Role of Shale Gas in the Energy Policy of Ukraine

V.G. Tsivatyi

Abstract The article analyzes the role of shale gas in the context of energy policy and security of Ukraine at the present stage. The author emphasizes general trends of the global natural gas market, as well as the prospects for shale gas production in Ukraine. Foreign policy dilemmas, challenges, achievements, and prospects in the gas production industry in Ukraine are characterized. Particular attention is paid to the political, diplomatic, and international factors of the issue researched, as well as to the environmental factor that both contributes and prevents the extraction of shale gas in present conditions on the territory of Ukraine.

Keywords Diplomacy, Energy policy, Energy security, Foreign policy, Natural gas, Shale gas, Ukraine

Contents

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1 Introduction

Ukraine belongs to the countries whose economic development is largely hampered by the lack of its own resources. In view of these circumstances during recent years, Ukraine has been increasingly concerned with energy diversification. One component of this process is the development of new deposits of fossil fuels, in particular production of unconventional gas (shale gas, coalbed methane, tight gas, etc.). That fact is attractive as the reservoirs of shale gas are formed within a large part of the territory of Ukraine, along with the extensive network of pipelines, which can ensure rapid delivery of the extracted gas. In addition, it deducts spending of significant funds for the construction of new pipelines.

Under the pressure of the increasing energy dependence of Ukraine on Russian energy supplies and constant increase in energy prices, energy intensive national economy comes up with lower production levels and stagnation of social and economic development of Ukraine. Therefore the issue of reducing the energy dependence through the formation of an efficient energy conservation programme and alternative energy development in Ukraine should be classified as strategically important, that need to be urgently tackled.

2 Energy Strategy Priorities

Today a draft document – "New Energy Strategy of Ukraine: Safety, Energy Efficiency, Competition" (07.08.2015) – has been developed in Ukraine. This system document is aimed at reforming the energy sector of Ukraine for the period up to 2020 and the formation of the long-term strategic targets of Ukraine – up to 2035 [1].

In accordance with the Ukrainian "Energy Strategy of Ukraine till 2030," the share of the renewable energy in the total energy balance of the country will be increased to 20%. The main and most effective directions of regenerative energy in Ukraine are the following: wind power, solar power, bioenergy, hydropower, geothermal energy, etc. [2].

Ukraine has considerable potential for unconventional gas (shale gas, tight sand gas, coalbed methane, etc.) (Fig. 1). Besides, Ukraine has some promising areas for the production of coalbed methane and natural gas from deepwater shelf of the Black Sea. By 2015, famous global energy companies, including Shell and Eni, have been working on projects on the extraction of unconventional gas in Ukraine at different stages.

In Ukraine, the total annual technically achievable energy potential of alternative energy sources in the recalculation on conventional fuel is about 63 million tons. The proportion of energy produced at the expense of alternative sources today is just a little over 3% [3].

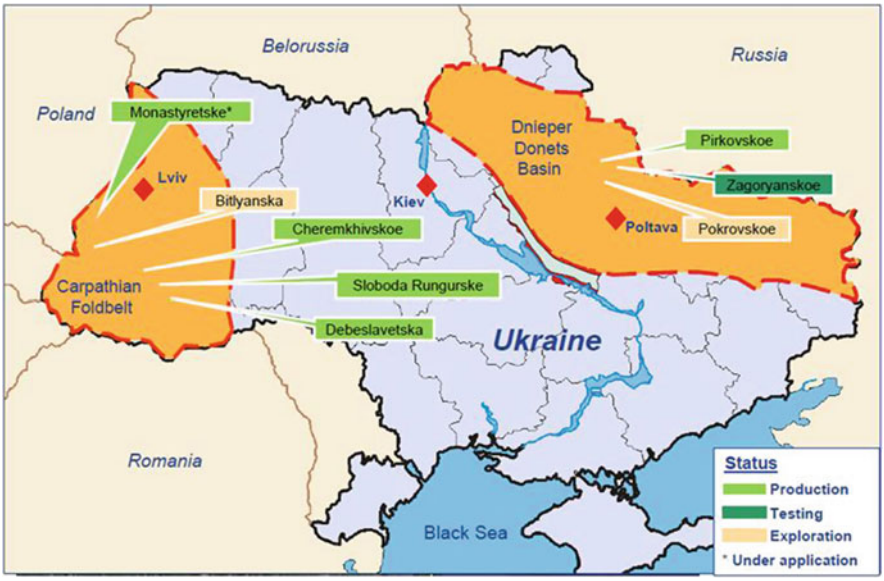

Fig. 1 Ukraine shale gas deposits (http://www.zerohedge.com/sites/default/files/images/user5/imageroot/2014/07/Dnieper%20Donetsk%20shale%20basin.jpg)

Revolutionary changes in the natural gas markets, which have been observed in world politics and diplomatic practice, have recently been associated with the beginning of a cost-effective large-scale extraction of shale gas in the USA. They significantly alter the strategic priorities of natural gas producers and consumers, and global prospects for using this energy source [4]. Undoubtedly, Ukraine, being one of the largest importers of natural gas in Europe, has also tackled an important issue of evaluating the effectiveness of shale gas production on its territory.

3 First Outcomes

Total reserves of shale gas in Ukraine are not exactly defined, but, according to preliminary estimates, they are in the range from 1.2 to 7.0 trillion m^3. Most experts agree that the reserves of shale gas in Ukraine rank the fourth in Europe after Poland, France, and Norway [5].

In 2012, Ukraine held three competitions for transactions on the product distribution for three prospective areas of possible natural gas production (Fig. 2):

- Yuzovsky (Kharkiv and Donetsk region) – the winner of the competition was the British-Dutch company Shell, which signed an agreement on transactions on the product distribution with the Government of Ukraine on January 24, 2013 for 50 years and had planned to extract shale gas;

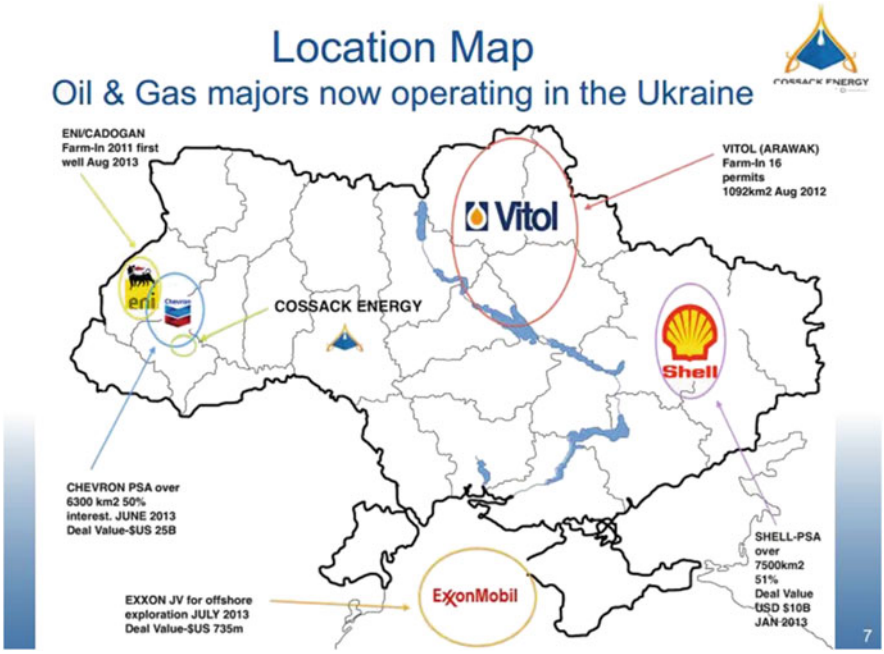

Fig. 2 Major oil/gas companies operating in the Ukraine (http://creofire.com/wp-content/uploads/2014/03/O-and-G-Majors-in-Ukraine.png)

- Olesky (Lviv and Ivano-Frankivsk region) – the winner was the American company Chevron (signing of the agreement in 2013);
- Scythian (deepwater shelf of the Black Sea) – the winner was a consortium of companies led by the US ExxonMobil (40%), Shell (35%), Austria's OMV represented by its Romanian subsidiary Petrom (15%), and National Joint Stock Company "Nadra Ukrayiny" (10%).

With a significant level of natural gas in its energy mix (more than 40%), rigid and uncompromising politics of the monopoly supplier of energy resources, and the limited capacity with respect to the geographic and economic feasibility of diversifying its sources of supply, Ukraine has to look for different options for reducing energy dependence. One of them is related to the prospects of shale gas production in Ukraine [6].

The USA intends to invest in the Ukrainian gas industry to help her stop importing gas and even to become its exporter. However, even Ukrainian experts say that the reserves of conventional gas in Ukraine are not enough, and the US companies have almost abandoned the plans to extract shale gas, or, to put it mildly, took a break for an indefinite period. Ukraine can become a gas exporter only under one condition: by serious reduction of gas consumption both by the population and by the industrial sector [7, 8].

Ukraine can increase production only through shale gas, but because of the high production costs, it will not be able to compete with conventional gas, including the Russian one. So far, Ukraine lacks a national action plan for energy efficiency: if it has been increased to the average European level, this can save annually about 34 bln m^3, which exceeds total gas consumption in Spain.

4 Target Prices of Shale Gas Production in Ukraine

The target price of shale gas in Ukraine should be discussed in particular. Trends of increasing technological complexity of production, as well as the requirements for ensuring environmental acceptability of production, increase the preliminary defined figures of pre-production cost, and probably it will make about 150–180 USD per 1,000 m^3 and the projects scale, on the contrary, can help reduce it in the long run. According to the estimates of Ukrainian and foreign experts, the cost of gas to be extracted from the Yuzovsky gas site will be 120–130 USD per 1,000 m^3. Although, it is premature to talk about the final price of production, the only thing that can be noted is that this price is less than the price of natural gas, which comes from Russia, and so, from the economic point of view, the production of shale gas in Ukraine can be fully justified [9].

Shale gas production is a long-term and quite expensive project for Ukraine. Six to nine years are necessary just to start production. Moreover, today, no one knows the actual reserves of shale gas. This requires prospecting, drilling wells. So far, there is no shale gas on the balance sheet of the Geological Service of Ukraine. Europe also cannot boast with the dynamics of shale gas production, because nothing is being developed or produced there. There were plans to start such production in Poland, but there are no sufficiently big fields found there. So now the world's shale gas production is developing dynamically in the USA, Canada, and recently in China. And only those countries can influence the global energy market [10, 11].

In March 2015, the National Joint Stock Company "Nadra Ukrayiny" has allocated 15 sites for exploratory wells for the purpose of gas production from shale. To implement long-term development plan, as a result of which the increase of fossil fuel reserves of 220 million tons of standard fuel is obtained, the company, having a limited budget funding, expects to receive $300 million from international financial institutions under the state guarantees and is actively working to attract international oil companies to participate in joint projects.

5 Prospects for Shale Gas Production in Ukraine

In 2015, the plans of many foreign companies have changed. It should be pointed out that the agreement on transactions on the product distribution in Olesky site with the corresponding local councils faces with certain difficulties. So, after the Ivano-Frankivsk Local Council had objected, Chevron agreed to disclose information about the names of the chemicals that are used for hydraulic fracturing to the state and local authorities. There are also some inconsistent aspects of transactions on the product distribution (primarily environmental).

Among major environmental threats of shale gas production, the following are emphasized: seismic risks; groundwater pollution; emissions to the atmosphere; and contamination of surface waters and soil [12].

Among the components of the environmental aggressiveness of shale gas production (fracking) towards the geological environment is a high density of wells, high pressure of hydro-crushing of layers, the possibility of artificial earthquakes, and high pressure injection of significant volumes (8,000–20,000 m^3) of technological solutions into the fracking zone [13–15].

Shale gas in Ukraine has a promising potential (up to 1.5 trillion m^3) and time equivalent of gas consumption of up to 40–50 years. However, the technology of drilling horizontal wells and hollow wells for fracking process has been implemented for 30 years in geological conditions of the USA (less depth, less pressure, etc.), but not in Ukraine [16]. In contrast, the geological environment of Olesky and Yuzovsky sites in Ukraine has a more complicated structure due to seismic (West) and tectonic (East) peculiarities that requires scientific research to adapt technology in shale gas production to the conditions in Ukraine. Besides, on the shale gas research areas there are a considerable number of people, a significant amount of developed engineering infrastructure, explored deposits of underground drinking and mineral water, and a network of environmental facilities. Now the works are carried out without adequate environmental impact assessment [17].

In general, such a process must take place within the framework of certain so-called golden rules, and become an example of transparency and completeness of the decision-making processes for the implementation of transactions on the distribution of products:

- Proper planning (maintaining a dialogue with local communities, residents, and other involved parties at all stages of field development and, first of all, before the development starts, the creation of opportunities to comment on the plans and actions of deposit developing companies, listening and providing a prompt feedback on complaints; initial evaluation of the environmental data (quality of drinking water prior to the development), and continuous monitoring of their changes; collecting and announcing operational data about the volume of water use, the volume and characteristics of wastewater, possible emissions into the atmosphere, along with a mandatory full disclosure of the information on the chemical additives and their volume, use of hydraulic fracturing, etc.; commitment that local communities receive economic benefits from mining);

- Full transparency (the choice of locations for wells, minimizing the impact on the local community, the existing land use, the environment; proper use of geologic data to select locations for drilling and hydraulic fracturing, including the assessment of the risks of deep faults and other geological effects that can lead to earthquakes, monitoring to prevent a situation when fracking can go beyond the gas field);
- Insulation of wells and prevention of leakage;
- Appropriate and rational use of water;
- Wide-scale thinking (finding opportunities for economies on scale and coordinated development of local infrastructure, which also helps to reduce the environmental impact, taking into account the overall and regional environmental effects of numerous drilling, first of all, on water use, land use, air quality, transportation, and noise environment);
- Ensuring a high level of environmental safety (the conviction that the expected level of output of unconventional gas justifies the costs; political support, relevant competence of employees, and reliable public awareness; finding the proper balance in decision-making policy in order to ensure high performance standards, promotion of innovation, and technological improvements; the belief that the plans for emergency response are reliable and correspond to the scale of risks; continuous improvement of the rules and methods of work, the provision of appropriate recognition of an independent evaluation and monitoring of environmental safety) [18–20].

The issue of shale gas production is still undefined today because of the difficult political situation. In view of these circumstances, in August 2015, the Shell company was considering to quit a joint project with the Ukrainian company "Nadra Yuzivska." Such intentions are caused by force majeure circumstances, in particular, the lack of stable sociopolitical situation in the Donbass region, which prevents the development of shale gas deposits. At the end of 2014, because of increased risks the US company Chevron refused to carry out geological exploration work at the deposits of shale gas in Ukraine. The corresponding decision on the termination of work on the shale gas sites was approved by the Board of Directors of "Chevron Ukraine BV" in July 2015.

6 Conclusions

1. Extraction of shale gas in Ukraine is possible (taking into account reserves and economic feasibility of the future price) and necessary (first of all, as a mechanism to counteract the monopoly in the natural gas supply, as well as a factor of ensuring modern high technological level of fossil fuels production, as a capital investment to state and local infrastructure and implementation of modern innovative projects).

A number of factors contribute to this: Ukraine will promptly get rid of gas dependence; the existing Ukrainian GTS (gas-transporting system) can quickly deliver gas to Europe; and the situation in the country is so poor that no one will even remember that the technology of hydraulic fracturing (HF) is not entirely harmless to the environment and requires a lot of water.

2. The absolute priority for implementation of shale gas production in Ukraine should be observance of the "golden rules" of shale gas production, which include: planning issues; full transparency of the implemented projects; participation of local communities in important decision-making; constant monitoring and control of environmental impact, including, independent assessment; adoption of regulations to ensure high standards; encouraging innovation and technological progress, despite the possible rise of the cost of the implemented projects, etc.
3. Environmental constraints for shale gas production projects do exist, but modern technological level of production enables us to reduce them to a minimum. However, environmental NGOs constantly study the issue and advocate implementation of best international practices, as well as coordinating the efforts of public authorities to prevent effectively the threats to environmental security.
4. Despite the undeniable positive aspects of implementation of the projects of shale gas production, it is appropriate to restrict the conclusion of new agreements for analysing positive and negative experience.
5. It is urgent to identify other opportunities to limit gas dependence primarily by a significant increase in energy efficiency, increasing the share of coal in the energy balance of Ukraine along with the implementation of modern technologies and compliance with high environmental standards, the development of other nontraditional or alternative sources of energy (regenerative energy from the sun, wind, geothermal, biomass energy), etc.
6. Only after the analysis of the material from experimental landfills, competent and reliable conclusions regarding the future development of shale gas production in Ukraine can be drawn, in particular considering the volume of its stock.
7. Energy issues in today's polycentric world play an important role in determining foreign policy strategies in relations between states, including the energy sector. One of the main means of implementation of such policies is the energy diplomacy. Geopolitics at the same time plays the role of coordinator of the areas of diplomatic means and methods in order to establish mutually beneficial cooperation between the states in the energy sphere. Ukraine should create an effective energy diplomacy with the aim of maintaining the energy policy of Ukraine as an independent functional area of foreign policy and diplomatic activities of the state.

In contemporary energy diplomacy, important sets of relationships should be defined: between consuming states; between resource-producing states; between the producers; between groups of resource-producing states and consuming states in the framework of international energy organizations; between producing and consuming states; and between importing and exporting states and transit states as well.

Currently, a system of world energy policy and diplomacy at global, regional, intergovernmental, and corporate levels has been set. Organizational and legal basis of bilateral and multilateral diplomacy are being formed. Ukraine takes an active part in the political and diplomatic processes of their formation.

In order to strengthen Ukraine's position in global and regional division of labor, to maintain sustainable development of its national economy and energy sector, it is necessary to carry out not only a series of unpopular but uncontested changes in the organization of the functioning of the energy sector, but also the implementation of urgent reforms in the political, social, and economic spheres. The transformation of energy sector of Ukraine should begin with a radical revision of the policy of energy efficiency and the development of its own highly efficient energy diplomacy.

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