Investment Management of Petroleum Fund on Exploration and EIOR Activities in Indonesia

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Overview

Indonesia at the moment still heavily relies on fossil energy with more than 48% of energy supply comes from oil. Increasing trend of investment in production activities in the recent years has not yet able to replace produced oil. In contrary, in the same period the investment in exploration areas showed a decreasing trend. Increasing trend of investment on production activities has not successfully arrested the decline of the proved reserves nor result in any significant reserves replacement. In the same time, exploration investment both in production and exploration area in the last 3 years indicates significantly declining level of investment. This figure implies that the Government of Indonesia should implement a strategy, which could withstand declining trend of oil proved volume from existing producing fields as well as improving exploration investment climate.

In the last few years, depletion premium fund has been heavily discussed not only to ensure the continuity and optimization of oil and gas revenue, but as well to secure energy supply for Indonesia in the future. This paper examines how petroleum fund in Indonesia could play as a key instrument for encouraging exploration and Enhanced and Improved Oil Recovery (EIOR) activities in Indonesia and improve proved reserves volume. Investment on exploration may be conducted in form of 2D/3D seismic survey while the investment on EIOR may be conducted by implementing EIOR field trial across mature oil field assets in Indonesia. Seismic survey will help minimizing the risks and attract investor. While some of the mature oil fields are approaching end of Production Sharing Contract (PSC) limit, independent field trial sponsored by government will help discovering the potential and encouraged the next contractor that will operates the field to implement EIOR activities.

The petroleum fund, recently proposed in the new bill of oil and gas in Indonesia, is accounted as a percentage of the Government Revenue within Indonesia PSC terms. While many other countries invest the petroleum fund in financial instrument, the Government of Indonesia may allocate the petroleum fund for financing independent activities of 2D/3D seismic surveys and EIOR field trial and research. These activities would lower the risks borne by contractors and promote E&P investment climate in Indonesia too.

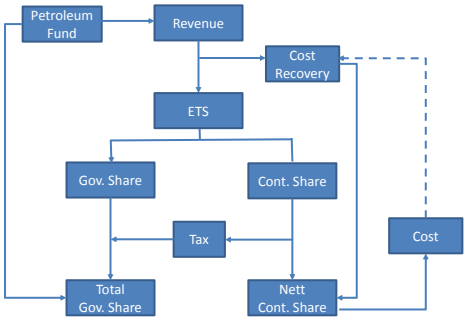

Figure 1 - Depletion Premium Application From Gross Revenue (Arsegianto, 2009)

Methods

This paper utilizes System Dynamic approach to analyze petroleum fund management on exploration and EIOR activities. The mechanism of how the petroleum fund, or the Depletion Premium, is acquired in a PSC system is presented in Figure 1. The system dynamic model is developed to represent the relationship between petroleum economic model under Indonesia's PSC terms and allocation mechanism of petroleum fund. This model evaluates options and defines the best investment policy of petroleum fund, which takes proved reserves adds, Government Revenue and final value of the collected petroleum fund into account, as depicted in Figure 2. A system dynamic model will be developed in this research to represent the relationship between proved ultimate recovery, production, revenue streams with Indonesia PSC terms, depletion premium fund allocation and to evaluate the value of investing the depletion premium fund in exploration and EIOR work programs towards Indonesia proved oil production and reserves in the next 50 years.

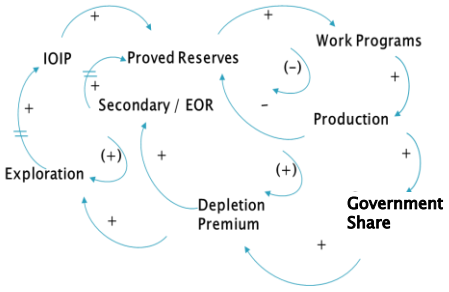

Figure 2 - Causal Loop Diagram of Indonesia E&P Cycle

Results

As a result, this paper recommends combined investment of 25% investment of petroleum fund in exploration 2D/3D seismic survey to unlock new discovery potential in Eastern area of Indonesia and in the same time, 75% investment allocation of the petroleum fund in secondary and tertiary oil field trial to create additional revenue stream as early as 2029. Recent EOR initiative by the Ministry of Mineral and Energy supported by President Act indicated the EOR hurdles are around chemical prices the project must bear and the expiring contract from existing Operators. From the production of 1.1.2016 Oil and Gas proved volumes within 2019-2029 period and with 5% of Government revenue allocated as Petroleum Fund, total present value of 11.4 Billion USD at 2016 reference will be collected. The evaluation conducted indicated that investing 25% of collected Petroleum Fund in 2D/3D Seismic indicated a potential finding of 61 TCF of gas resources volume and the 75% of the collected Petroleum Fund for the pilot implementation of EIOR pilot and providing lower cost of chemical (i.e: optionally fund chemical industry development in Indonesia) would bring incremental recovery of 1.6 Billion Barrel of Oil Production from existing proved oil reserves.

The 25% exploration – 75% EIOR investment scenarios is expected to lower down the gap between oil supply and demand which will later minimize the import need and government spending on fuel subsidy and produce higher rate of gas production in meeting Indonesia energy requirement in 2025 and beyond. The allocated fund for exploration activities is considered enough to discover the expected gas reserves finding, providing the fund to improve the understanding exploration potential in Eastern Indonesia considering a more established infrastructure for domestic gas delivery across Indonesia would also be required. Study indicated EIOR would have shorter lag time of production add compared to new discovery development. Investment in EIOR will create early new revenue stream for Government. The investment disbursed for EOR pilot and chemical development as well 2D/3D seismic are expected to be returned back by applying 15% DMO after the third year of EOR production and signing bonuses from exploration companies that would come to explore the area with significantly reduced risks.

Conclusions

The paper provides academically sound evaluation with clear set of data and analysis covering both technical and commercial aspects of Indonesia E&P business and can used as references of different investment management of depletion premium fund compared to investment mechanisms applied in the other 34 countries. Evaluation conducted indicated of the selected 25% exploration – 75% EIOR investment scenario is estimated would bring 12.1 BBOE reserves from gas discovery finding in Eastern Indonesia and incremental recovery of proved oil reserves. The investment would also extend the revenue stream from Oil and Gas by 25 years, fulfilling the gap for national energy need, increase the net present value of Government Revenue by minimum of 14% approximately and grow the invested Petroleum Fund by 50% at 2016 Net Present Value references. Earning from the development of local chemical industry, advancement of technology and other multiplier effects would be other complimenting factors to support the investment of Petroleum Fund in exploration studies and EIOR implementation. Follow up study to understand the need of domestic gas infrastructure development as well as recently announced Gross Split PSC mechanism would be required to understand how these things would impact the Petroelum Fund management strategy. Evidently, investing the Petroleum Fund in Exploration and EIOR activities would be a strong fund management option for the Government of Indonesia to implement.

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