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Gas Field Development - Challenges and Current Best Practices to Maximise Value

29 – 30 October 2024 | Ho Chi Minh City, Vietnam

Navigating FDP Challenges to Ensure National Gas Demand

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AGENDA

1. Background
2. Pain Points
3. Optimization Efforts
4. Conclusion

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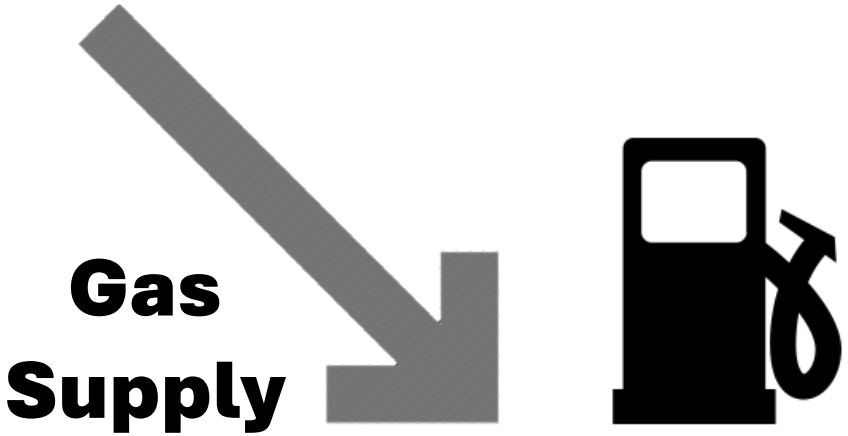
A stable and continuous gas supply is essential for maintaining energy security.

- Background
- Pain Points
- Optimization Efforts
- Conclusion



In the coming years, gas demand is expected to rise, but the country may face low gas supply.

Therefore, it is crucial for PETRONAS to ensure a stable gas supply to maintain energy security.

Natural gas is often regarded as a cleaner alternative to coal or oil.

This has driven the team to develop multiple efforts to overcome the challenges associated with maturing the field development plan (FDP) study.

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Project A involves drilling six infill gas producers in the Offshore X brownfield.

Background

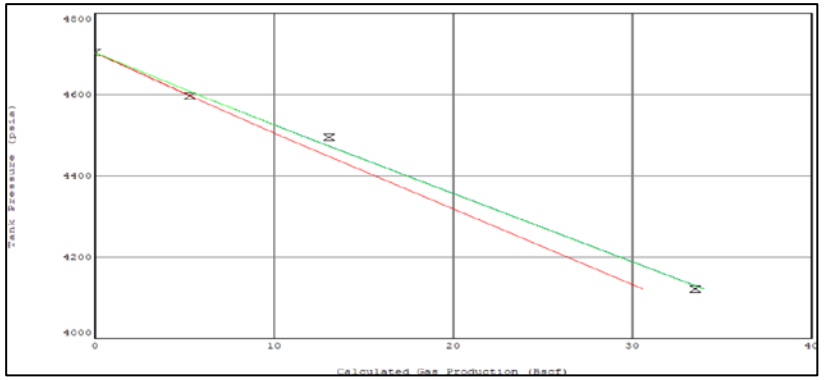
Pain Points

Optimization Efforts

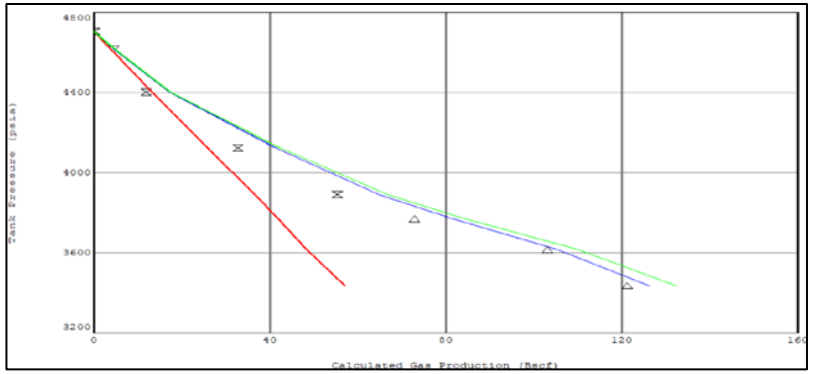
Conclusion

Project A facing challenges to move forward due to :

1. Market escalation
   a. The daily rig rate has almost doubled in recent years, leading to a 30% increase in total project costs.
2. Volume Reduction
   a. Latest reservoir pressure data and updated material balance study indicated a strong water drive mechanism in the target K reservoir.
   b. Led to 25% reduction estimated connected Gas In-Place volume.



Less pressure points in the early stages of production.



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Several optimization efforts had been undertaken by the team to reduce the risk of contact movement and costs escalation.

Background

Pain Points

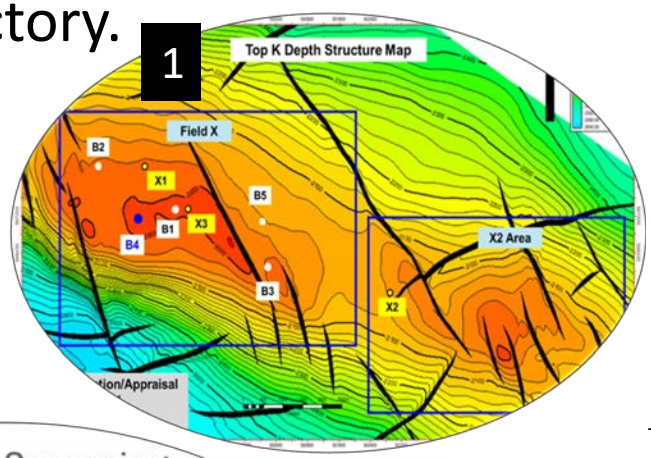
Optimization Efforts

Conclusion

Efforts involved:

1. Optimize target location and well trajectory.
2. Maximize completion target.
3. Number of wells optimization.
4. Well completion design optimization.

1



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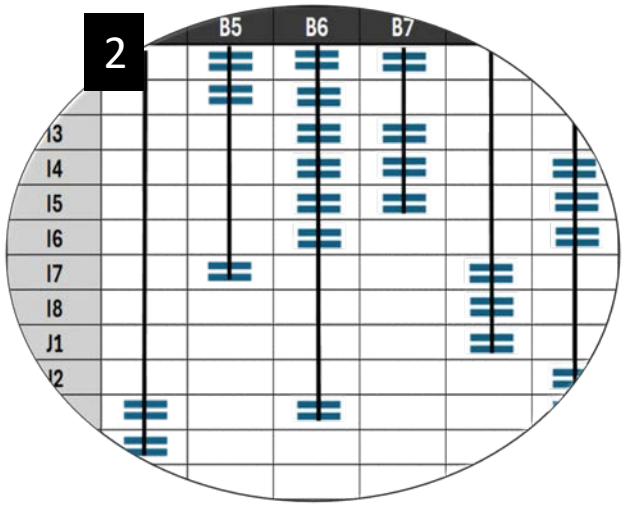

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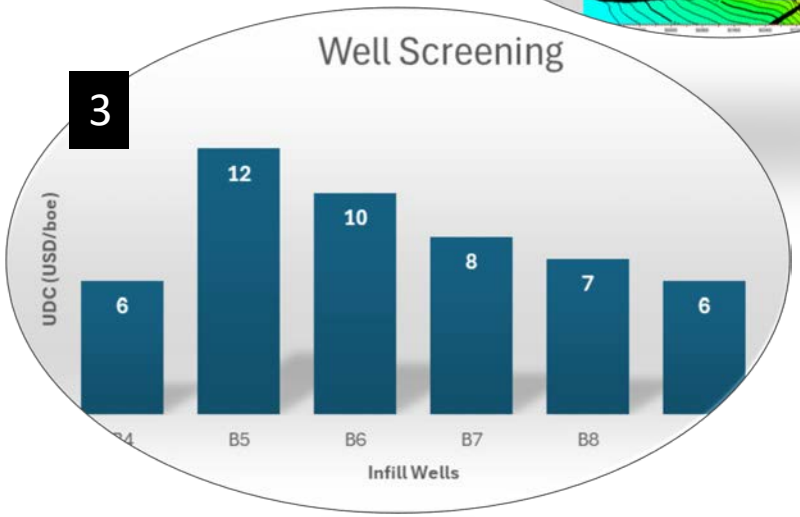

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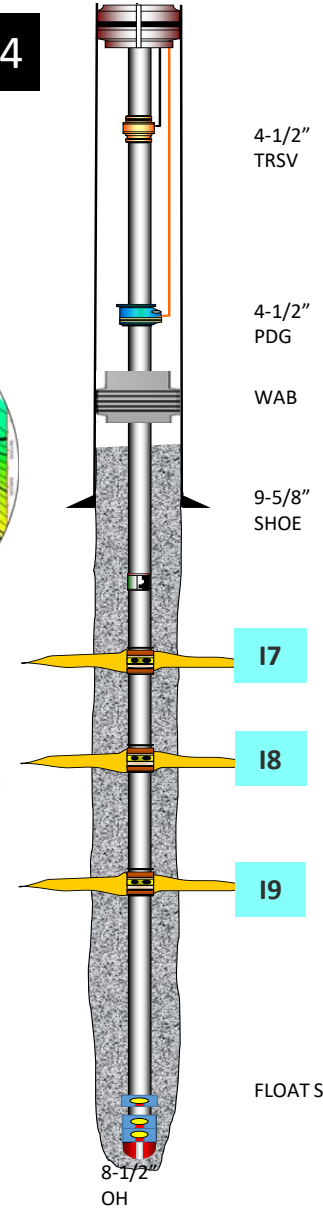

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Optimizing target location and well trajectory.

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Pain Points

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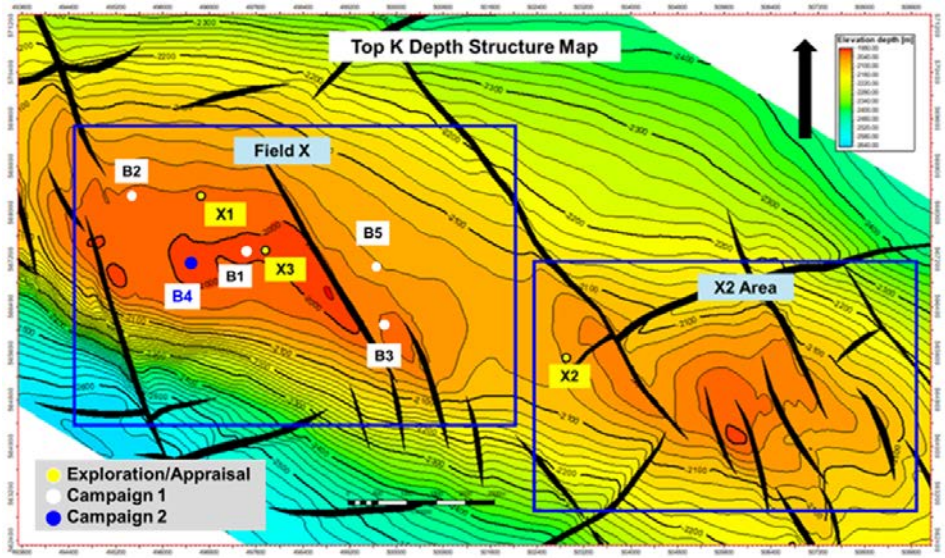
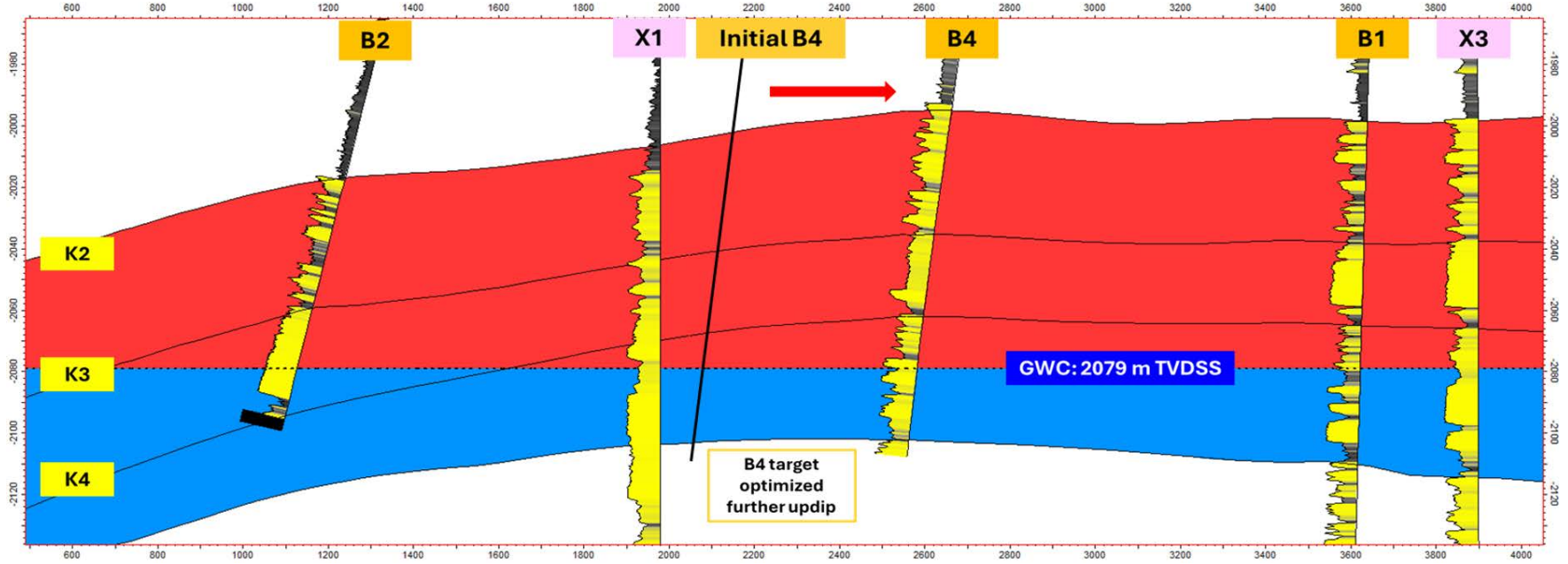
1. Shifted the location to the crestal area to stay away from encroaching aquifer and water contact.
   a. Resulting to shallower total depth (TD).
   b. Actual rates almost double than prognosed rates.





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Reducing well count from 6 to 4 and maximizing completion target for cost optimization.

Background

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Optimization Efforts

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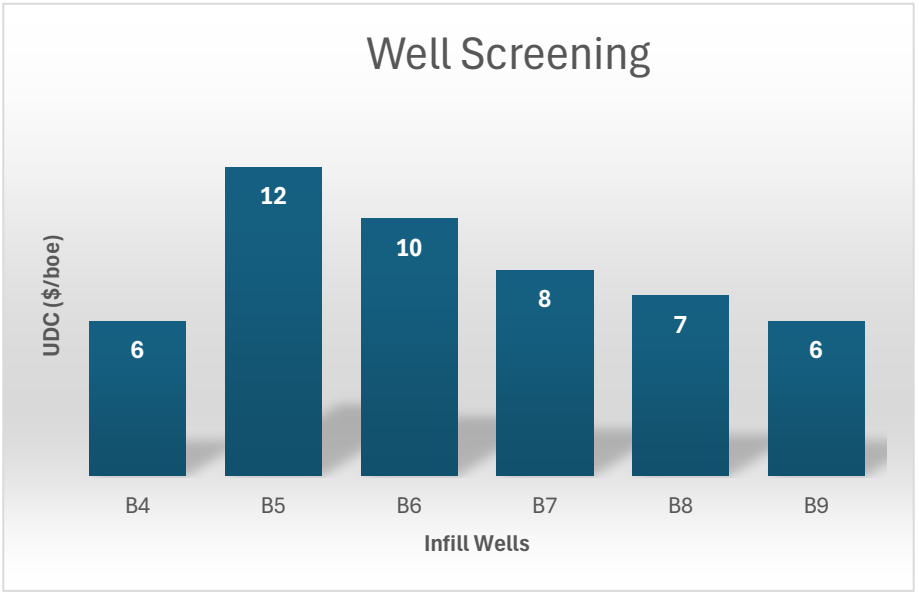
1. Carried out well screening and ranking based on unit development cost (UDC).
2. Dropped the 2 wells with highest UDC.
3. Maximize the completion target to minimize the reserve loss from the dropped wells.
4. Reduce the project costs by 20%.



Reservoir	B4	B5	B6	B7	B8	B9
I1						
I2						
I3						
I4						
I5						
I6						
I7						
I8						
J1						
J2						
K2						
K3						
K4						

Original

Reservoir	B4	B5	B6	B7	B8	B9
I1						
I2						
I3						
I4						
I5						
I6						
I7						
I8						
J1						
J2						
K2						
K3						
K4						

Dropped

Optimized

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Well completion design changes for cost optimization.

SPE workshop

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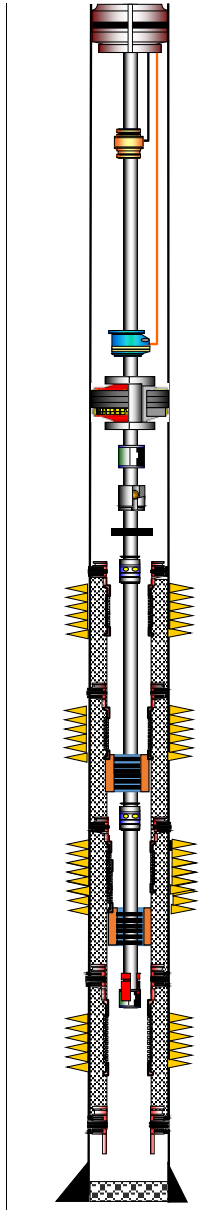
Conclusion

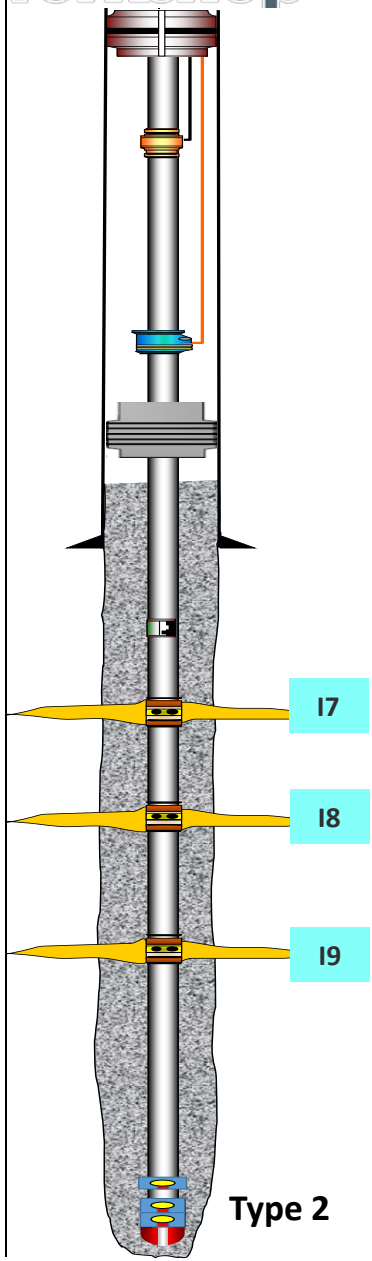
1. Unconsolidated reservoir with tendency for fines migration- require downhole sand control.
2. Well completion design optimization:
   a. **Type 1** : Screenless frac pack + **resin consolidation** → frack pack with screen (eSTMZ).
   b. **Type 2** : Cased Hole Gravel Pack (frack pack) → cemented monobore + screenless frac pack .

30 % cost optimization

- ✓ Single trip well completion
- ✓ Single trip perforations
- ✓ Pilot technology



Type 1



Type 2

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Pain Points

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Conclusion

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1. High production and reserve attainability, along with cost reductions, have contributed to the success of this project.
2. Overall, this project was a huge success due to:
   a. Proactive approach in incorporating new subsurface data.
   b. Able to adapt to new technology to optimize costs.
3. These efforts have significantly helped to ensure gas security.
4. The strategies and methods applied can be replicated in other projects, helping to share knowledge and best practices effectively.