EA16b

Shale Gas and Oil Perspectives: The Tanzania Case

E. Msaki* (Oil and Gas Advisory Bureau) & H.J. Duyverman (Terra Incognita)

SUMMARY

Besides tight gas hydrates and coal bed methane, shale gas is an unconventional gas resource. The U.S.A has been a pioneer for shale gas exploration. Over the past 20 years shale oil and gas have revolutionized the oil and gas industry as a real “game-changer”, specifically in the U.S.A. The US is now the largest oil producer and the 5th largest gas producer worldwide. To date, more than 8-10% of domestic gas produced in the US comes from Paleozoic and Mesozoic gas shales which are thick, rich organic matter and thermally mature.

Besides tight gas hydrates and coal bed methane, shale gas is an unconventional gas resource. The U.S.A has been a pioneer for shale gas exploration. Over the past 20 years shale oil and gas have revolutionized the oil and gas industry as a real “game-changer”, specifically in the U.S.A. The US is now the largest oil producer and the 5th largest gas producer worldwide. To date, more than 8-10% of domestic gas produced in the US comes from Paleozoic and Mesozoic gas shales which are thick, rich organic matter and thermally mature.

The trend in the U.S.A has prompted many companies and governments to search for these unconventional in other places with successes in the Western Europe, Argentina and Australia. These unconventional, all with Paleozoic and Mesozoic reservoirs, do often occur onshore in places, where there is no conventional hydrocarbon production, thus enabling the local government or companies to have a new and unexpected energy source.

Shale oil and gas have been looked upon by environmental agencies with some distrust, worried about groundwater, emissions, fracking and seismicity, spatial planning and the use of chemicals. Therefore any commercial production has to integrate the environmental concerns of public, and must be accompanied by legal framework.

The current authors believe that with proper precautions and monitoring the environmental concerns can be overcome.

In Tanzania a short study was performed to look at unconventional oil and gas resources in the Palaeozoic and Mesozoic sedimentary basins (the Karoo basins). In general, one needs a thick sedimentary basin with a lot of shales, good maturity and TOC values, and a fairly unfaulted basin to prevent seismicity when fracking. In Tanzania, Karoo sediments are a product of prolonged erosion and are deposited within intracratonic sedimentary basins which lie unconformably on the Precambrian basement. Karoo Supergroup sediments of Permian/Triassic age mostly occur in the southern part Tanzania. These sediments are a suitable candidate for large shale oil/gas reserves. Also, since unconventional gas does not involve migration after formation, it is found therefore in huge volumes and the chances of success in exploration are high.

The geological map of Tanzania shows large basinal features as a result of pre-Karoo rifting. A few wells have been drilled in the Mandawa (Karoo basin), indicating possibly large shale/coal/sandstone sequences. On regional seismic lines the Karoo clearly is indicated.

Analogies for the Tanzanian Karoo are also the Sakamena oil-bearing sandstones from Madagascar, which were in Karoo time juxtaposed to Northern Tanzania. A large heavy oilfield at surface in Madagascar proves an oil source in the Karoo. In Southern Kenya and also on Pemba oilshows are known, with an unknown source, which could be the Karoo sediments. Preliminary resource calculations in Tanzania indicate possible large resources in place, at par with the offshore natural gas reserves. The depth of the source rocks make gas the most likely hydrocarbon phase. One has to note that calculating unconventional resources is much more complicated than with conventional resources, since the adsorbed gas (or oil) needs to be calculated from core or log analyses.

What is needed urgently is to deepen any onshore well with possible Karoo sequences or drill a proper shale gas/oil well in a chosen, optimum location. With the resource calculations; only areas maximum 300 km from well-populated areas are taken into account, since longer pipelines would make these ventures normally uneconomical.

Shale gas (or oil) exploration could be an interesting incentive for onshore Tanzanian Karoo sedimentary basins.