

Shale Gas and Oil Resource Assessment in Middle and Lower Indus Basin of Pakistan

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Abstract : The focus of hydrocarbon exploration in Pakistan has been primarily on conventional hydrocarbon resources. Directorate General Petroleum Concessions (DGPC) has taken the lead on the assessment of indigenous unconventional oil and gas resources, which has resulted in a 'Shale Oil/Gas Resource Assessment Study' conducted with the help of USAID. This was critically required in the energy-starved Pakistan, where the gap between indigenous oil & gas production and demand continues to widen for a long time. Exploration & exploitation of indigenous unconventional resources of Pakistan have become vital to meet our energy demand and reduction of oil and gas import bill of the country. This study has attempted to bridge a critical gap in geological information about the potential of shale gas & oil in Pakistan in the four formations, i.e., Sembar, Lower Goru, Ranikot and Ghazij in the Middle and Lower Indus Basins, which were selected for the study as for resource assessment for shale gas & oil. The primary objective of the study was to estimate and establish shale oil/gas resource assessment of the study area by carrying out extensive geological analysis of exploration, appraisal and development wells drilled in the Middle and Lower Indus Basins, along with identification of fairway(s) and sweet spots in the study area. The Study covers the Lower parts of the Middle Indus basins located in Sindh, southern Punjab & eastern parts of the Baluchistan provinces, with a total sedimentary area of 271,795 km². Initially, 1611 wells were reviewed, including 1324 wells drilled through different shale formations. Based on the availability of required technical data, a detailed petrophysical analysis of 124 wells (21 Confidential & 103 in the public domain) has been conducted for the shale gas/oil potential of the above-referred formations. The core & cuttings samples of 32 wells and 33 geochemical reports of prospective Shale Formations were available, which were analyzed to calibrate the results of petrophysical analysis with petrographic/ laboratory analyses to increase the credibility of the Shale Gas Resource assessment. This study has identified the most prospective intervals, mainly in Sembar and Lower Goru Formations, for shale gas/oil exploration in the Middle and Lower Indus Basins of Pakistan. The study recommends seven (07) sweet spots for undertaking pilot projects, which will enable to evaluate of the actual production capability and production sustainability of shale oil/gas reservoirs of Pakistan for formulating future strategies to explore and exploit shale/oil resources of Pakistan including fiscal incentives required for developing shale oil/gas resources of Pakistan. Some E&P Companies are being persuaded to make a consortium for undertaking pilot projects that have shown their willingness to participate in the pilot project at appropriate times. The location for undertaking the pilot project has been finalized as a result of a series of technical sessions by geoscientists of the potential consortium members after the review and evaluation of available studies.

Keywords : conventional resources, petrographic analysis, petrophysical analysis, unconventional resources, shale gas & oil, sweet spots

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