

An Updated Evaluation of Reservoir and Geological System of the Niger Delta Province

Lawal A. Johnson, Mohammed Nagib and Ghaseem Nasr

School of Computing Science and Engineering, Department of Petroleum and Gas Engineering, University of Salford, Manchester, M5 4WT, United Kingdom
E-mail: lajo_75@yahoo.com

Of all the provinces ranked and rated in the United States Geological Survey's World Energy Assessment, the Niger Delta province occupies a promising position, occupying the twelfth position in terms of richness in petroleum resources (about 1.4% of the worlds discovered gas and about 2.2% of the worlds discovered oil). Hence, detailed analysis of the geological and reservoir system in the Niger Delta province is crucial not only in determining its reserve capability or potential but also in proving its economic importance and value to the country as an endowment of valuable natural resource. This research work evaluates the quantity of oil, gas and natural liquids that have potential to be added to the reserves through computation of mature source rock thickness that will be required to account for the Petroleum Resources in Agbada unit of the province. In addition, the economics of developing the marginal fields is also considered in this study. Different marginal field development strategies are evaluated through the comparison of economic indicators like NPV, IRR, DPI, Revenue (net revenue), Lifetime, Recoverable reserves as well as PV (PROD) so as to boost the economic value from marginal field assets in the Niger Delta province of Nigeria.

From the material balance computation, it was calculated that between 99 and 296 meters of mature source rock thickness is required to account for the estimated recoverable reserves in the Agbada unit. It has also been established that the case-study or assessed units account for about 76% of the total possible oil reserves and about 68% of total possible gas reserves. The economic assessment of the marginal fields' development also indicated that the NPV for the different strategies considered closely mirror each other with slight differences occurring at low discount rates. On the other hand, the IRR is less differentiating while the DPI displayed more spread values/figures due to upfront investment in exploration and development in one of the strategies. The production and revenue profiles developed for each strategy also established that the marginal fields' economics of Nigeria is production dominated.