



SPE Workshop HPHT and Deepwater Wells: Drilling Challenges, Technologies and Applications

23 - 24 JUNE 2026 | JAKARTA, INDONESIA



SPE Workshop: HPHT and Deepwater Wells: Drilling Challenges, Technologies and Applications



Executing Deepwater Wells in Malaysia with Precision: A Host Authority-Operator Model Integrated Strategies for Planning, Assurance, and Delivery.

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PETRONAS



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INTRODUCTION

DEEPWATER IN MALAYSIA

30%

of Malaysia's oil
production portfolio

150kbd

Total production
(Kikeh~40, Malikai~30,
Gemusut-Kakap~80)

126

Exploration
deepwater wells

Deepest exploration
well

~2800m

32%

of Malaysia acreages
is deepwater

4.06Bboe

Total discovery

*as of May 2026

KEY HIGHLIGHTS

Kebabangan Field Offshore Sabah

Discovered in 1994 and was later developed as a **gas deepwater hub**

Gemusut-Kakap Offshore Sabah

The **largest deepwater oil field** in Malaysia with total recoverable resources **~600MMstb.**

Kikeh Field Offshore Sabah

The **first deepwater oil producer** in 2007 with total recoverable resources **~400MMstb.**

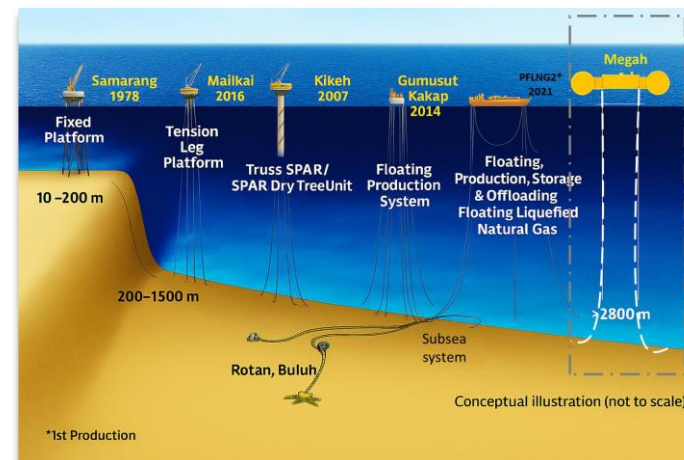


Figure 1:
A Progressive Deepwater Evolution

HOST AUTHORITY AS REGULATOR, SHAPER AND ACCELERATOR

Malaysia Petroleum Management (MPM) is entrusted to act for and on behalf of PETRONAS in the overall management of Malaysia's petroleum resources throughout the lifecycle of upstream oil and gas assets. MPM is the **governing body** for the country's petroleum development since PETRONAS was established in 1974.

MPM Strategic Role

Custodian of Malaysia's petroleum resources to drive sustainable and inclusive growth, not only as a regulator but as a **shaper** and **accelerator** upstream operations

MPM Execution Role

- Guiding operators, closing communication gaps
- Active intervention early in the lifecycle, not only as approval gates

*From **regulator** to **enabler** of execution excellence*



CHALLENGES AND OPPORTUNITIES IN DEEPWATER DEVELOPMENT

Silo based planning in DW drilling

Wells are executed on a single-well basis, limiting economics of scale and driving **higher unit cost**

Increasing Complexity in DW Environment

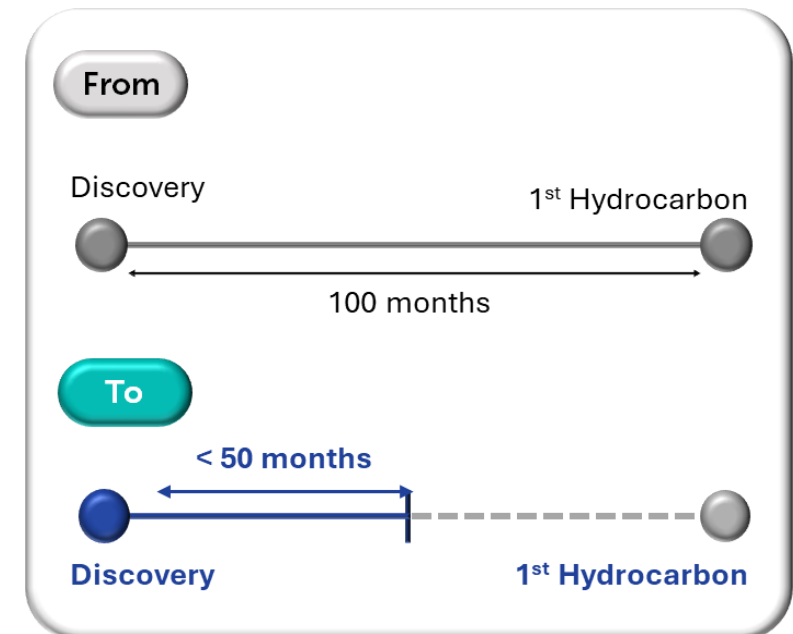
Carbonate-dominated formations in Malaysia introduce uncertainty with narrow drilling margin (<1.0ppg), impacting well design and specialized rig/equipment requirement

Long Time Require for Logistics and Planning

LLI for deepwater equipment require **extended procurement timelines** up to 12 months

*MPM aspiration to accelerate from **Discovery** to **1st Hydrocarbon** despite the challenges in deepwater environment*

Accelerate resource monetisation



STRUCTURED, LIFECYCLE-BASED GOVERNANCE MODEL

Regulating through Governing Standard

Governing Standards (13 sections) provide a structured framework, with Wells Management (Section 11) guiding lifecycle execution.
Enables **self-driven compliance**, reducing reliance and waiting time with the host authority.

Well Approval through WMRC

WMRC facilitates well readiness by assessing **13 key evaluation factors** (e.g., LLI, design, cost, risk factors). Drives alignment, enabling **~20-30% cost optimisation** across projects.

Coordinating PAC Alignment

Alignment across PACs through structured engagement and **deepwater workshops**.
Enables **resource sharing** and improves execution efficiency across operators.

Standardising and Optimising Well Design across PAC

Standardisation across PACs enabled through **VISMA**.
Achieves **~60% tubular surplus utilisation**, reducing overall national cost inefficiencies.

Exploration Well Workflow

Well Proposal Submission

WMRC sitting

NOOP Submission

FWR Submission

Development Well Workflow

FDP Submission

Well Proposal Submission

WMRC sitting

NOOP Submission

FWR Submission

Continues MR

BENCHMARKING FOR PERFORMANCE OPERATION EXCELLENCE

Drilling Minimum Standard (DMS)

Developed from [historical well performance data](#), establishing benchmarking for deepwater across 3 exploration categories and 6 development categories.

Evaluation is based on performance metrics including DDPTF, DCPF, and WCPF .

Value Delivered

- Reduced well delivery time & cost
- Improved consistency across operators
- Enhanced drilling performance excellence

Benchmarking sets initial expectations, but [learning from each well](#) is what continuously refines governance over time.

DMS 8.0 - Exploration Wells			
	DDPTF	DCPF	WCPF
Deep Water (DW)			
DW EXP C1 - Wells with 2-3 hole sections, no carbonate	2.4	2300	5425
DW EXP C2 - Wells with 4-5 hole sections, no carbonate	4.4	4200	6400
DW EXP C3 - Wells with more than 6 hole sections or Carbonate Wells	6.6	4135	6410

DMS 8.0 - Development Wells		
	DDPTF	DCPF
Deep Water (DW)		
DW DEV C1: Wells with 3 or less hole sections		
DW DEV C1 (Dry Tree)	3.9	1540
DW DEV C1 (Wet Tree)	1.8	2700
DW DEV C2: Wells with 4 hole sections		
DW DEV C2 (Dry Tree)	4.1	2635
DW DEV C2 (Wet Tree)	3.7	3200
DW DEV C3: Wells with 5 or more hole sections		
DW DEV C3 (Dry Tree)	5.1	1525
DW DEV C3 (Wet Tree)	2.9	2475

DMS

CAMPAIGN-LEVEL PLANNING AND OPTIMIZATION

Maximizing Rigs Opportunity Through LTDS

Aligns drilling sequence to optimise rig utilisation, minimise idle time, and reduce mobilization cost.
Enables ~15-25 wells per rig annually.

Incorporates Best Practices and Lesson Learnt for Performance Excellence

Campaign-level planning ensures each well benefits from prior well learnings, improving execution consistency. Learning are systematically embedded into subsequent well design and operations.

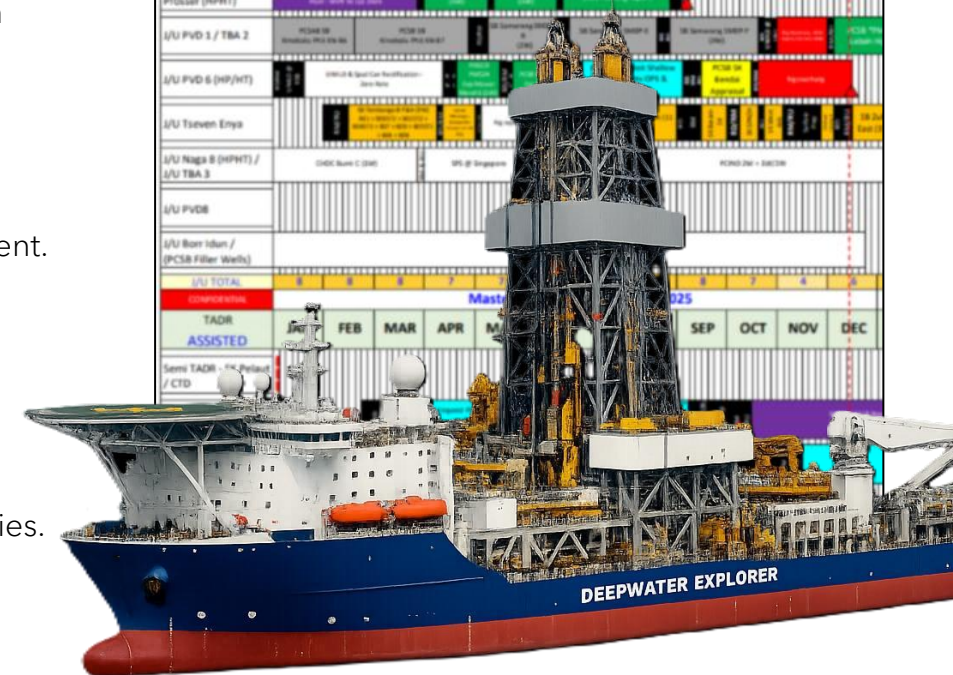
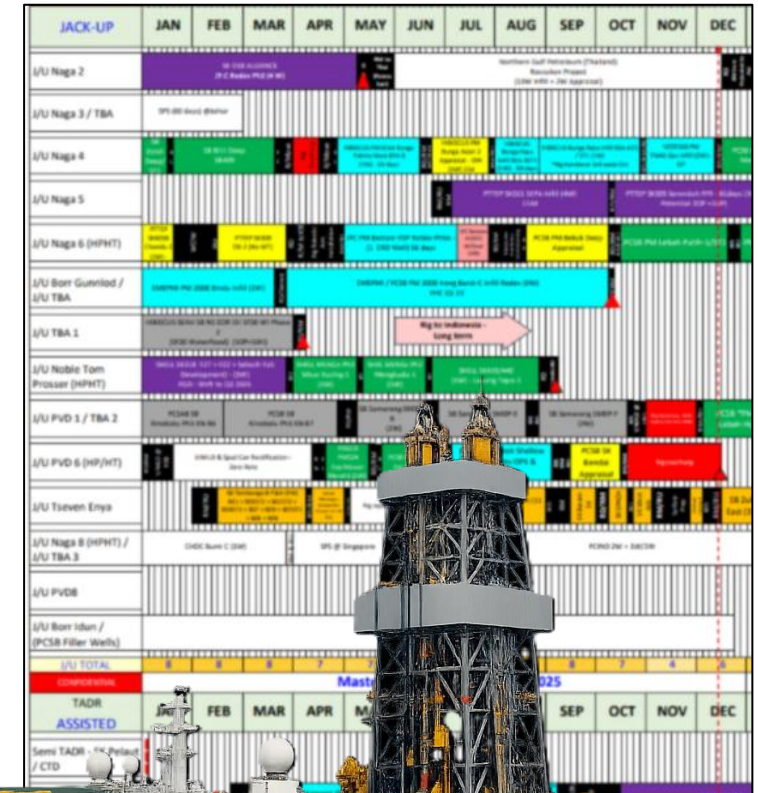
Pioneering Technology for Performance Evolution

Enables deployment and scaling of deepwater technologies, accelerating performance improvement.
Supported by PSC framework, allowing shared investment and cost recovery.

Campaign-Level Learning Integration

Provide national-level relief well planning, optimising resource readiness and response capability.
Integrated with OSRP framework, ensuring preparedness through shared relief well surplus strategies.

LTDS



DIGITAL-ENABLED DRILLING OPTIMISATION

Establishing Data Foundation Through MyWells

Centralized well data covering **10+ years (2014-present)**, eliminating **±30% discrepancies** and improving data accessibility and accuracy for benchmarking and analysis.

Advancing Data Analysis Through Generative AI

Converts unstructured reports (NOOP, FWR) into usable insights, reducing analysis time and enabling **offset well analysis** across projects.

Automation Workflow Through Agentic AI

Automate standardised workflows to **reduce manual effort** and improved execution consistency.

Deep Dive NPT Analysis for Performance Optimization

DDR analysis through ODBS to identifies **7 key NPT categories** with **~10%+ NPT** yearly for enabling targeted interventions to improve drilling performance across wells.



MyWells

REPLICABILITY BEYOND P&A AND MALAYSIA

The Integrated Strategies for Planning, Assurance, and Delivery is designed to be applicable across **regions**, **well types**, and emerging **subsurface activities**.

Thank you for your time



Questions?