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FIRST REPORT:

ASSESSMENT OF SHALE GAS AND SHALE OIL RESOURCES OF THE LOWER PALEOZOIC BALTIC-PODLASIE-LUBLIN BASIN IN POLAND

Abstract

Authors

The Report is completed by Polish Geological Institute – National Research Institute (PGI), acting as a geological survey of Poland. It is a result of research conducted from October 2010 to February 2012. PGI acknowledges support of the U.S. Geological Survey, in particular training on shale gas resources assessment and common analysis of data from the Baltic – Podlasie – Lublin Basin. For the USGS the cooperation with PGI is a part of USGS global shale gas resources assessment, which covers also Poland.

Scope and lateral extend of the research

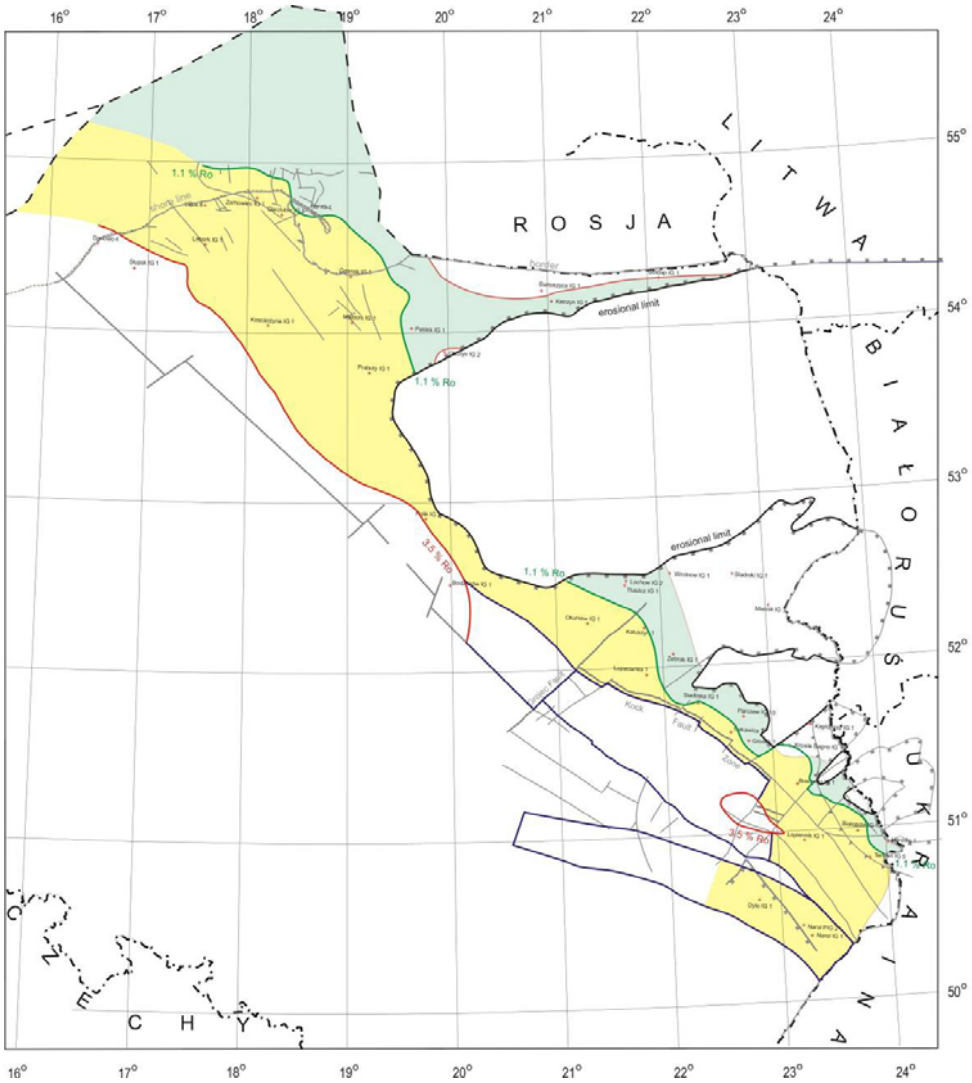
The Report is an attempt to estimate technically recoverable shale gas and shale oil resources for the Lower Paleozoic shale formation in the Baltic –Podlasie – Lublin Basin in Poland. The studied area extends form the Baltic offshore north of Słupsk and Wejherowo towns to the area of Hrubieszów and Tomaszów Lubelski towns, and covers some 65.000 km^2. The Report does not cover conventional hydrocarbon resources of Poland, as well as other unconventional resources, such as tight gas or Coal Bed Methane. Other perspective regions of Poland, i.e. Lowers Silesia or Wielkopolska, are also not included.

Data and methodology

The current report might be regarded as a base line for further reevaluations and is based only on archive data collected for 39 key wells throughout years 1950-1990. As a new data from shale gas/oil exploration wells, drilled since 2010, will become available, the assessment shall be verified and new reports shall be issued every 2 years.

For recoverable shale gas/oil resources assessment a broad range of geological, geochemical, geophysical and geomechanical data is required. For the analyzed basin some of key data are still not available. This refers to such data as porosity and permeability of shale reservoir, gas composition, reservoir pressure or initial production. For this reason the assessment is based partly on assumptions from the analogue basins, resulting with increase of the result's error bars. As the analogues for the Baltic – Podlasie – Lublin Basin data from some of the US with well understood field characteristics were used.

In this Report the recoverable resources were estimated with application of average Estimated Ultimate Recovery (EUR) for individual well, and average well drainage acreage, both adopted from US analogues. To qualify an individual archive well from the Baltic – Podlasie - Lublin Basin into acreage for which resources were calculated a criteria of net thickness at least of 15 m of shale formation with TOC at least 2 % wt was used, according to USGS procedures.



The acreage incorporated into assessment units and qualified into calculation of resources of shale gas (yellow color) and shale oil (green color) in a model with maximum thickness of shale intervals with TOC contents > 2 % wt on the basis of 39 exploratory drillings from 1950-1990

Alternative scenarios

The key parameters of the assessment do not have a unique value and were adopted for the calculation in a few alternative scenarios. As a result a range of resources estimation results were revealed.

The error bars of the analysis might be systematically limited once new data from the exploration wells, conducted by the concession holders on all the basin, will become available.

Results

SHALE GAS

Shale gas recoverable resources of the onshore and offshore Baltic – Podlasie – Lublin Basin are estimated for maximum:

1920 Bcm (1,92 Tcm)

Taking into account constraints on key parameters of the calculations the higher probability range of recoverable shale gas resources is:

346 - 768 Bcm m^3

These resources are therefore **2,5 to 5,5 times higher than documented** conventional gas fields in Poland (145 Bcm).

With the level of current gas consumption in Poland (14,5 Bcm/y) the shale gas resources together with conventional fields are an equivalent of:

- **35 - 65 years of cumulative gas consumption on Polish market**, or
- **110 – 200 years of gas production in Poland at its current level with no changes in current proportion between domestic production and import**

SHALE OIL

Shale oil recoverable resources of the onshore and offshore Baltic – Podlasie – Lublin Basin are estimated for maximum:

535 MMtons (3905 MMB)

Taking into account constrains on key parameters of the calculations the higher probability range of recoverable shale oil resources is:

215 – 268 MMtons (1569 – 1956 MMB)

These resources are therefore **8,5 to 10,5 times higher than documented** conventional fields in Poland (26 MMtons; 190 MMB).

With the level of current oil consumption in Poland (24 MMtons; 175 MMB) shale oil together with conventional fields are an equivalent of:

- **10 - 12 years of cumulative oil consumption on Polish market**, or
- **360 - 440 years of oil production in Poland at its current level with no changes in current proportions between domestic production and import.**

Updates/ verification

Once data from new exploration well, drilled since 2010, will become available, the resources assessment shall be reevaluated. Following reports shall be issued every 2 years.