



Navigating the Changing World of Reserves and Resources in the Context of the PRMS

20 - 21 AUGUST 2024 | BRISBANE, AUSTRALIA

Public Disclosed 2P Reserves – Confidence Rating

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Focus of this presentation



This presentation is tailored to those who utilize the PRMS in business, government, or other sectors, particularly those who may not fully understand its workings. While the focus is on Coal Seam Gas (CSG), the concepts discussed also share similarities with shale gas.

Source of Open Data

2P reserves and Production data

Queensland Government Open Data Portal

<https://www.data.qld.gov.au/dataset/petroleum-gas-production-and-reserve-statistics>

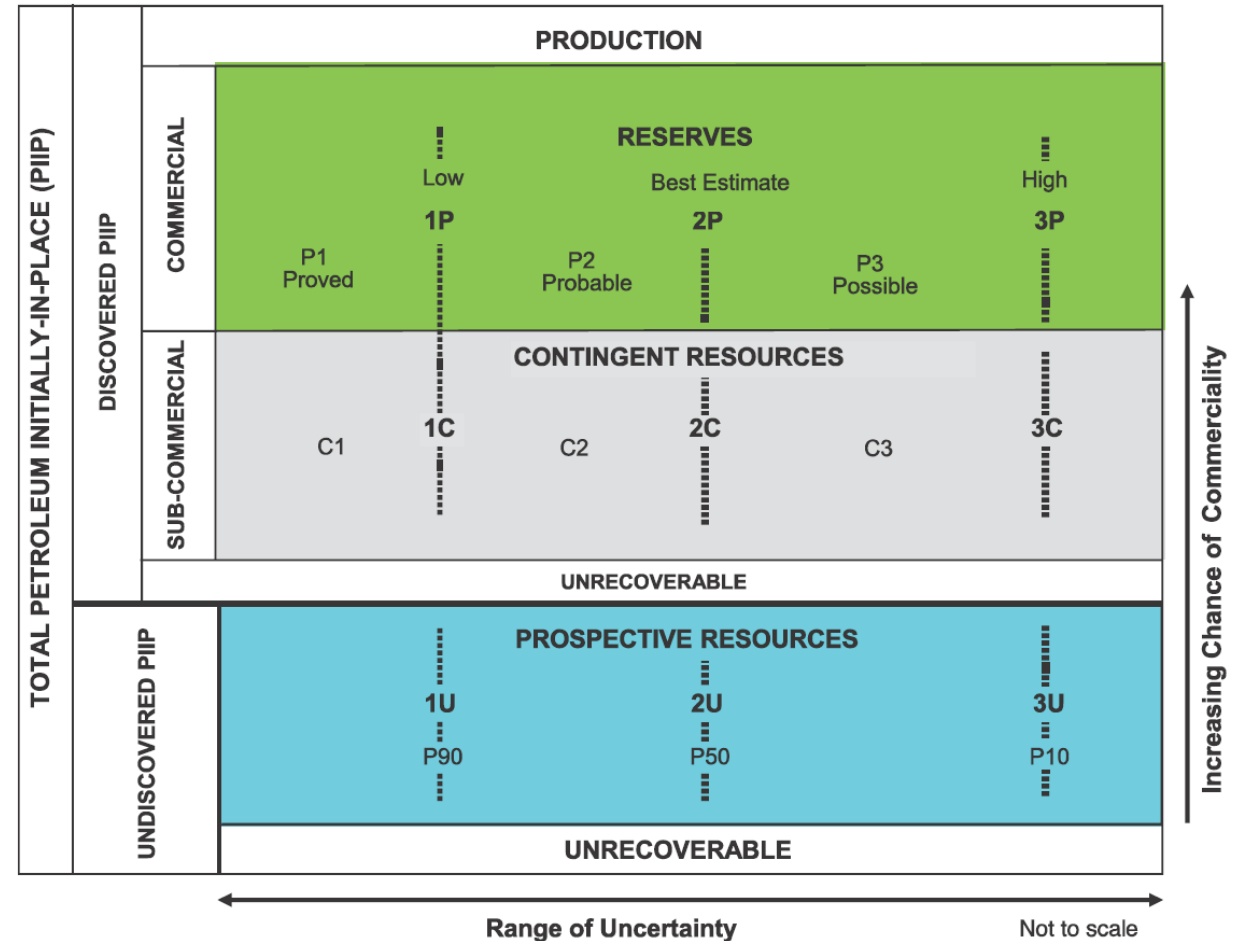
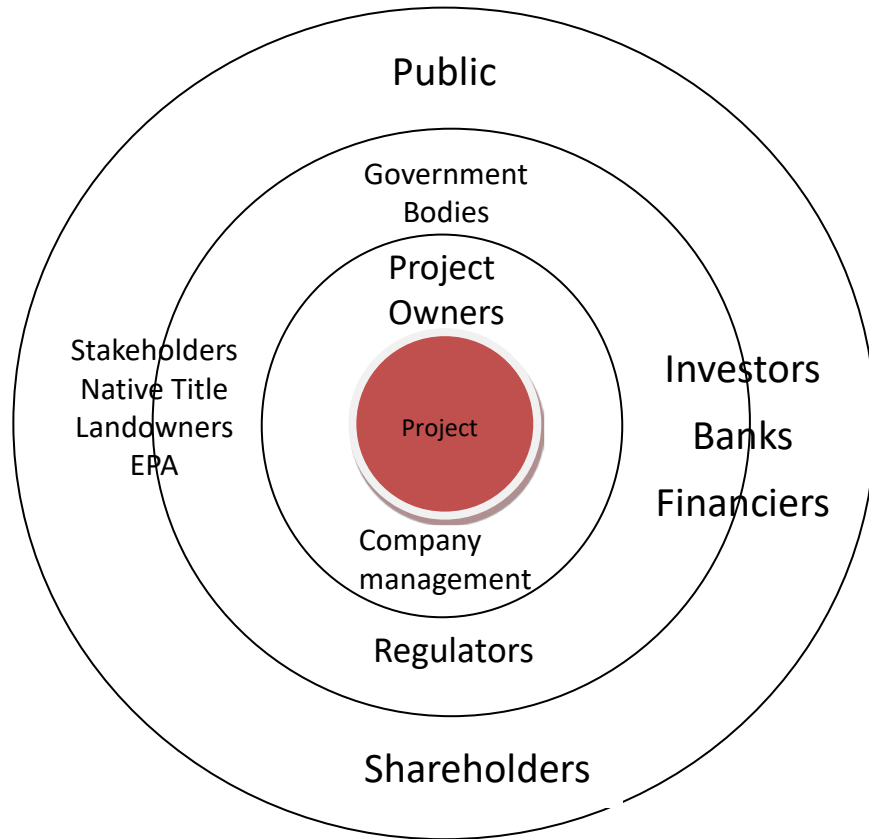
Plots and Graphs

Source is on each slide

Papers [download from www.oilgascbm.com.au]

1. **SPE JPT Article March 2018**. Is there a need for a Reserve Confident Metric? <https://doi.org/10.2118/0318-0054-JPT>
2. **APPEA Journal 2017, 57**, Conference May 2017 Perth: Gauging the confidence in publicly reported oil and gas reserves Introducing the **Reserves Confidence Metric**; <http://dx.doi.org/10.1071/AJ16050>
3. Reserves SPE-PRMS [April 2014 SPE JPT publication page 38]
4. 2012 APPEA paper – Why North American markets have shifted to spoolable pipes.
5. Spoolable GRE pipe – APIA Pipeliner July 2012 Pg126
6. SPE-PRMS and Reserves reporting in Australia – PESA Dec/Jan 2009/2010
7. CBM Fracture Simulation an Australian Experience – SPE 110137; <https://doi.org/10.2118/110137-MS>

What is PRMS?

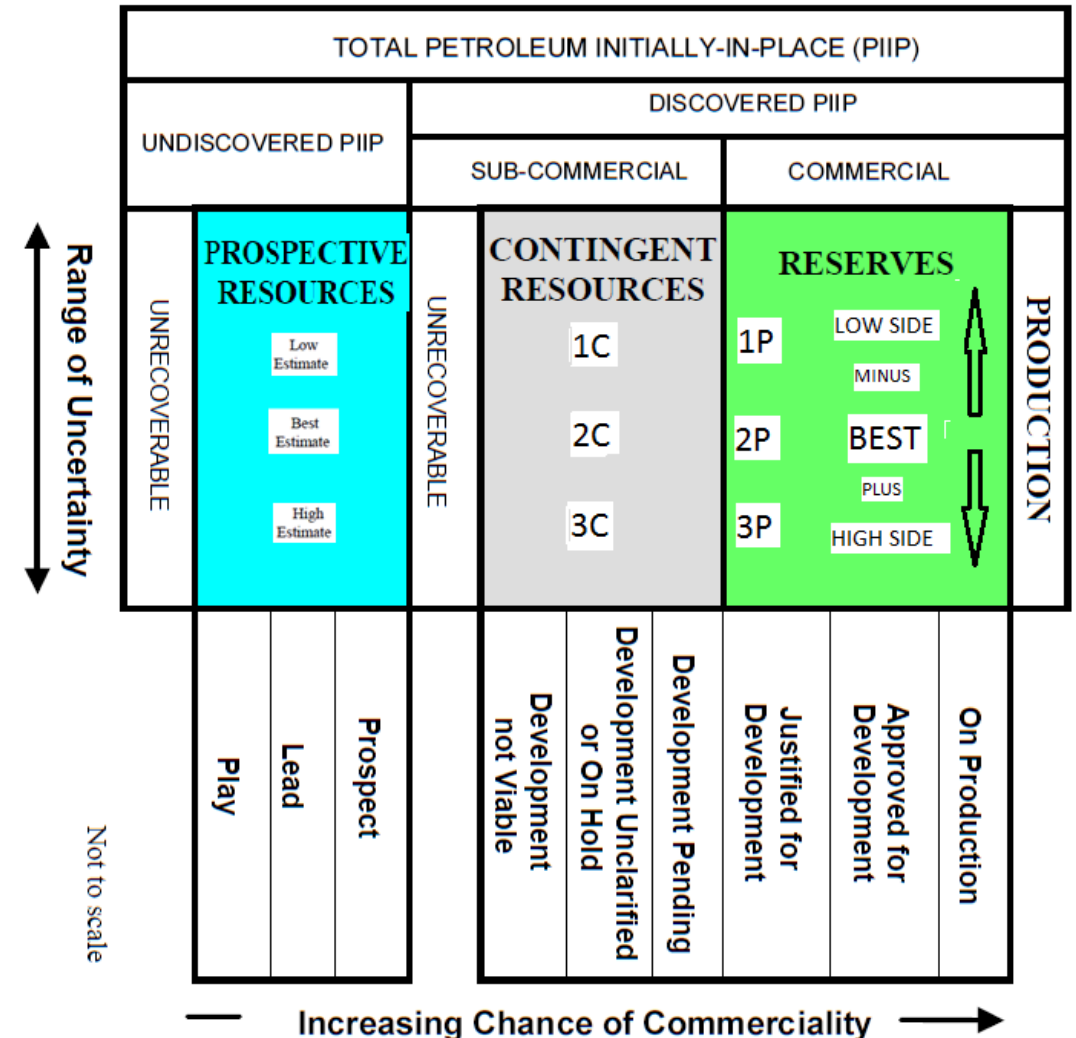


- Standard or a guideline?
- Project Based – Reports to the project manager
- Regulatory Framework not included!!
 - Comparing reserves from one company to another would require a regulator framework.

Figure 1.1—Resources classification framework

- Investors see
 - 1P as money in the bank.
 - 2P this is what they expect.
 - 3P reward

- Reserves is the commercial subset of contingent resources.
- Chance of commerciality is the timeline.
- At each point in time the resource estimate [NOT MEASUREMENT] & has a “Range of uncertainty”.
 - NOTE Arrows point in both directions
- 2P = “Best Estimate” At any point in time we have a best estimate with a range of uncertainty.
- Commercially recoverable from a date
 - for this presentation: 31 Dec 2022
- 2P is the “best estimate” or P50 forecast used in the commercial test
- P50 means 50% chance that quantities recover will equal or exceed the best estimate.
 - DOES NOT mean 50:50 chance of happening—flipping a coin
 - 2P reserves will produce a outcome approximating to a log normal distribution.



Timeline on X-Axis → Project Maturity Sub-classes

Figure 2.1—Sub-classes based on project maturity

[Modified]

Survey showing there is a perception that there is a difference between 2P conventional and 2P unconventional reserves

TECHBITS Article
SPE-JPT April 2014
<https://jpt.spe.org/there-need-reserves-confidence-metric>

.....

It is expected that different reserve estimators estimating reserves for a conventional reservoir would have similar results (e.g., +/-10%).

Sample	Agree	Neutral	Disagree
37	70%	19%	11%

.....

It is expected that different reserve estimators estimating reserves for an unconventional reservoir would have similar results (e.g., +/-10%).

Sample	Agree	Neutral	Disagree
37	35%	32.5%	32.5%

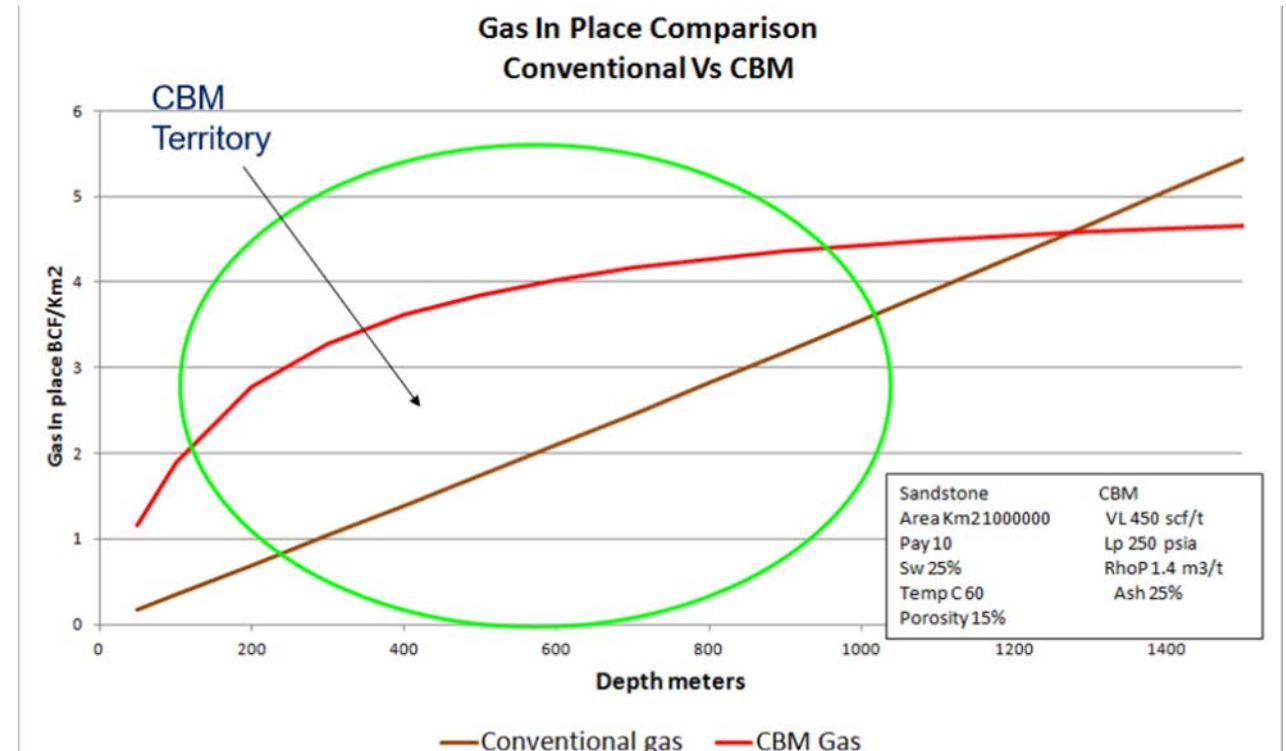
Difference between Conventional and unconventional resources [CSG focus]

Discovery

- CSG generally low risk and small finding costs
- Conventional high risk and high finding costs.

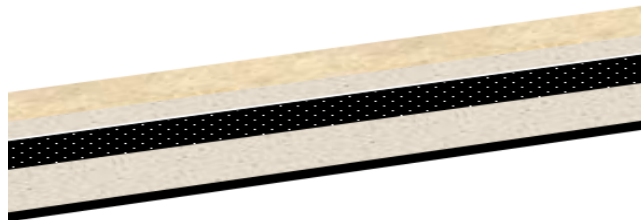
Development

- CSG deliverability is the challenge
- Conventional reserves is the challenge



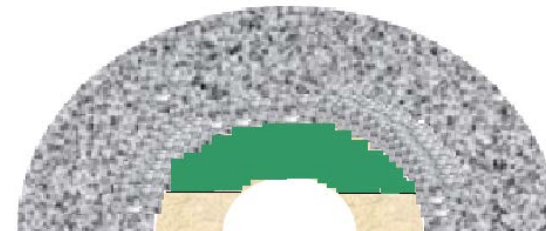
CSG

- Source Rock & reservoir the same.
- Pressure is the reservoir seal {Boundary defined by economics}
- Structure need for deliverability {Youngs Modulus}

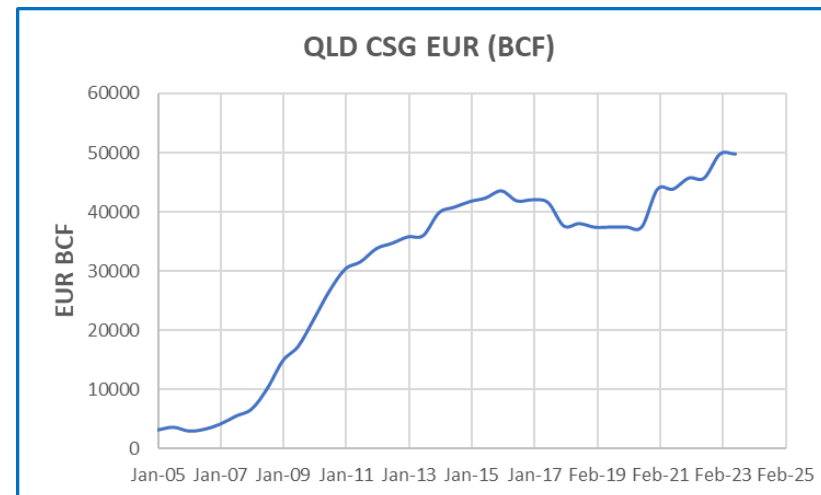
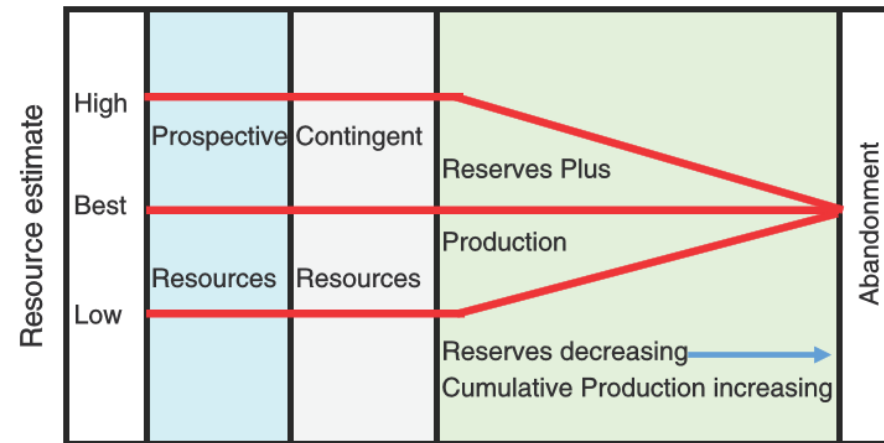
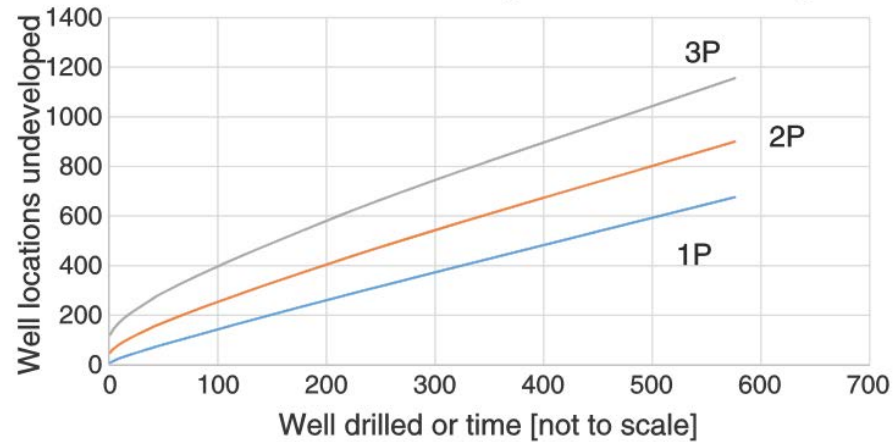
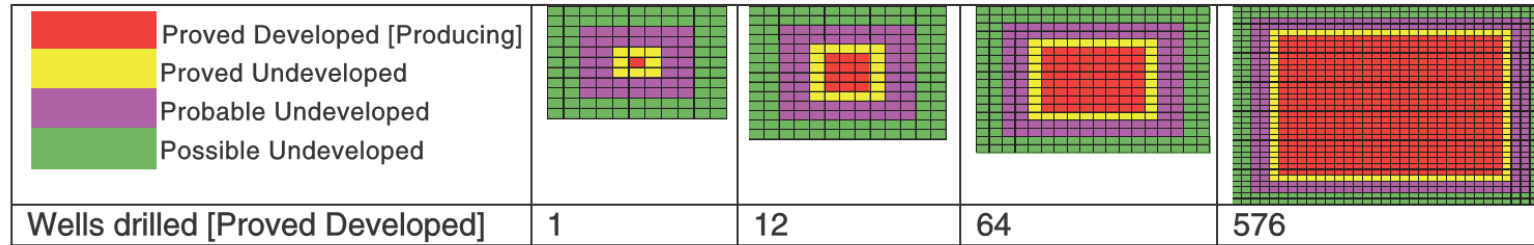


Conventional

- Relies on petroleum migration
- Structure & Impermeable overburden {GWC is defined}
- Structure need for reserves



CSG methodology





Reserve Confidence Metric [RCM]



It is just a flag “Good Confidence” & “Poor Confidence”
Poor does not mean wrong it's to prompt the user to ask questions.

No need to have any knowledge of geology, reservoir engineering etc

Reference

1. **SPE JPT Article March 2018**. Is there a need for a Reserve Confident Metric? <https://doi.org/10.2118/0318-0054-JPT>
2. **APPEA Journal 2017, 57**, Conference May 2017 Perth: Gauging the confidence in publicly reported oil and gas reserves Introducing the **Reserves Confidence Metric**; <http://dx.doi.org/10.1071/AJ16050>



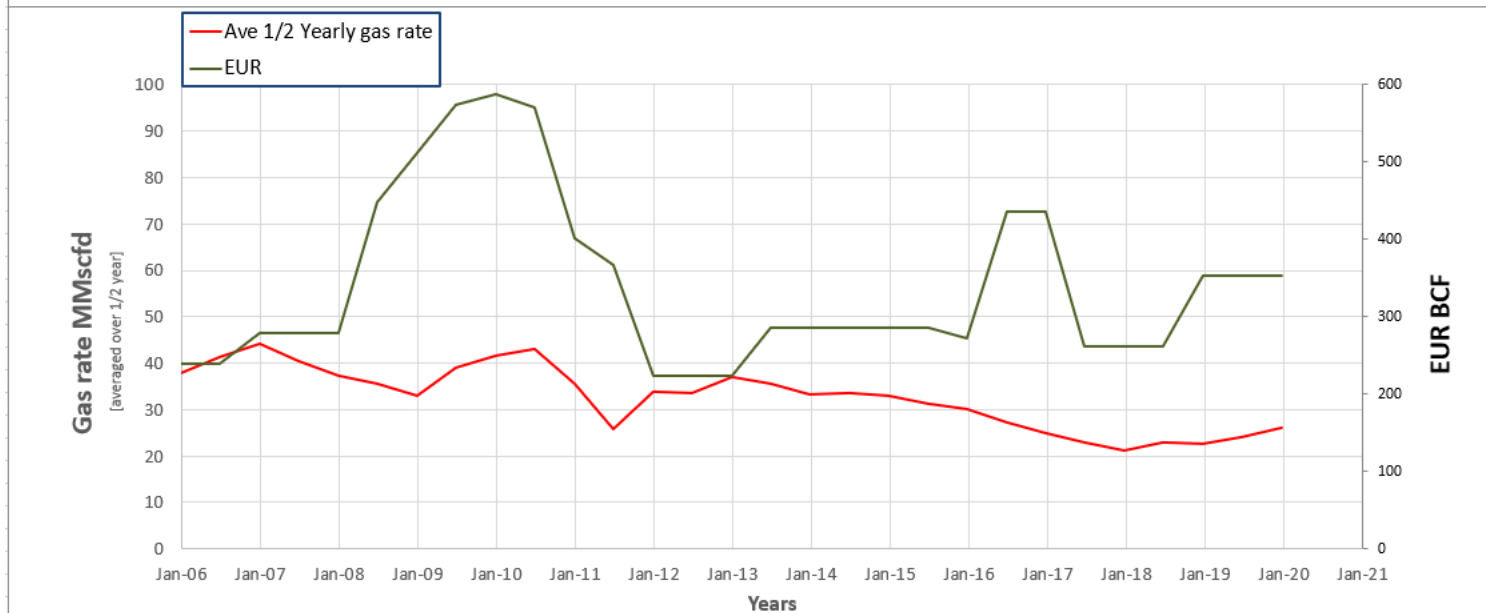
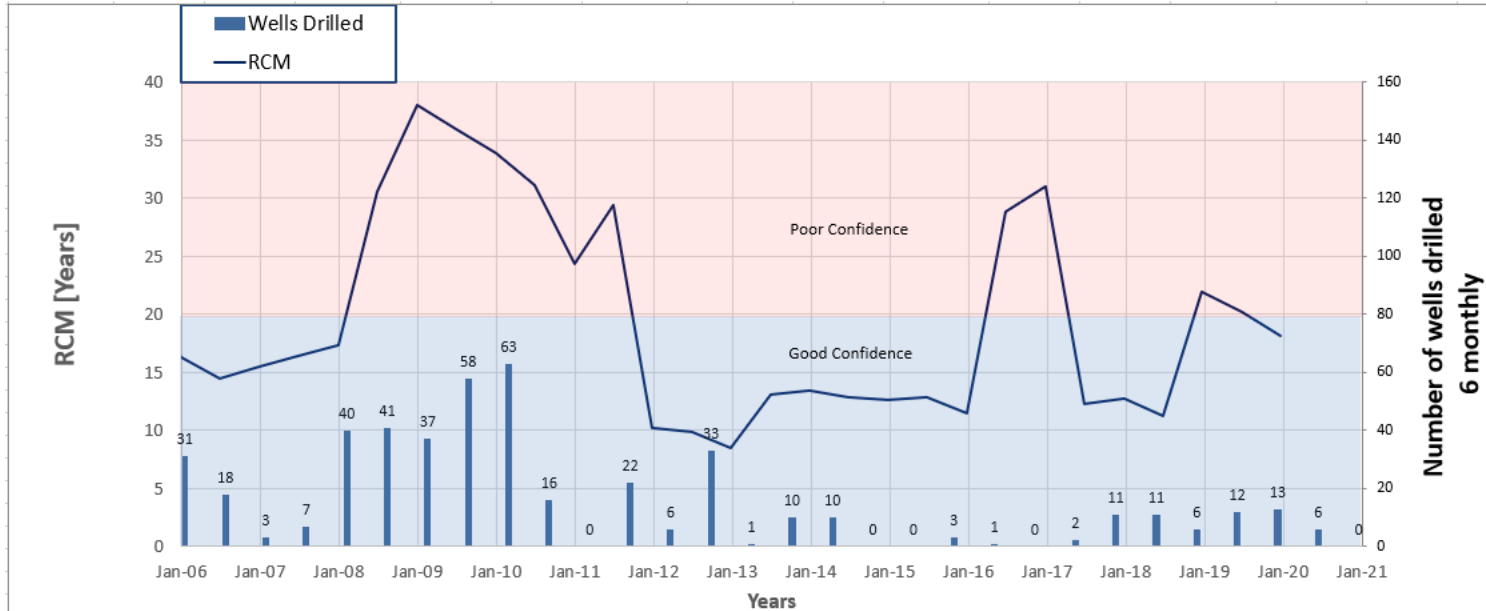
Reserves Confidence Metric RCM



RCM	Formula	Units	Good Confidence	Poor Confidence
RCM [1P]	$\frac{1P \text{ Reserves}}{\text{Current Production Rate}}$	$\frac{\text{Volume}}{\text{Volume/Time}}$	<= 10 Years	> 10 years
RCM [2P]	$\frac{2P \text{ Reserves}}{\text{Current Production Rate}}$	$\frac{\text{Volume}}{\text{Volume/Time}}$	<= 20 Years	> 20 years

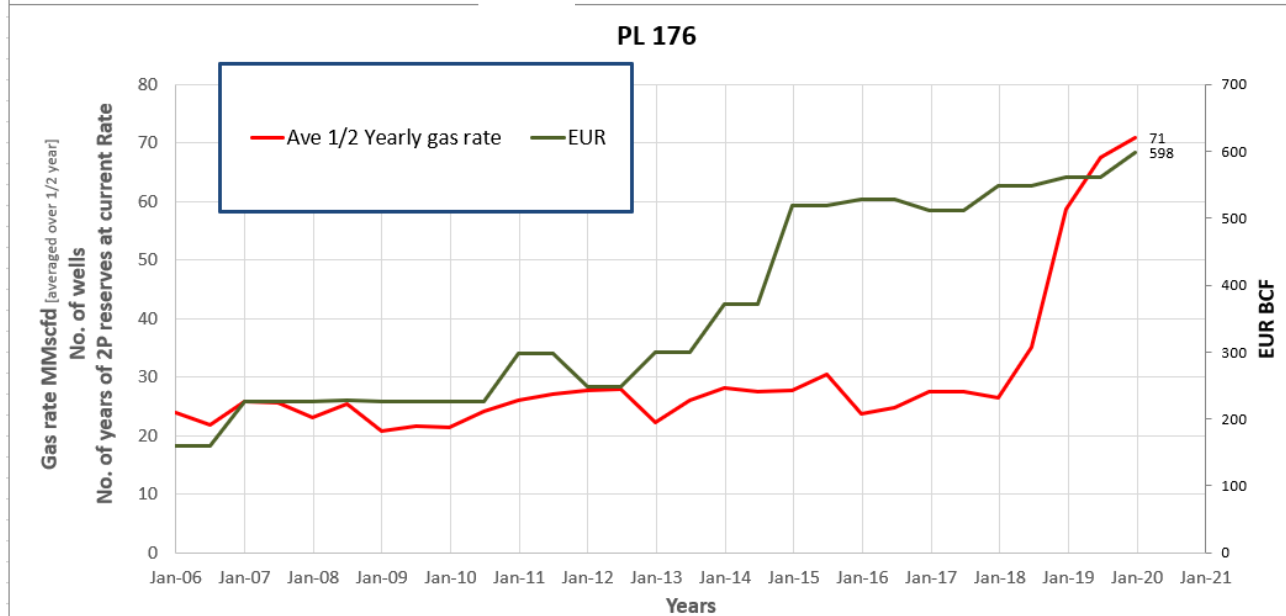
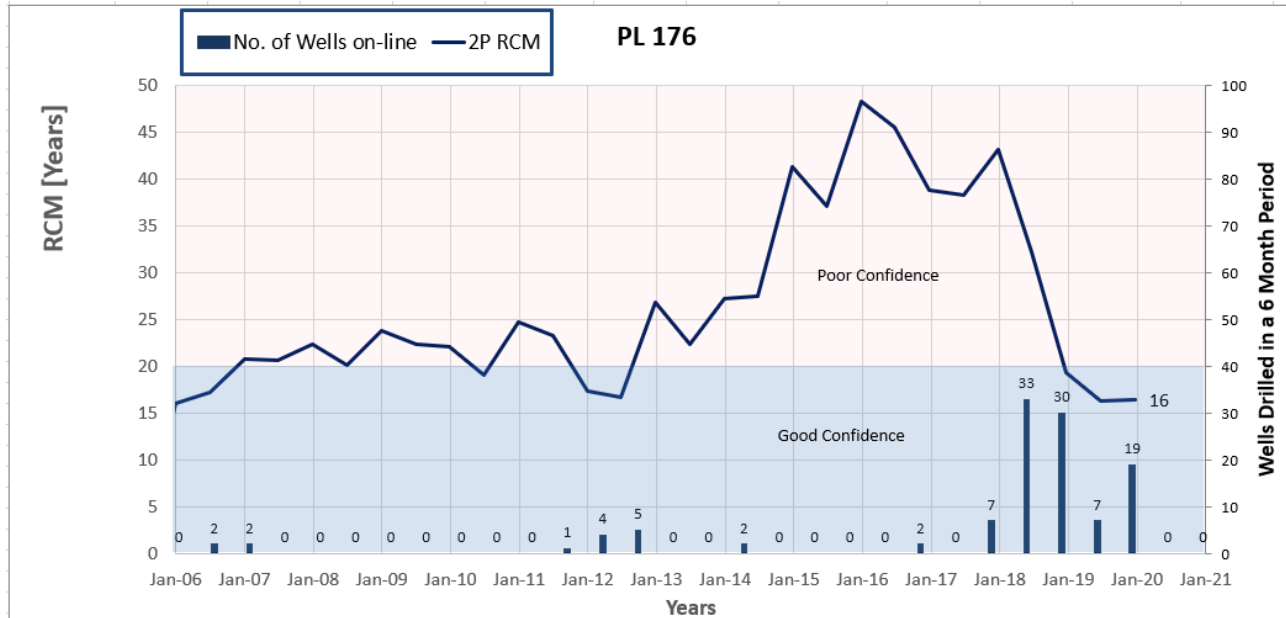
- RCM is independent of the disclosing entity, Reserve Estimator, & Auditor.
- Independent of Reserve Standard and commodity
- No knowledge of geology engineering etc required.
- Empower Stakeholders

Example 1 CSG Field 1



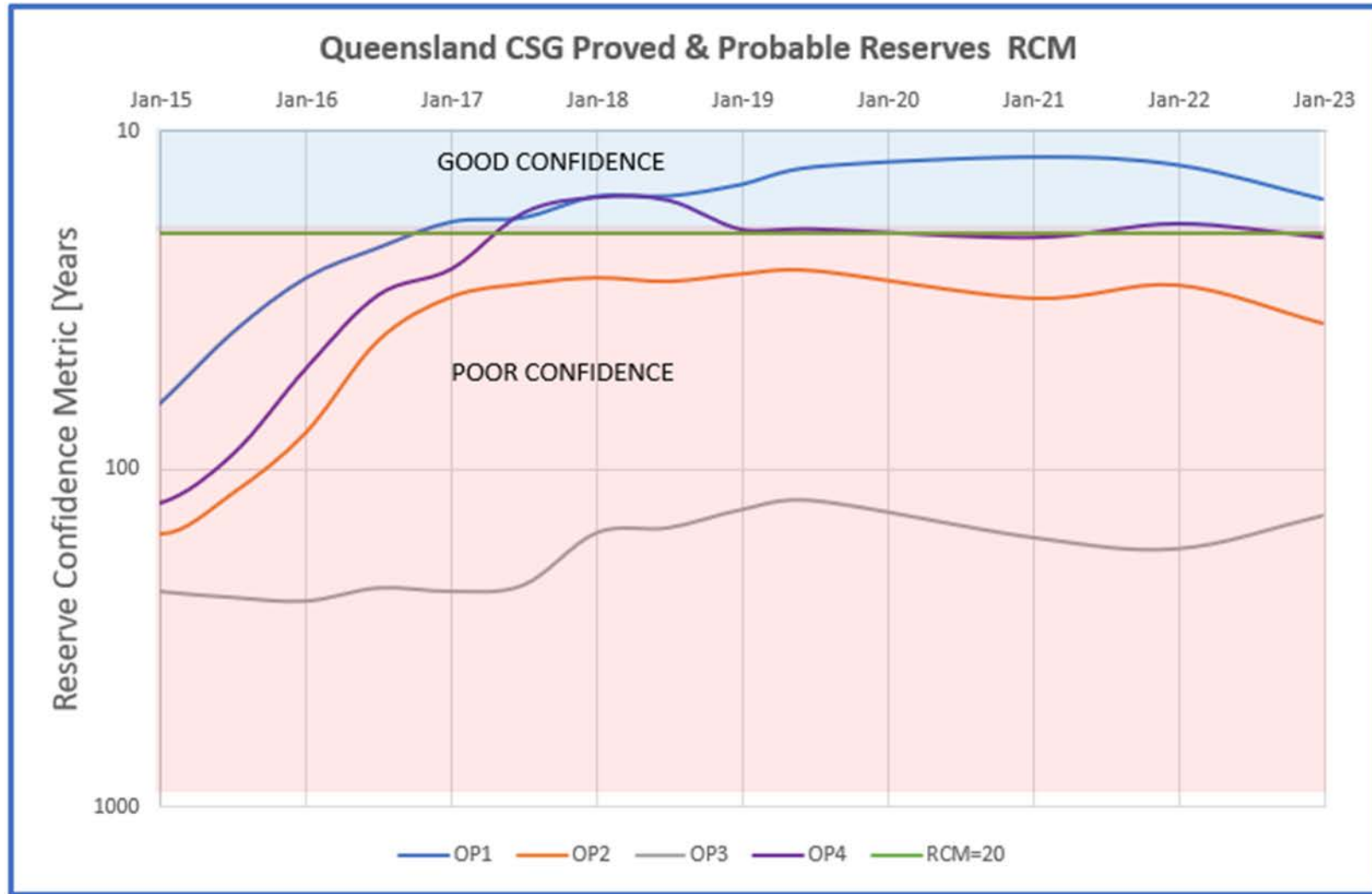
- Production ~10 years
- The Operator prepared to reduce reserves.
- Drilling seems not to be successful
- Write-downs imply initial 2P allocation was incorrect.

Example 2 CSG Field 2



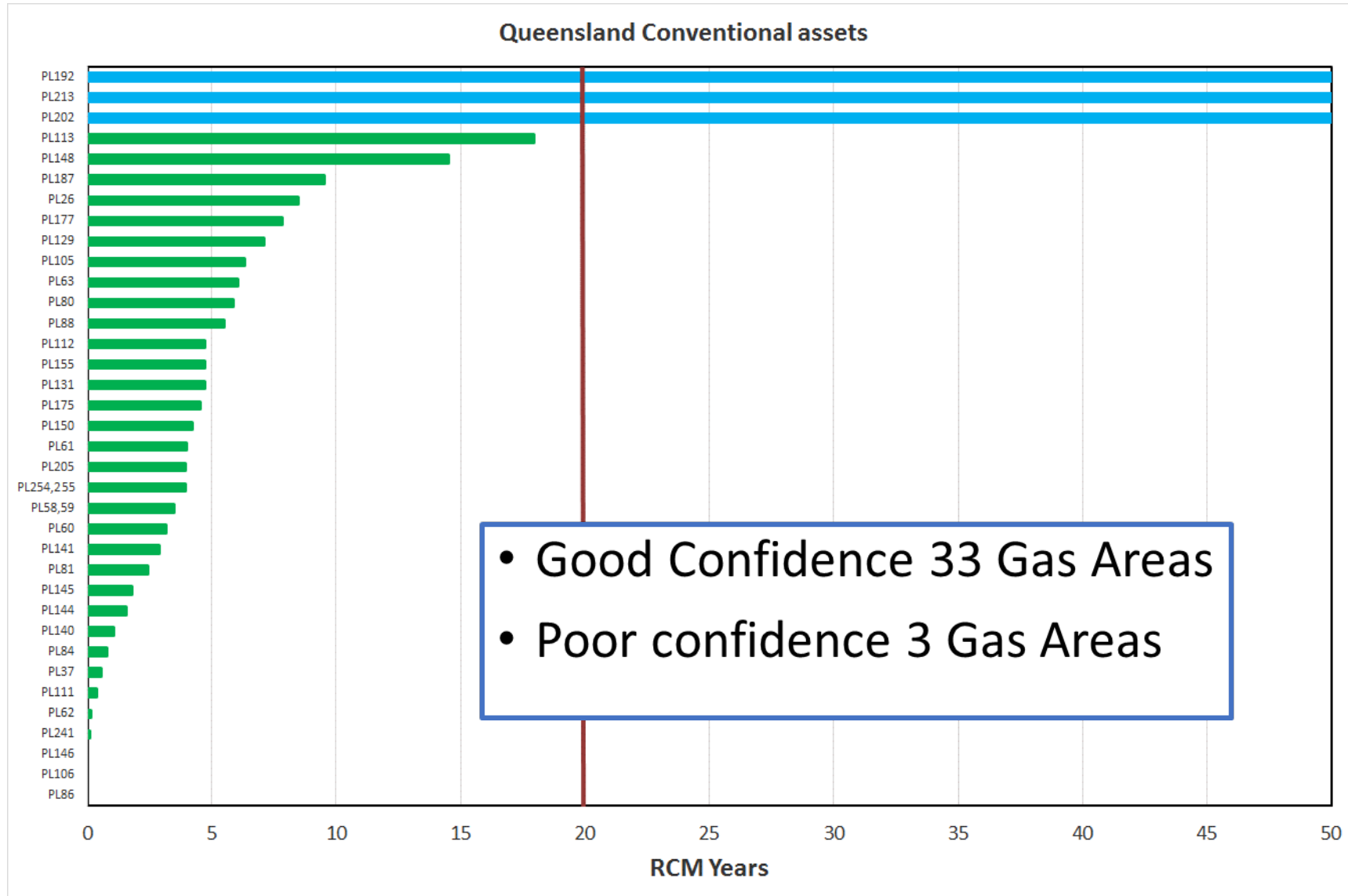
- Both been on production ~ 10 years
- Reserves Growth [Undeveloped]
- Drilling commenced <5yrs
- Production Growth to justify the Reserve Increase.

RCM Queensland CSG



First LNG shipment from Curtis Island January 2015

Note 2P reserves are the only resource information available





Conclusion



- There are significant nuances between estimating conventional and unconventional oil and gas resources, which can substantially impact the magnitude of the estimates.
- The development of the Petroleum Resources Management System (PRMS) has focused on methodology and classification. However, users of these estimates, such as the financial sector, may not fully understand the intricacies of reserves reporting especially with respect to CSG unconventional resources.
- We must create strategies to support users of PRMS reserves and resource estimates, ensuring they achieve the best possible outcomes for their specific applications..
- **RCM**
 - Empowers stakeholders to question!
 - No place for bad management to hide
 - RCM does not replace due diligence
 - Plotting RCM identifies patterns and trends