Shale Gas in Poland

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Poland is carrying out the most intensive program of exploration and prospecting for unconventional hydrocarbons in Europe. The major target of the exploration is the Lower Paleozoic gas shales, but Permian Rotliegend tight gas sandstones and Carboniferous coalbed methane are also being considered as unconventional resources.

The concession areas of exploration cover 37,000 sq km, which constitutes 11% of the country’s territory and extends as a wide belt from Pomerania (northeastern Poland), through Mazowsze and Podlasie (central Poland), to Lubelszcyna (southeastern Poland). According to a report published by the Polish Geological Institute in March, 2012, estimated technically recoverable shale-gas resources are probably in the range of 346 to 768 bcm.

The prospect of increased natural gas production creates new hope for rationalization of the Polish energy mix, which is currently based mainly on coal. Alongside other supply projects it would allow the diversification of Poland’s energy sources, and this is considered an important element of the country’s energy security. Because of this, shale gas production as a new branch of the national economy is supported by all the main Polish political parties and has major public acceptance.

"We are looking for the ways and means to get into the barrel of honey, but still we don’t know if there is honey inside or it’s just the smell of it."

Hubert Kiersnowski, Polish Geological Institute – NRI

Resources

The first shale gas resource estimates in the Polish Lower Paleozoic strata (Ordovician and Silurian) were made by private consulting agencies, using a limited quantity of available public geological data provided by the Polish Geological Institute. These data were collected during a deep-drilling program that took place in Poland between 1960 and 1980.

In 2009 the Wood Mackenzie agency estimated recoverable resources of Lower Paleozoic shale gas in Poland to be of a volume of 1400 bcm. In the same year Advanced Resources Int. estimated the resources to be 3000 bcm, whilst Rystad Energy published information on potential resources calculated to be 1000 bcm. These estimates, compared with the volume of officially documented conventional natural gas resources (145.15 bcm), led to very optimistic conclusions.

In 2011, super-optimistic visions describing Poland as a “second Norway” started to dominate public discussion, following a publication from the U.S. Energy Information Administration in 2011. The EIA predicted geological shale gas resources to be about 20,000 bcm, with a volume of 5,300 bcm possibly recoverable.

A Polish Geological Institute report published in 2012 dampened everyone’s zeal. Scientists from PGI hold the view, based on archival geological and geophysical data, that recoverable shale gas resources are only in the range of 346 to 768 bcm, whereas, in comparison, maximum level of recoverable natural gas is 1,920 bcm. Recoverable resources of shale oil were also calculated for the

Silurian and Ordovician strata and they represent a volume of 215 to 268 MMtons with a maximum prediction of 535 MMtons. It is believed shale oil should be found at the eastern side of the gas shale belt.

This huge decrease in the estimate of resource volumes was an unpleasant surprise. It should be noted, however, that even these lower calculations constitute volumes 2 to 5 times larger than those documented in conventional gas reservoirs in Poland, and so can still fulfill Polish gas demand for up to 65 years in an optimistic scenario.

The PGI report was prepared in co-operation with specialists from the U.S. Geological Survey. The USGS provided natural gas production data from the American shale gas plays, from which a few were chosen, as they show similar geological features to the Polish shale plays; by analogy possible production rates were estimated. The PGI report did not take into account data from wells drilled recently in Poland. The next report will be published after drilling 100 new wells in Poland, probably in the first half of 2014.

Concessions and perspectives on exploitation

In the Polish public administration structure, responsibility for preparing for shale gas exploitation lies with the Minister for the Environment, supported by the Deputy Minister for the Environment, and the Chief National Geologist. The procedure for issuing concessions for unconventional hydrocarbon exploration is dealt with by the Department of Geology and Geological Concessions, at the Ministry of the Environment.

Under actual Polish law for the issuing of concessions for exploration, any legally operating Polish or foreign entrepreneur may apply, subject to the submission of a Project of Geological Work, listed in accordance with the provisions of Geological and Mining Law. The concession is issued for a period of three to five years and commits the concessionaire, among others things, to drill up to three exploratory wells in a defined area.

Exploration concessions do not entitle the holder to mineral deposit exploitation. This condition is the subject of dispute with the European Commission, which wishes to introduce more effective protection of the interests of exploration companies. Currently, despite investing significant funds into drilling, they have no guarantee of running any of the following exploitation. The Ministry of the Environment controls the progress of geological work specified in the concession agreement, the production of investor annual reports, information on the development of each additional kind of work and the final results of exploration. Up to now, the Environment Office has issued 109 concessions for exploration and identification of unconventional gas deposits. These concessions have 19 capital groups. The largest share has been allocated to the Polish Oil and Gas Company (PGNiG).

The location of concessions and company data are regularly published on the Ministry of the Environment website. It is planned to dig 309 exploration wells up to the year 2021 (128 for certain, an optional 181 in addition, depending on the capabilities and results of the work). According to the Ministry of the Environment, work on most of the concessions is going too slowly. In half of the areas, concession investors have not begun any activity.

Up to 31 December, 2012, investors had made 33 exploration wells. Hydraulic fracturing was performed in 11 wells. Eight treatments performed in vertical section wells can be described as pilot works. The full program of research, including fracturing in horizontal sections at a length up to 1 km, has been carried out in three cases. The results disclosed by some companies are promising but far below expectation. Low results from technological tests was one of the reasons the Exxon Mobile company gave for withdrawing from exploration in Poland.
According to Mikołaj Budzanowski, former Minister for the Treasury, commercial gas production will start in 2014, most probably at the “Wejherowo” concession. Analysts say that this is possible but 2015 or 2016 is more likely. Full development of the deposits, depending on the results of exploration work, will need several decades. In many areas exploitation will never proceed because of environmental and infrastructural constraints.

Economic and social aspects

Poland consumes about 14.5 billion m$^3$ of natural gas annually. Almost 70 % of natural gas is imported, the rest is produced from domestic resources. In the national energy balance - strongly dominated by coal - the role of natural gas is minuscule. Natural gas is a key raw material for the chemical industry however, and an important element in the municipal infrastructure.

In light of the EU’s energy mix climate policy for Poland, specialist debates concerning optimum gas usage levels, carried out long before the shale gas boom, indicate that natural gas should play a greater role in Poland, as a more environmentally friendly fuel, and in an effort to reduce the absolute dominance of coal. Realization of the possibility of increasing domestic production of natural gas, through the development of unconventional deposits, strengthens this conviction.

Public opinion deems the chance to reduce dependence on gas imports from an eastern direction to be very important. An agreement with Gazprom is effective until the year 2037 and is seen as a treaty that is not only economic but also political. This agreement has already been used to try to apply political pressure, and history suggests that this may happen again in the future.

The necessity of importing gas from a monopolist provider makes it possible for that monopoly to dictate deposit prices, which are now among the highest in Europe, even after the renegotiation agreement. This reduces the competitiveness of industry, and inhibits the gasification process of the municipal economy. We have even observed the return of previous gas recipients, to the use of cheaper coal. In wintertime stifling smog from coal becomes a huge problem, especially in the large cities in the southern part of the country.

Extreme dependence on coal and the unfavorable structure in place for gas import make the Polish situation unique among the countries of the European Community. Awareness of these conditions raises high hopes for shale gas exploitation. This helps to explain why the development of new energy resources has such a high acceptance level within Poland. According to a survey by the Public Opinion Research Center, CBOS, of September, 2011, 73 % of Polish citizens are in favor of shale gas exploitation, despite doubts about hydraulic fracturing and its potentially harmful effect on the environment. 4 % of the population are definitely opposed.

Groups protesting against hydraulic fracturing are few and local in character. One of the most active is the Association Niesiołowice – Węsiory “Kamienne Kręgi”, directed by Hieronim Wiącek. Paradoxically, a group of opponents to fracturing through their activities have had a positive impact on companies looking for gas, they must now carefully observe the norms of environmental and mining laws and work in an exemplary fashion with local communities. A few attempts to disregard public opinion ended negatively for oil companies, who were even forced to give up on troublesome locations.

Political aspects

As noted before, all the main Polish political parties support the idea of the development of potential unconventional gas resources. The first 11 exploration concessions were granted by the Prawo i
The Platforma Obywatelska political party, which has formed the government since 2007, strengthened support for exploration work on Polish shale gas – the Ministry of the Environment granted more than 100 exploration concessions, which practically exhausted the possibility of acquiring more prospective areas.

The approach to shale gas by the two main political parties in Poland (Platforma Obywatelska and Prawo i Sprawiedliwość) differs only in the way that the predicted tax revenue should be invested, and the way in which oil and gas companies should be supervised by the government.

Support for the governmental exploration and exploitation program is declared also by the current coalition partner Polskie Stronnictwo Ludowe, and the opposition party Sojusz Lewicy Demokratycznej. The only parties that run an active campaign against shale gas are the Ruch Palikota, a parliamentary party, and the Zieloni 2004 party, which is not represented in the parliament.

Prime Minister Mr. Donald Tusk (Platforma Obywatelska), during his last and current term in office, has emphasized that shale gas exploitation is one of the government’s priorities. Those most involved in implementation of the government’s shale gas program are the Ministry of the Treasury, the Ministry of the Environment and the Ministry of Foreign Affairs. A high degree of interest in the field is also shown by the Ministry of Economy, the Ministry of Finance and the Ministry of Science and Higher Education.

The government’s announcement in November, 2012, of project objectives in the so-called Hydrocarbon Act, was an important step on the way to organizing legal and financial issues concerning this new branch of business. It introduced a new tax structure for the oil and gas sector and set the government’s supervision over oil and gas companies in the form of a national agency called National Energy Minerals Operator (NOKE).

NOKE will also have the right of first refusal on the secondary trade in licenses, on market terms. One of the most important elements of the new act is that higher tax revenues will go towards municipal government budgets. Details are being discussed with the participation of the opposition parties, the organization of entrepreneurs and local communities.

On the initiative of the former Treasury Minister, Mr. Mikołaj Budzanowski, in mid-2012, five firms, PGNiG, ENEA, KGHM, PGE, and TAURON Polska Energia, signed an agreement that will see them accelerate the development and exploration of shale gas in Poland.

Another important government initiative was the idea of support for the development of new technology for shale gas exploitation. An agreement between the Polish Agency for Enterprise Development, the Centre for Research and Development and the Ministry of Science and Higher Education, was signed in July, 2012. The first competition for funding research projects was announced in August, 2012. The total budget for the project is quite high and accounts for 1 bln PLN. Half of the budget will come from national budgetary means, the rest will be sponsored by companies interested in the new technology results.

In regions that are likely to be among the first to participate in the exploitation of shale gas, local authorities have set up agencies. Their task is to represent the interests of local communities to investors and to mediate on approaches to possible conflict resolution. Such agency positions have been set up by the Marshals of Pomerania, Warmia-Mazury, Kuyavian-Pomeranian, Lublin and Mazovia voivodeships.

Concerns are raised by unfavorable opinions on the exploitation of shale gas that seem to prevail in most European countries. Particularly puzzling is the attitude of politicians in countries that have never performed hydraulic fracturing, or sometimes even deep-drilling on a larger scale. To make matters worse, in our point of view an aversion to new and little-known technology is present within the European Parliament, which in the future may result in an exacerbation of the EU policy.

Gas market analysts believe that increasing the environmental requirements of shale gas production will extend the authorization procedures for operations and may call into question the fragile economy of the new drilling industry. Polish members of the European Parliament, regardless of party affiliation, are trying to cool an emotional debate in the Parliament, presenting arguments based on existing Polish research and experiences. The most active include Boguslaw Sonik (floor manager of the Environment Committee report, September 2012), Lena Kolarska-Bobińska, Tadeusz Cymański, Konrad Szymanski and Jerzy Buzek.

Environmental issues

In the years 2010–2012, several local protests were recorded against attempts at shale gas exploration, mainly in Pomerania and around Zamość. The safety of hydraulic fracturing was disputed and requests made for more open information on the policies of the oil companies.

To test rumors about the dangers of hydraulic fracturing, the Ministry of the Environment has performed environmental research in the area of the Łebień LE-2H borehole in Pomerania, where in mid-2011 the Lane Energy company carried out the first full-scale hydraulic fracturing in a horizontal section in Poland.

A research report (so called “Report of Łebień”) published by the Polish Geological Institute in March, 2012, is the first, and apparently the only, fully scientific publication concerning the effects of fracturing on the environment in Europe.

The co-ordinator was the Polish Geological Institute. The research involved geologists and hydrogeologists from the Institute and included specialists from the Institute of Geophysics, the Polish Academy of Sciences, the Provincial Inspectorate of Environmental Protection, the Department of Biology at the Faculty of Environmental Engineering at Warsaw University of Technology, and the Oil and Gas Institute in Cracow. Over 30 experts were involved in the field works, and about 20 in the laboratory. The research included all elements of the environment, whose condition was monitored before, during and after the fracturing.

Researchers assessed the state of the atmosphere, soils, groundwater, seismic activity and noise level. They researched the radiation levels and searched for traces of increased concentrations of methane and radon in soil, air and surface water. They checked the management of waste on the drilling rig, the quality of fluid return purification and the increased impact of water abstraction on groundwater resources.

The research did not identify any deviations from the norm, except for sound levels which slightly exceeded the permissible level during fracturing fluid injection into the borehole. It was recommended that groundwater quality monitoring be continued, to exclude the possibility of emergence of contaminants in the long term. So far, monitoring in the control boreholes has shown no change. The results of the report were published on the website of PGI.

The General Directorate for Environmental Protection, in co-operation with the Ministry of the Environment, began in May, 2012 the development of a two-year program of comprehensive evaluation of the impact of hydraulic fracturing on the environment. Research will include five boreholes selected according to the geographical criteria reported by the oil companies, which are voluntarily participating in the program. The Polish Geological Institute performs the geological and hydrogeological part of the program.

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