

Marginal Fields Focus of Malaysian Workshop

The Malaysian island of Langkawi was the setting for an SPE Applied Technology Workshop (ATW) titled “Development of Marginal Offshore Fields” held 21–24 April. Fifty-six participants representing 36 organizations and 11 countries discussed the challenges in developing marginal fields and the current industry trends and technology employed to deal with complex geologies, challenging drilling environments, and infrastructure constraints.

Interest in this workshop was great, as increasing energy demand continues to push oil and gas prices to new highs, forcing producers to examine fields that might have been considered economically unfavorable just a few years ago. High energy prices have brought a series of new challenges that developers of marginal fields have been forced to consider, including higher development costs due to rising commodity prices; increased environmental concerns pushing higher standards; and resource constraints in the form of a limited number of engineers, fabrication yards, drilling rigs, and construction barges. The workshop’s program committee, cochaired by Azmi Mohd. Noor of Shell Global Solutions Sdn. Bhd. and Rakesh Kumar Vij of Oil & Natural Gas Corp. (ONGC), framed the content with these issues in mind.

Three keynote addresses were given, the first by Chen Kah Seong, General Manager of Project Development for Petronas Carigali Sdn. Bhd. Chen’s address titled “Challenges of Developing Marginal Fields” set the stage for the workshop, and was followed by the speech “Trends in Marginal Fields” by Rajendra Marathe, General Manager and Head of the Institute of Reservoir Studies, ONGC. Garth Taylor from the Australian Trade Commission gave the final keynote, titled “Regulatory Body Influence in Marginal Fields Development.”

Development Uncertainties Discussed

A series of nine technical sessions followed, with Sessions 2 and 3 discussing how to effectively manage subsurface uncertainties, including uncertainties in quantifying hydrocarbons in place, and anticipating the range of reserves recovery and production profiles. Other topics in these sessions addressed the value of information management for reducing subsurface uncertainties, how to maximize value by employing optimum reservoir recovery processes, and the appropriate evaluation and planning methods for a particular marginal development. Various

methods for modeling uncertainty were also presented, followed by portfolio ranking at both the field and basin level, with examples of how risk management methods were successfully applied in various fields around the world.

Sessions 4 and 5 addressed the topic of “Current Factors Affecting Field Development Economics.” Discussions during these sessions highlighted that while increased oil prices have brought increased opportunities for marginal field development, they have also heightened development risks and costs. A major factor affecting cost escalation is the increased utilization of rigs and installation barges, which has driven an increase in building activities, particularly for deepwater rigs. Presenters foresaw the upcoming introduction of newbuild rigs into the market as an excellent opportunity for new merger and acquisition opportunities. Another obstacle contributing to longer lead times is the shortage of necessary resources, particularly experienced rig crews. Presenters agreed that while rig operators must move quickly to train new rig personnel, they must not sacrifice safety and overall project management efficiency in the process.

Session 6, titled “Novel Wells for Increased Production Rates, Improved Recovery, and Reduced Cost,” offered a perspective of how innovative well designs, operating philosophies, and fit-for-purpose completions have been used to overcome marginal field development challenges. Shell’s Brunei field was highlighted, where the operator employed novel “fish-hook” and “snake” well trajectories to complete complex reservoirs and optimize recovery. Other presentations demonstrated how a new casing-while-drilling nudging technology was used to enable the drilling of cheap slim horizontal wells in shallow target reservoirs in Thailand, and how swellable packers and novel uses of capillary work string tubing have paved the way for cost reductions on well completions.

The seventh session investigated innovative facilities solutions to reduce capital and operating costs for marginal fields. Several industry examples were presented that highlighted current trends in utilizing reusable topsides facilities and standardized and modular designs to reduce costs on the construction side. Case studies demonstrating the successful application of floatover installations in both shallow and deepwater marginal fields were also discussed. In terms of cost savings on the operation side, presenters discussed technologies such as

a ram-type multiphase pump with high sand tolerance, novel process separation equipment featuring membrane CO₂ removal, and smart internals to reduce separator sizes.

Debate, Development Exercises Close ATW

The next session featured an interactive debate on several controversial topics, including:

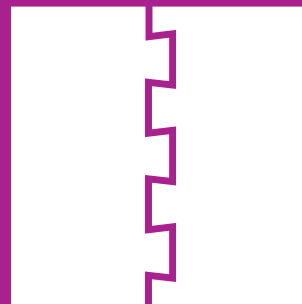
- Why are big companies not good at developing marginal fields?
- Tendering is a waste of time for marginal field developments
- It's a waste of time trying to quantify uncertainty for marginal fields
- Many cheap wells are better than a few smart wells
- Reusable facilities—dreams or reality?

Participants brought both their own field experiences and the points they learned in earlier sessions into this debate.

Brief case studies from various marginal fields around the world were featured in the following session. The three case studies—the Bualang field in the Gulf of Thailand, a cluster of shallow gas fields offshore Netherlands, and the D1 South Marginal field in India—were evaluated in terms of their relative successes and shortcomings, and their subsequent returns on investment.

The final technical session included a breakout that allowed participants to develop a hypothetical offshore gas field. The aim of this session was to generate discussion around the issues heard over the course of the previous sessions, and to determine if participants could develop a technically and economically viable marginal field concept.

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