

## **THE TECHNICAL AND POLICY CHALLENGES OF PRODUCING SHALE GAS PROFITABLY AND SAFELY**

- USA is advanced in shale gas
- Indonesia is looking for the opportunity
- Pertamina EP is just started with resource calculation
- Shale gas needs local consumption
- The drilling needs horizontal well
- It gives side effect of water use.
- Time to propose better environment regulation
- It will produce for 30 years or more

Back in 1821, USA first commercial shale gas well was drilled. It was only 27 ft deep into the shale, but people of the nearby village were happy to use the gas to light on their homes. In 2000, there were 28,000 shale gas wells in the United States, with a combined production of more than 700 bcf per year. Recent natural gas shale discoveries have changed the energy picture in America. Increased market share for natural gas vs. oil will provide the demand growth

Indonesia is following USA. In 2012, we start assessing qualitatively and quantitatively. Gas market in Indonesia is good. It's time to improve infrastructure and submit input for government regulation. Organically rich gas shale reservoirs, once ignored by company seeking easier plays and faster returns on their investments, are now looking the fortunes of midsized producers. Recent advances in drilling and completions along with higher gas prices, are making shale gas production economical. Shortage in gas can be overcome by local shale gas.

In 2010, Pertamina EP conducts Shale Gas Identification Studi in Jawa, Sumatra and Kalimantan. It proves that there are some shale gas in Indonesia. Then in 2011 it's continued with resource calculation of those basin. In the future, we like to have shale gas in Indonesia put in a map. Some major basin will be in database comparison and develop relationships from the database to compare various gas shale, It's our aim to develop a shale gas Rock Catalog in order to evaluate Shale Gas, provide operators with a searchable database for various shale gas that can be used as analogs to aid in the appraisal and exploitation of the unknown or the newly discovered shale gas.

Statistically it's obvious that it needs 200 wells to produce 1 Tcf, It can be done by exploiting one area, and use the gas for local consumption, like electricity power. If it use locally, the benefit will be clearer.

Shale gas wells are not difficult to drill, but they are difficult to complete. Shale gas has been produced from shale with natural fractures. Recently, however, there has been a lot more development of shale gas due to the use of techniques that create artificial fractures around well bores. This procedure is known as hydraulic fracturing.

Horizontal wells are used. This is because natural fractures in some shale, are vertical. When vertical wells are drilled, the borehole does not intersect many vertical fractures. Horizontal wells are drilled through the shale formation itself. Thus, the wellbore in the shale is perpendicular to the most common fracture orientation, which allows it to intersect a much greater number of fractures.

But it has side effects namely water use and associated issues. Horizontal wells, undergoing multi-stage fractures, can use between 5 and 6 million gallons of water. The millions of gallons of water must be transported by truck to the well site prior to a fracture treatment. Then, the flow back (waste water) from the fracking operation may require as many as 700 truckloads to transport the fluids to a disposal facility.

It's time to propose better environmental regulation in Indonesia, and do assessment and input the obstacles to Indonesian government. Time to maximize opportunities and minimize challenges in Indonesia

Shale gas wells don't produce high, but once the production stabilizes, they will produce consistently for 30 years or more. There are some chances to produce shale gas in Indonesia, but still a lot of efforts to be done.