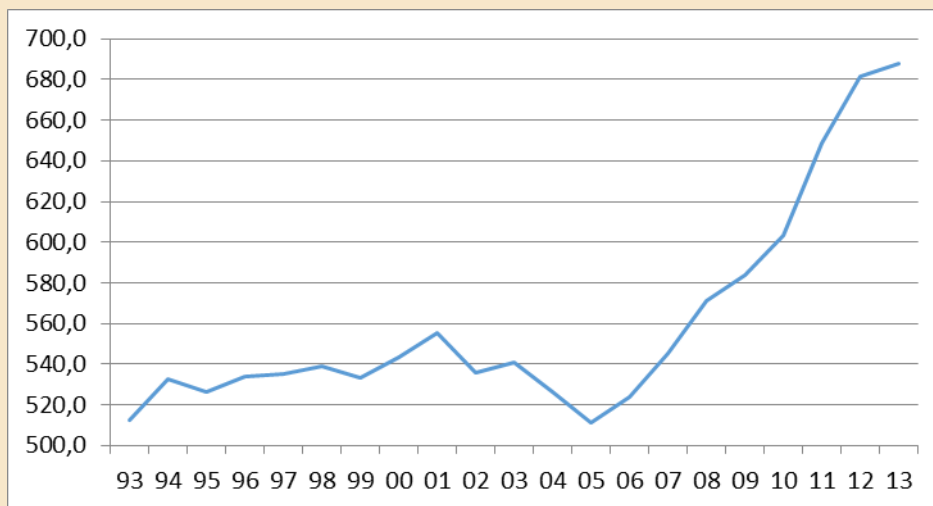


Figure 1. Natural gas production in the United States, 1993-2013, billion cu.m.  
*Source: BP Statistical Review of World Energy, 2014.*

Figures for the estimated technically recoverable shale gas reserves are even more impressive: 18.8 - 32.9 trillion cu.m. in the United States alone, which controls only a small share of the world total. Chinese reserves are estimated at 31.6 trillion, Argentina at 22.7 trillion, and Algerian at 20 trillion. Russia is also in the Top 10 of that ranking with 8 trillion cu.m. The global total, according to the U.S. Department of Energy, is at least 206.7 trillion cu.m. To illustrate, the world's largest proved reserves of natural gas are controlled by Iran; the figure stands at only 33.8 trillion cu.m. Russia is a close second with 31.3 trillion.

*Geopolitically, one important fact is that shale gas reserves are distributed across the globe much more evenly than conventional gas fields. As a result, many countries that were previously energy-poor have been found to be sitting on top of large shale gas reserves. For example, now that shale gas can be produced economically, Poland's gas reserves have increased by a factor of 50 to 4.2 trillion cu.m. Argentina, with 22.7 trillion, has suddenly become one of the world's most gas-rich countries. France's reserves have shot up more than a hundredfold to 3.9 trillion.*

The U.S. Department of State has long been aware of the major geopolitical implications of shale energy. The DoS views the *shale revolution* as a huge contributor to global

energy security. It is now working to facilitate closer cooperation between the countries aspiring to replicate America's shale revolution and the relevant U.S. government agencies and companies. China became a key U.S. partner in that area in 2008. The shale revolution is also one of the main subjects on the agenda of U.S.-EU dialogue. In 2010 the DoS launched a new multilateral cooperation mechanism, the Global Shale Gas Initiative. In 2011 that initiative was transformed into a program of technical support for the transition to gas production from new sources.

*It must be remembered, however, that technically recoverable reserves (defined as "reserves that can potentially be recovered with the existing level of technology, regardless of economic factors and costs") cannot be estimated with any degree of precision. First, this has to do with the complex geology of shale formations, where gas production can be very different even from two wells sitting next to each other. Second, since shale gas production is a fairly recent phenomenon, it is not clear how production from the existing wells will change in the long run.*

Estimates of technically recoverable shale gas reserves outside the United States are being made using generalized comparisons of the geophysical parameters of shale gas fields in foreign countries with the known parameters of fields in the United States. These estimates are also based on the assumption that these parameters are fairly homogenous across the entire field. Such methodology obviously results in frequent reassessments as more accurate geological data becomes available, and as actual test wells are drilled. One example is the reassessment of the technically recoverable reserves of the Lublin basin in Poland. The latest estimates put these reserves at 0.26 trillion cu.m., which is only a fifth of the 2011 estimate of 1.25 trillion. Another, even more extreme example is the Alum Shale basin in Norway and Sweden. It was once thought to hold 2.3 trillion cu.m. of recoverable gas reserves. That estimate has now been reduced to zero.

#### FROM TECHNICALLY RECOVERABLE SHALE RESERVES TO GAS IN THE PIPELINES

The shale revolution in the United States did not happen overnight. Its roots go back to the late 1970s, when the U.S. government launched a new strategy of stimulating investment in national energy security. As part of that strategy the government introduced special tax incentives that remained in place from 1980 to 2002. Also, the U.S. system of taxation in the energy industry stimulates oil and gas exploration and development by small and innovative companies. These companies were the engine of the shale revolution at its early stages.

In theory, these government programs and tax incentives can be emulated by other countries. There are, however, a number of factors that make a repeat of the American success story in other countries very difficult.

*The fact that shale gas formations are not geologically homogenous has one important corollary: hundreds of wells have to be drilled to begin gas production, and half of those wells may well prove unproductive. That makes the success of any shale gas development project severely dependent on the availability of a sophisticated market for drilling equipment and services. That reduces the chances for a repeat of the "shale revolution" outside North America.*

As of June 2014, North America had 1901 operational drilling rigs, which is more than anywhere else in the world. To illustrate, in 2012 there were only 1,100 rigs in Russia and all the former Soviet republics, and 1,500 rigs in China. The figure for the rest of the world, with the exception of Iran, Sudan, Cuba, North Korea, and Syria, stood at 1,344 in June 2014. Also, depending on the market situation, these rigs can be used to drill for oil rather than natural gas.

*There are also several other reasons why a repeat of the shale revolution outside the United States remains unlikely. These include the lack of fresh water that is used for hydraulic fracturing (fracking) of shale rock, especially in China; different land use regulation and legislation; more stringent environmental requirements (especially in Europe); and very big expense of building the necessary transport infrastructure.*

As regards the contentious issue of the environmental impact of shale gas production, its most obvious risks include: the contamination of ground waters by chemicals used in fracking; contamination of the liquid used for fracking by radioactive elements; and increased seismic activity in the fracking area. Another issue that is particularly acute in light of the EU's energy policy and worries about climate change is the contribution of shale gas production and use into global warming; it is believed that the greenhouse effect of the shale gas industry is much greater compared to conventional gas.

#### INDIRECT EFFECTS OF THE SHALE REVOLUTION: THE LNG FACTOR

It appears that the *shale revolution* will remain a regional phenomenon confined to North America in the medium time frame. It will not have any major direct effect on the market situation on other continents. Its indirect effects, however, should not be underestimated.

✓ *Globalization of the natural gas markets and the resulting changes of the rules of the game in these markets are becoming the main mechanism through which the North American shale revolution is affecting other parts of the world.*

There are currently three main regional markets for natural gas: North America, Europe, and Asia. For now, each of them retains its own distinctive characteristics in terms of price formation and the principles of contractual relations.

**The North American market** is the most sophisticated and has the greatest liquidity, thanks largely to a highly developed system of trading gas at commodity exchanges. Most of the gas imported by the United States is supplied by pipelines from Canada; the rest is delivered in the form of liquefied natural gas (LNG).

**The Asian market** is dominated by LNG rather than pipeline gas because many of the local consumers, as well as producers, are islands separated by large stretches of water. At the same time, most of the gas in that market is sold under long-term contracts, with prices linked to the price of oil.

**The European market** is the most complicated subject for analysis because it has a complex hybrid structure. European countries still import most of their gas via pipelines, but the proportion of LNG is growing all the time. Traditional long-term contracts for pipeline deliveries, with prices linked to the price of oil, coexist with the spot market, volatile market prices, and contracts that rely on hybrid price formation mechanisms.

*Globalization of the natural gas market became a tangible phenomenon only in the past ten years or so. It is also inextricably linked to the "shale revolution" in the United States. The main agent of that globalization is Qatar, which launched LNG export capacity on an unprecedented scale in the 2000s. The country was targeting the North American market because according to all the projections at the time, that market was in for a large deficit of natural gas. But following the onset of the "shale revolution" in the United States, Qatar was left with a large surplus of LNG export capacity. The market became flooded with LNG (including re-exports from the United States) looking for a buyer. The Qataris eventually found new customers elsewhere, including Europe, even though up until the early 2000s the Middle East was regarded as part of the Asian market (with the East Asian countries as the largest consumers).*

## LNG AS THE MAIN THREAT TO RUSSIA'S POSITIONS IN EUROPE?

The globalization of the natural gas markets directly impinges on Russia's interests as the largest exporter of hydrocarbons. The mechanisms of that threat's real-life effects, however, remain ambiguous. To understand why, let us look at the main European importers of Russian gas, and the degree of their involvement in the globalization process.

**Europe** can be divided into three distinctive parts in terms of the globalization of natural gas markets. **Southern Europe** finds itself in the most advantageous situation because it has a lot of LNG import capacity and receives some of its gas via pipelines from Northern Africa. **Western Europe** relies on its own resources, which are rapidly dwindling, supplies via pipeline from Norway, and rapidly growing LNG import capacity (especially in Britain). **Central, Eastern, and Northern Europe** (with the exception of Denmark) is heavily dependent on Russian gas supplies via pipelines, and does not have any significant LNG import capacity.

About a third of the EU's LNG imports are destined for Spain. LNG accounts for three quarters of gas imports in Spain, two thirds in Portugal, a third in Britain, France, and Greece, and a quarter in Belgium. Italy receives only about 10 per cent of its gas imports in the form of LNG. There are no other large LNG importers in Europe.

*The main consumers of Russian natural gas are Central and Eastern European countries. There is still no single European gas market, and there are few cross-border gas interconnections between the European countries. As a result, even if European LNG imports were cheaper than pipeline gas (which is not always the case at this time), it would not have a direct effect on Gazprom's main customers in Europe.*

Of course, that situation can change in some marginal gas markets. A case in point is Lithuania, which has nearly completed the construction of a floating LNG terminal in Klaipeda. Another is Poland, which is building an LNG terminal in Świnoujście. In both cases, however, the regional effect of these projects will be limited due to the absence of the necessary infrastructure, as well as lack of coordination between the national energy policies, despite the European Commission's efforts in that regard. Also, according to various estimates, LNG imports will not cost Poland and Lithuania any cheaper than imports of Russian gas via pipelines. For these countries, access to alternative sources will mainly be a catalyst of further liberalization and integration of the gas markets.

*Diversification of supplies and increasing the liquidity of the market are instruments of bolstering strategic, long-term energy security. The continuing slide of the oil price will not have any significant effects on these efforts.*

- ✓ *First, after coming under pressure from European suppliers, Gazprom has already changed the price formation mechanism on many contracts. More specifically, prices under these contracts take into greater account the current prices at the gas hubs rather than being directly dependent on the oil price.*
- ✓ *Second, the falling oil price is merely a secondary factor as far as its effects on the gas markets are concerned. These markets could potentially react much more strongly to one of the primary factors that depress the oil price - namely, slowing economic growth in China. That slowdown has already led to a significant fall in the LNG spot prices in Asia, making exports to Europe a more attractive proposition for LNG producers.*

## CHINA: HOME OF THE NEXT SHALE REVOLUTION?

For all the problems listed in this article, there is at least one country outside North America that has a realistic chance of pulling off its own *shale revolution* over the next few years. Most experts agree that this country is China. In 2013 the

Chinese reported gas output figures from several test drills in Fuling District that look phenomenal even by American standards. In 2012 the Chinese government formulated very ambitious targets for shale gas production; it wants the country's shale gas output to reach 60-100 billion cu.m. by 2020.

Most of the new LNG export facilities being built in Australia will target China as their main market. Australia wants to increase its LNG exports from 55bn cu.m. to 163bn over a three-year period to 2017. These are huge figures, given that global LNG exports stood at 325.3bn cu.m. in 2013. Meanwhile, Russia and China recently signed a deal on gas supplies from Eastern Siberia after ten years of talks. The exact terms of the deal have not been disclosed, but they are thought to be extremely favorable for the Chinese.

Regardless of whether predictions of a Chinese *shale revolution* come to pass, these predictions, combined with China's active participation in the globalization of LNG markets, are already giving China a stronger hand during negotiations, including with Russia. At the same time, it is worth noting that in the autumn of 2014, after the announcement of the gas deal with Russia, China was forced to admit that despite successful drilling in Fuling District, Chinese shale gas output will reach only about 30bn cu.m. by 2020.

#### CONCLUSION: NEW RULES OF THE GAME

We do not believe that Russia's external energy policy has been directly affected by the shale revolution or the globalization of the natural gas markets. So far, most of the importers of Russian gas have not felt the benefits of that globalization, or at the very most, globalization has given them access to new sources than cost about as much as Russian supplies, after discounts given by *Gazprom*. But these discounts actually represent the main threat facing the Russian energy policy, with "threat" defined in this case as the need for the Russian government and *Gazprom* to change their *modus operandi*. The need to provide discounts or to give ground on the previously stipulated take-or-pay principle (i.e. an obligation by the customer to buy a certain amount of gas or pay fines) has arisen precisely because of the globalization of the natural gas markets, with the *shale revolution* also being an indirect cause.

The rapid rise of the spot market and the growing popularity of a new price formation mechanism that foregoes the link to the oil price were made possible by the growing liquidity of the market, with more buyers, more sellers, and more gas being traded. So far, it is too early to speak of a genuine revolution in LNG trade. But the new price formation systems, whose very existence makes Russian gas look more expensive, and the general decline in gas demand resulting from the financial and economic crisis, have contributed to the substantial weakening of Russia's positions at the negotiating table as far as energy policy is concerned. The EU member states have consolidated their positions in an effort to produce a single external energy policy and create a genuine single energy market. The globalization of the natural gas markets has made these objectives easier to achieve.

Meanwhile, as we have demonstrated, the indirect effects of the shale revolution are being felt very strongly on the eastern flank of the Russian gas policy, the new gas deal with China being a case in point.



The author of this paper, Andrey Shadurskiy, holds a PhD in political sciences and is a senior lecturer at the European Studies Department of St Petersburg State University.

Editor: Julia Fetisova

(c) Trialogue Club International: [trialogue@pircenter.org](mailto:trialogue@pircenter.org);

(c) Centre russe d'études politiques: [crep@pircenter.org](mailto:crep@pircenter.org)

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