Identification of Prospective Zones for Shale Gas and Shale Oil Accumulations in Poland – New Results and Future Exploration Directions

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ABSTRACT

The so called “shale gas boom “ which took place in Poland over the last few years was followed by a research project performed by the geoscientists of the Polish Geological Institute – National Research Institute (Polish Geological Survey). The project aimed at integrating newly acquired and archival data from legacy and recently drilled boreholes to widen the current understanding of the unconventional petroleum systems of the lower Paleozoic shales in the Polish part of the East European Craton (Baltic-Podlasie-Lublin Basin). The research was mainly focused on four shale formations showing the best perspectives for the hydrocarbon production: Piasnica Fm (Upper Cambrian-Lower Ordovician), Sasino Fm (Upper Ordovician), Jantar Member of Paslek Fm (lower Silurian) and Pelplin Fm (lower Silurian). It included regional geological evaluation that incorporated stratigraphical, litho-sedimentological and wireline logs analyses which were the basis for the further petrographic, petrophysical, X-ray diffraction, organic geochemical, organic matter petrological and thermal maturity studies. Integration of the results led to the identification and detailed characterization of four prospective zones corresponding to each of the aforementioned formations. The lateral and vertical extent of these zones were contoured by six main perspective criterion parameters including average TOC content, thermal maturity, effective porosity, thickness, brittleness and maximum clay content. The results show that the Baltic Basin (both onshore and offshore) is the most promising area for the shale gas and shale oil exploration in Poland. All four zones show prospectiveness in the oil, wet and dry gas thermal maturity regimes there and Sasino Fm out of four considered formations seems to hold the greatest potential for future production due to its favorable properties. The zone that corresponds to the Pelplin Fm has the broadest horizontal extent and shows the highest potential in the Podlasie and Lublin sub-basins but despite preferential thickness, lower average TOC content and lower hydrocarbon potential places this formation as the least perspective at this stage of recognition. It is clear that the exploration of unconventional resources is to be continued in Poland as the potential for production remains high despite the recent unsatisfactory production rates. The Baltic Basin appears as the place to unlock this potential.