

Shale gas: Poland starts prospecting

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In the light of America's shale gas success, prospecting for shale gas has started in many parts of the world, including Poland. Drilling a shale gas well entails a greater technical risk than in the case of conventional gas. Those characteristics of rock mass considered to be useful in the case of conventional deposits can become an obstacle.

Among the most common technical challenges arising from geological conditions are the appearance of natural fissures that could cause captured gas to escape, the swelling of clay minerals under the influence of drilling liquids or materials used for hydraulic fracturing, and insufficient silica content resulting in poor fracturing efficiency, low total organic carbon content and thermal maturity, and possible local yield of nitrogen.

In Polish conditions, an additional difficulty is the lack of specialised and experienced companies on the European market able to perform all the necessary services. In Poland, the cost of a single shale gas well including stimulation treatment and well testing is estimated at US\$15-20 million. Stimulation treatment requires large amounts of water. An average vertical well requires 2,000-4,000 cubic metres of water, while a horizontal well may need 8,000-20,000 cubic metres of water, as well as 2,500 metric tons of proppant.

There are many companies operating in the territory of Poland which altogether hold 87 exploration licenses

primarily for shale gas, but also for tight gas (Table 1).

The Polish company, PGNiG, has been awarded 15 licenses in several oil provinces from Central Pomerania to the Lublin area. In the area of the Gdańsk Petroleum Province, exploration work will be carried out by PGNiG SA in the Wejherowo, Kartuzy-Szemud and Stara Kiszewa within Ordovician and Lower Silurian formations.

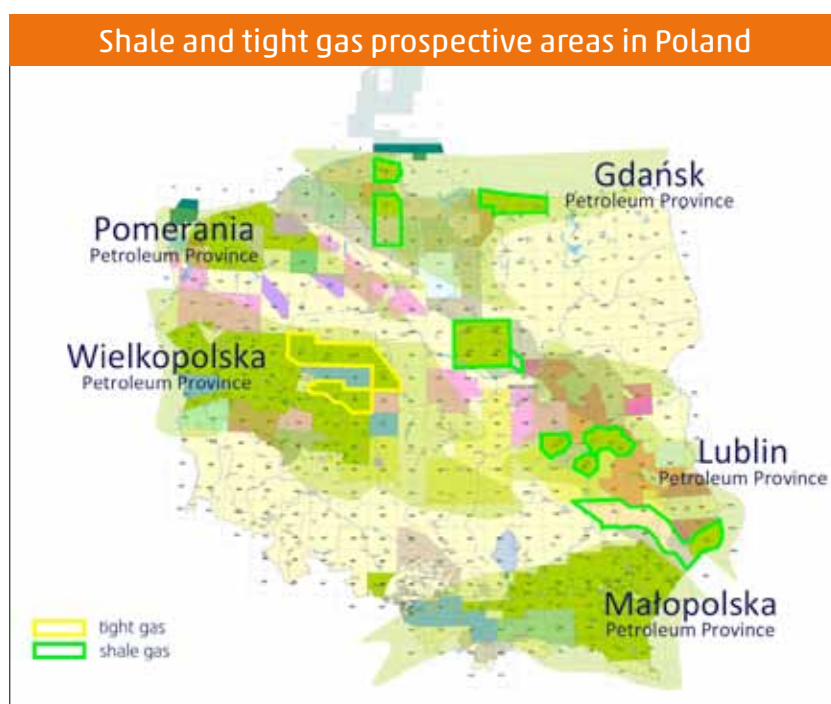
PGNiG has started with a first exploration well within the Wejherowo license area. Drilling work was preceded by seismic acquisition. On this license area, the Lubocino-1 well was drilled up to depth of 3,000m. At present, the drilling results are being evaluated. The initial results are very promising.

On the other PGNiG licenses, geological analyses of Ordovician and Silurian shales progress. Geophysical surveys have also been started (magnetotelluric, gravimetric, seismic acquisition). In the Pionki – Kazimierz license area, the Markowola-1 well was drilled in 2010. The well tests have not confirmed the presence of unconventional gas deposits, however the tests were carried out in the Carboniferous and Devonian sediments. Parallel geological analyses of Silurian and Ordovician shales were performed. Additionally, a gravimetric and magnetotelluric survey has been started.

The target of the exploration for tight gas in the Rotliegendes formations is the Wielkopolska Petroleum Province, under the Szamotuły, Kórnik-Środa, Murowana Goślina-Klecko, Pызdry, Gniezno and Ślesin licenses. In this area, seismic acquisition and exploration drilling are planned.

The challenges associated with the exploration of unconventional gas deposits in Poland include unknown geology, urbanisation of the area, restrictive environmental regulations, opposition of local authorities, especially in the case of attractive tourist destinations such as Pomorze and Roztocze, access to adequate water reserves, a very high capital cost (cost and number of wells, large production facilities), and the cost of appropriate technologies.

It was obvious from the beginning that exploration for unconventional





natural gas deposits would not be easy, but one has to remember that it also creates opportunities for both Poland, and for companies which hold licenses in our country and have started the exploration work.

Among the potential benefits of shale gas exploration are possibly enormous natural gas resources, which will allow Poland to become independent from external gas sources, development of the PGNiG Group's drilling companies, and the opportunity of significant profits for PGNiG and other licence-holders.

In the US, shale gas exploration has proved very successful in terms of documented in-place reserves and of financial returns. However, one has to keep in mind that exploration in Poland may be harder than in the US, not only because of different geological conditions, but also because of tougher fiscal conditions for unconventional gas projects, higher costs of drilling, more highly urbanised or cultivated agricultural license areas, and a higher percentage of environmentally protected areas.

Poland's projected shale gas reserves have been variously evaluated as 1.4 trillion cubic metres by Wood Mackenzie, at 3 bn cubic metres by Advanced Resources, and at 5.29bn cubic metres by the US Energy Information Administration. But one has to remember that producible resources in the case of shale gas deposits are estimated at 10-20 per cent.

Unconventional sources of hydrocarbons – tight gas and shale gas – will play an increasingly important role in the planned exploration work in Poland and in the long term can result in a significant increase in resources, both geological and natural gas production. Cooperation of Polish companies, especially companies from the PGNiG Group, with foreign companies will ensure access to modern technologies, necessary for economically feasible shale gas production. ■

Table 1: Polish exploration licenses

Company	No. of licenses
PGNiG	15
Marathon Oil	11
San Leon Tehcnology	9
3Legs Resources	9
ExxonMobil	6
BNK Petroleum	6
Lotos	6
Orlen	6
DPV Service	5
Chevron	4
Realm Energy International	3
ENI	3
Cuadrilla Polska	2
Composite Energy	1
Aurelian	1
Strzelecki Energia	1
Ogółem	87

Source: EIA, Ministry of Environment

