



## PRESS RELEASE

### How much tight gas is in Poland?

Polish Geological Institute made an estimate of potential (undiscovered) resources for another unconventional natural gas category – the so-called tight gas

The estimation of mineral resources is one of the key responsibilities of National Geological Survey, as performed in Poland by Polish Geological Institute. The resources of several categories – metal ores, salt, coal and lignite deposits – have been thoroughly investigated, but the progress in geological and mining science opens potential for development of mineable resources that hitherto have not been considered in our reports.

These novel resources include unconventional gas and liquid hydrocarbons:

- coal-bed methane
- shale gas & oil
- tight gas

In an attempt to fill the uncharted gaps on the map of Poland's energy resources, in the 1990's Polish Geological Institute prepared a forecast of coal-bed methane resources, followed by a report on its proven resources and in 2012 published the first estimates of the shale gas and oil resources.

Today, we present the report on the third tier of unconventional resources: tight gas entrapped in tight, poorly permeable sandstones. In terms of chemical and physical properties, tight gas is not different from natural gas – flammable methane gas is its main component. The pattern of occurrence is the key difference. Tight gas is entrapped in microscopic pore spaces of sandstones, but the spaces are not interconnected with each other. For that reason traditional methods of production fail. Hydraulic fracture stimulation is required to release the gas by crushing the rock and inducing a dense network of fractures.

The production technology is very similar to that used in shale gas extraction. In the USA, the first tight gas wells have been drilled decades before the shale gas ones. Today, tight gas accounts for a significant share of the total US natural gas production (approx. 30%). It has been produced in Germany, the Netherlands, Russia and Argentina for the past 20 years.

Our Report focuses on three large geological complexes that are considered most prospective in the light of existing knowledge. They are located in three areas: Poznań-Kalisz, Wielkopolska-Silesia and in the western part of the Baltic Basin (see the enclosed map). It should be noted that the estimates of resources in these regions are for the total volume of gas contained in the rocks. In the industry terminology they are called *resources in place*.

This Report is a scientific hypothesis based on geological interpretation of data from over 500 existing research and petroleum exploration wells. About 30 of them provided information that enabled an estimation of the potential resources. Data from more recent unconventional gas exploration wells were considered, too.

The total volume natural gas in the three analysed areas most probably ranges from 1 528 to 1 995 Bcm (53.94-70.42 Tcf).

How much of this volume can be recovered? It is too early to give any precise figure. Assuming the most realistic ratio achieved in active fields worldwide – 10% of in place resources – it is reasonable to assume a volume of 153 – 200 Bcm (5.4 – 7.0 Tcf). It's a tiny fraction of the total resources, but available technology does not allow for a better recovery now. For comparison: Poland's proven (i.e. appraised and confirmed) recoverable resources of conventional natural gas are now equal to 134 Bcm (4.7 Tcf).

Recently, tight gas accumulations have been discovered in small isolated geological structures of Siekierki – Trzek and Pniewy near Poznań. They are located at the margin of one of the analyzed areas in a transitional zone with both conventional and unconventional accumulations in Permian sandstones. Production tests of hydraulically fracture stimulated wells are successful and encouraging in terms of potential commercial production.

It should be emphasized that tight gas exploration is a very costly undertaking due to high depths of occurrence (even as much as 4.5 – 6.0 km) and the necessity to apply hydraulic fracture stimulation. The actual volume of production will be contingent on the rate of exploration and accrual of knowledge that is required for tapping this prospective source of natural gas.

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