



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

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Chance of Development (Progress x Chance Method)

Greg Horton

Greg Horton Petroleum Engineer

Collaborators Barbara Pribyl, Paul Lyford, Greg Horton, Doug Peacock

The presentation material is the view of the collaborators in general, but not necessarily in detail, and not necessarily the view of their employer or SPE. The material is provided to promote discussion amongst the workshop attendees on better understanding of PRMS.

Note – it provides results of 2 examples

A - No emissions issues,

B - High CO₂ and Fracking

A second ppt focuses on set up of the matrices etc

Topics

- Pc, Pg, Pd definitions
- Pc, Pg, Pd PRMS Framework
- Pd = fn (Commerciality Criteria (CC) factors) AND Commitment factor
- Conceptual form of “matrix” for each CC
- Detailed form of matrix for each CC
- Key Points
- Example A – “No” emissions and other issues
- Example B – High CO2 and Fracking
- Example A v B

$P_c = P_g \times P_d$ → they are “chance” factors, not “progress”

TERM	PRMS Section	DEFINITION
Chance of Commerciality, P_c	2.1.3	The estimated probability that the project will achieve commercial maturity to be developed. For Prospective Resources, this is the product of the chance of geologic discovery and the chance of development. For Contingent Resources and Reserves, it is equal to the chance of development.
Chance of Development, P_d	2.1.3	The estimated probability that a known accumulation, once discovered, will be commercially developed.
Chance of Geologic Discovery, P_g	2.1.3	The estimated probability that exploration activities will confirm the existence of a significant accumulation of potentially recoverable petroleum.

Pc, Pg, Pd – PRMS Framework

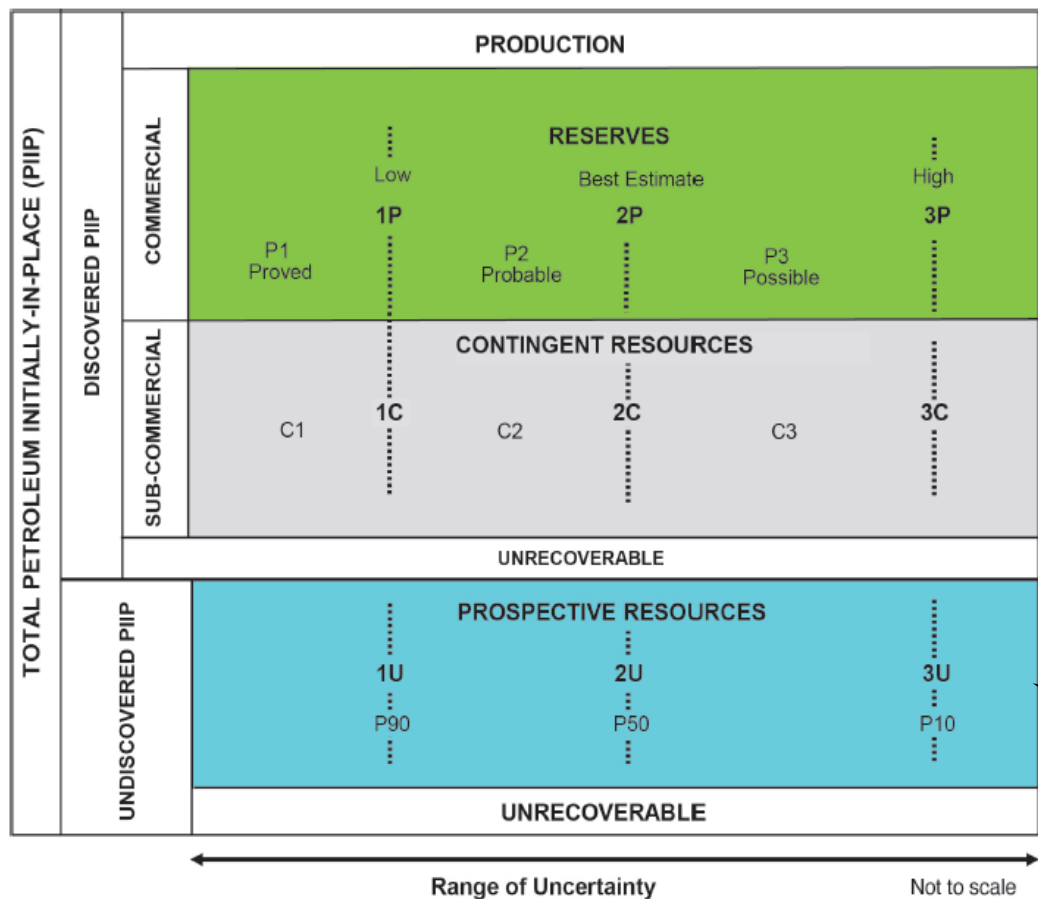


Figure 1.1—Resources classification framework

For Reserves
 $P_c \sim 0.9-1$
 with all
 Commerciality
 Criteria met
 and
 Commitment

For CRs
 $P_c = P_d$
 Since $P_g = 1$

For PRs
 $P_c = P_g \times P_d$

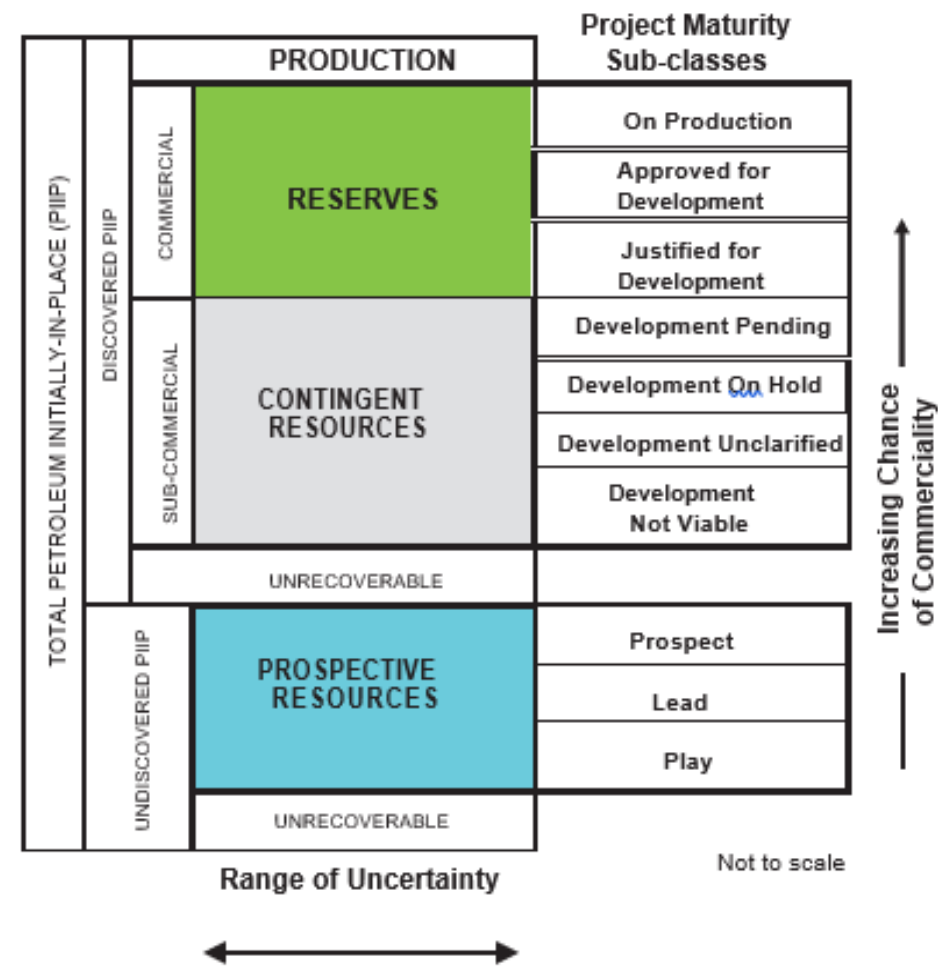


Figure 2.1—Sub-classes based on project maturity



$Pd = fn$ (Commerciality Criteria (CC) factors) AND Commitment factor



$= fn$ (CC_A, CC_B, CC_C, CC_D, CC_E, CC_F, CC_G) AND Commitment factor

Factor	Abbreviation	PRMS 2018 2.1.2 Determination of Commerciality requirements (A-G)
CC _A	Technical	A. Evidence of a technically mature, feasible development plan.
CC _B	Finance	B. Evidence of financial appropriations either being in place or having a high likelihood of being secured to implement the project.
CC _C	Timeframe	C. Evidence to support a reasonable time-frame for development.
CC _D	Economics & Investment	D. A reasonable assessment that the development projects will have positive economics and meet defined investment and operating criteria. This assessment is performed on the estimated entitlement forecast quantities and associated cash flow on which the investment decision is made
CC _E	Market	E. A reasonable expectation that there will be a market for forecast sales quantities of the production required to justify development. There should also be similar confidence that all produced streams (e.g., oil, gas, water, CO2) can be sold, stored, re-injected, or otherwise appropriately disposed.
CC _F	Infrastructure	F. Evidence that the necessary production and transportation facilities are available or can be made available.
CC _G	Environmental, Social and Governance (ESG)	G. Evidence that legal, contractual, environmental, regulatory, and government approvals are in place or will be forthcoming, together with resolving any social and economic concerns.
Commitment		Discovered recoverable quantities (Contingent Resources) may be considered commercially mature, and thus attain Reserves classification, if the entity claiming commerciality has demonstrated a firm intention to proceed with development and has met all the above CCs.



Conceptual form of “matrix” for each CC



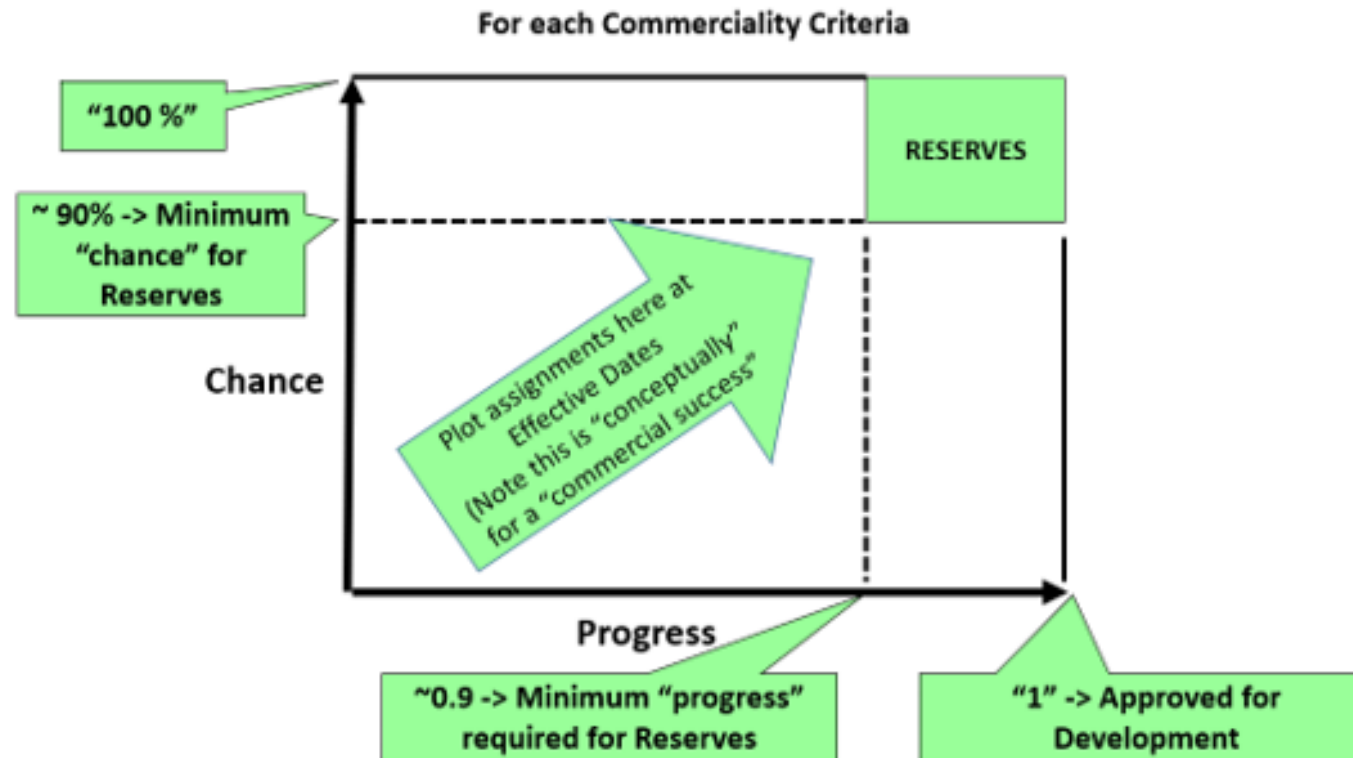
Progress x Chance matrices for each CC

At an Effective Date position “progress x chance” of each CC in its matrix

Logic: Increased “progress” => increased “chance” - but not necessarily! => review at each ED

Combine CC’s, assess Commitment -> Pd

Update at subsequent Effective Dates





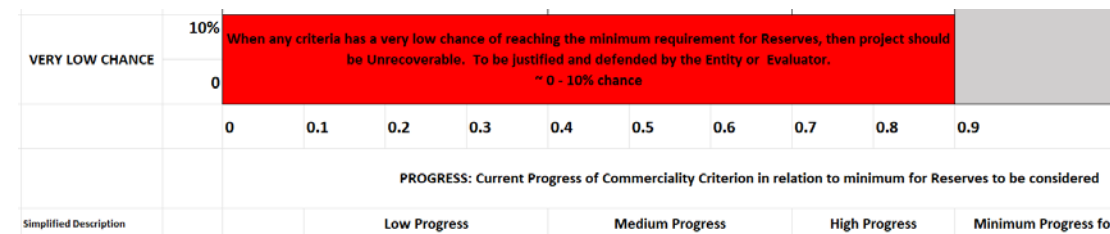
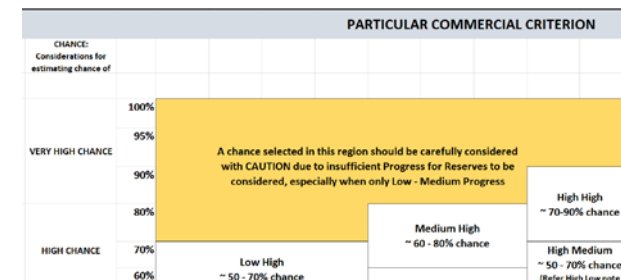
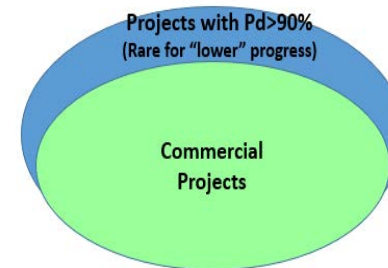
Detailed form of “matrix” for each CC



Detailed example of Progress x Chance matrices for each CC

		PARTICULAR COMMERCIALITY CRITERION										
VERY HIGH CHANCE	100%	<p>A chance selected in this region should be carefully considered with CAUTION due to insufficient Progress for Reserves to be considered, especially when only Low - Medium Progress</p>								Reserves may be considered for this Commerciality Criterion ~ 90 - 100%		
	95%									<p>High High ~ 70-90% chance</p>		
HIGH CHANCE	90%	<p>Not Applicable (since minimum Progress for Reserves met)</p>										
	80%			<p>High Medium ~ 50 - 70% chance (Refer High Low note below ...)</p>								
	70%			<p>High Low ~ 10 - 50% chance (For High Progress to be associated with a Low Chance of maturing, some unforeseen or unforeseeable Technical issue would have arisen)</p>								
MEDIUM CHANCE	60%	<p>Medium High ~ 60 - 80% chance</p>		<p>Medium Medium ~ 40 - 60% chance</p>								
	50%	<p>Low High ~ 50 - 70% chance</p>										
LOW CHANCE	40%	<p>Low Medium ~30 - 50% chance</p>		<p>Medium Low ~ 10 - 40% chance</p>								
	30%	<p>Low Low ~ 10 - 30% chance</p>										
VERY LOW CHANCE	20%	<p>When any criteria has a very low chance of reaching the minimum requirement for Reserves, then project should be Unrecoverable. To be justified and defended by the Entity or Evaluator. ~ 0 - 10% chance</p>										
	10%											
	0	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
<p>PROGRESS: Current Progress of Commerciality Criterion in relation to minimum for Reserves to be considered</p>												
			Low Progress			Medium Progress			High Progress		Minimum Progress for Reserves	Ready for OR Appr'd for Dev

- 1) Pg does not equal “chance of recognising CRs” rather its “chance of geologic discovery”
 - Additional requirements are required to recognise CRs
- 2) A high Pd alone does not confer Reserves status
 - Meet requirements of all CC’s to “reasonable expectation” and Commitment
 - Caution recommended for “low progress”
- 3) Commitment alone is insufficient to confer Reserves status; all CC’s must be met
- 4) If any CC has a very low chance of progressing
 - > then the project also has a very low chance of progressing to commerciality
 - > consider for Unrecoverable





Key Points (2/2)



- 5) Pd is Entity specific for the project
 - eg one entity may have a specific marketing advantage over another entity

- 6) For PRs, Pd will be different depending whether the “full” or “truncated” portion of the full distribution is used.

- 8) Tracking change of CC’s and resulting Pd’s and Project Maturity Sub-classes should assist dealing proactively with commercialisation challenges

- 9) Timeframe of any future development should be considered in any assessment
 - Eg PRMS is silent in relation to CRs, however delays may indicate contingencies are absolute -> Unrecoverable



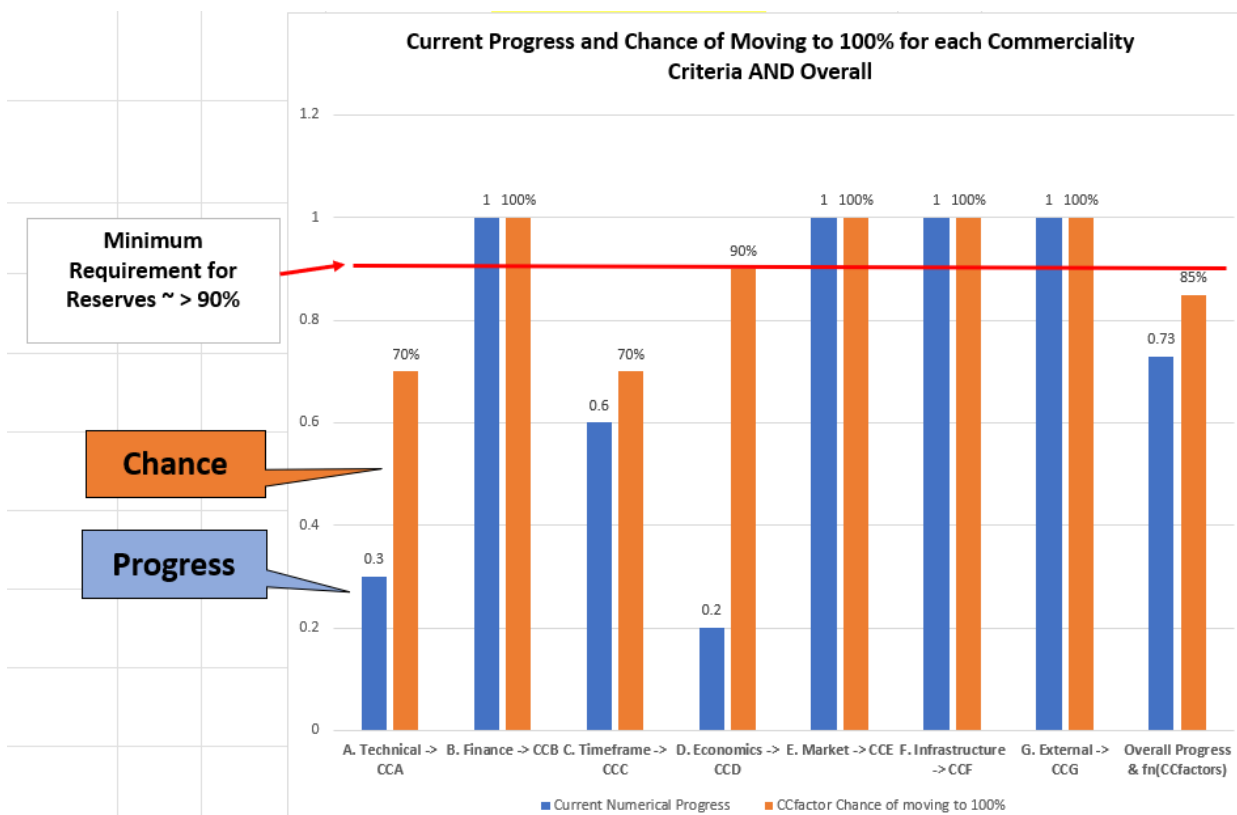
Example A: “No” emissions and other issues

Example A: “No” emissions and other issues (1/5)

Results for Example Situation: Simple, immature, gas discovery – Minimal barriers to Commerciality

- Assumes a recent, immature, smallish discovery in an existing petroleum producing area.
- Regarding Technical, the recovery technology aspect of “Technical”, is Established for the Project, and in common use in the area.
- No issues expected as the appraisal, concept select etc. routine.
- Finance, Market, Infrastructure, External have no issues and are "Ready for Approved for Development", so have a CCfactor of 100%.

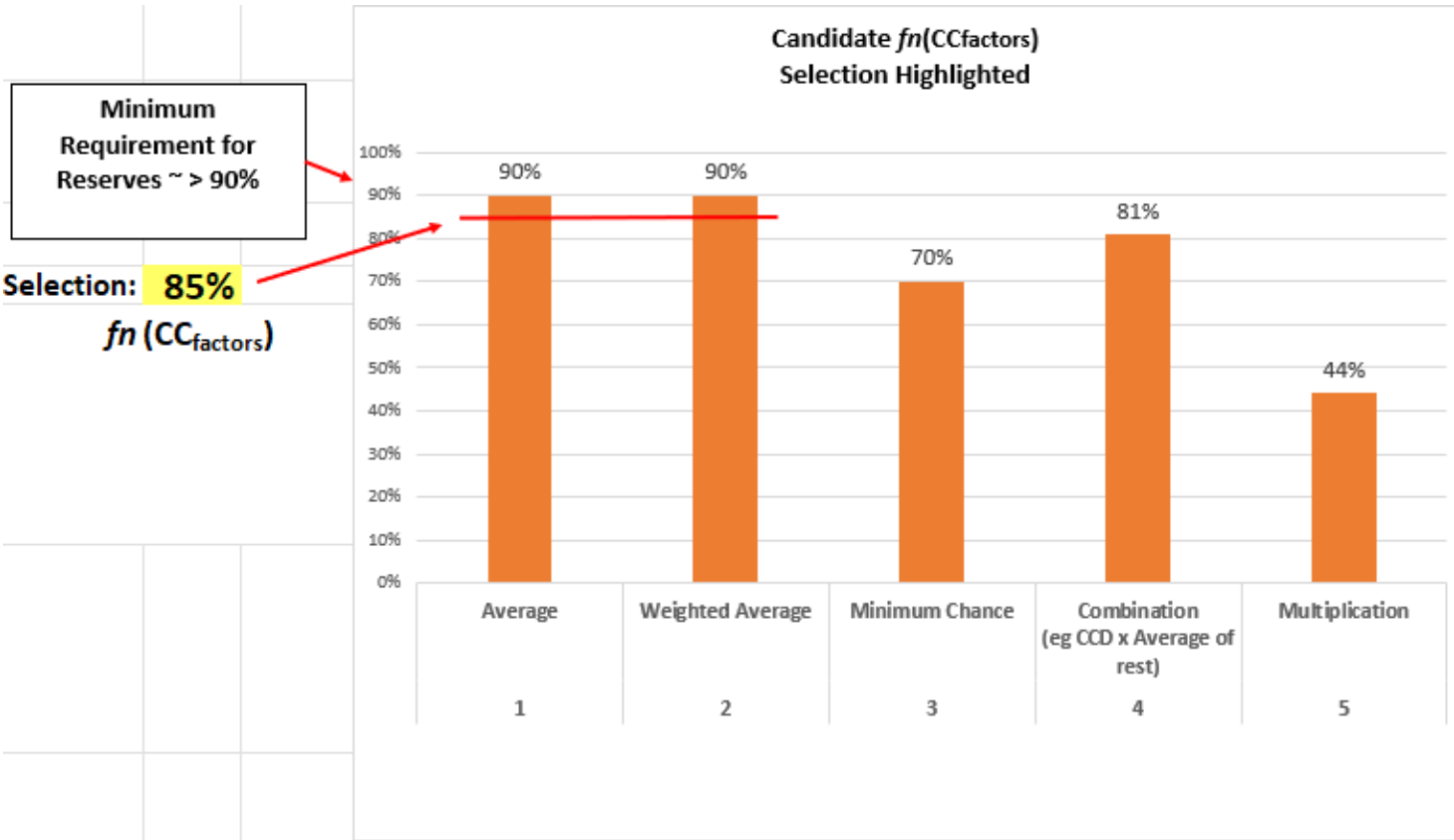
Example A: “No” emissions and other issues (2/5)



From Progress x Chance Matrices for each Commerciality Criterion - see to right for selections ...

	PRMS 2018 2.1.2 Commerciality Criteria requirements -> CC _{factors}	Current Qualitative Progress	Current Numerical Progress	CC _{factor} Chance of moving to 100%	Weighting	Comment
C o m m e r c i a l i t y C r i t e r i a	A. Technical -> CCA	Low Progress	0.3	70%	1	
	B. Finance -> CCB	Ready for OR Appr'd for Dev	1	100%	1	
	C. Timeframe -> CCC	Medium Progress	0.6	70%	1	
	D. Economics -> CCD	Low Progress	0.2	90%	1	
	E. Market -> CCE	Ready for OR Appr'd for Dev	1	100%	1	
	F. Infrastructure -> CCF	Ready for OR Appr'd for Dev	1	100%	1	
	G. External -> CCG	Ready for OR Appr'd for Dev	1	100%	1	
	Overall Progress & fn(CC_{factors})	High Progress	0.73	85%		
			(Wt. Average)	(Refer graph for selection)		

Example A: “No” emissions and other issues (3/5)



Combining Approach (ie approach for combining all $CC_{factors}$ for the Project)		Candidate $fn(CC_{factors})$	*Appropriateness of Approach Highest (5) to Lowest (1)
1	Average	90%	4
2	Weighted Average	90%	5
3	Minimum Chance	70%	2
4	Combination (eg CCD x Average of rest)	81%	3
5	Multiplication	44%	1

Example A: “No” emissions and other issues (4/5)

Combining “CCfactor” approaches – rank them for the situation

- i. Generally, if there is no significant ability for one criterion to dominate Pd, then an “Average” (I.e. Approach (1)) could suffice.
- ii. If there is strong dependency or “ability for one (such as economics) to influence the rest” a “Weighted Average” (2) Approach may be more appropriate.
- iii. If there is one criterion that is a “showstopper” (such as regulatory approval, or market) and the others are similar and relatively high, the Minimum Chance Approach (3) is recommended.
- iv. If per (iii), but others are relatively lower, a Combination Approach (4) would suffice.
- v. If criteria are “independent” then the Multiplication Approach (5) may be appropriate (though rare).

Example A: “No” emissions and other issues (5/5)

PROJECT DESCRIPTION		Example Situation: Simple Immature Discovery	
<p>Assumes a recent, immature, smallish discovery in an existing petroleum producing area. Regarding Technical, the recovery technology is Established for the Project, and in common use in the area. No issues expected as the appraisal, concept select etc routine. Finance, Market, Infrastructure, External have no issues and are "Ready for Approved for Development" so Progress =1 for them.</p>			
RESULTS SUMMARY			
Effective Date		14/03/2023	Notes
Number of Commerciality Criteria (CC) that: (Note CC_{factor} = Chance of moving to 100%)	$CC_{factor} \sim < 10\%$	0	If > 1, Project is a candidate for "Unrecoverable"
	Less than Min Progress for Reserves and $CC_{factor} \sim < 90\%$	0	Project CC's that are NOT on track to achieve Reserves
	Less than Min Progress for Reserves and $CC_{factor} \sim \geq 90\%$	3	Project CC's that are on track to achieve Reserves
	Exceed Minimum Progress for Reserves	4	Must = 7 for Reserves to be considered, and
Current Overall Progress (Qual, Num)	High Progress	0.73	> ~0.9 for Reserves, and
$fn(CC_{factors})$ (%)		85%	> ~90% for Reserves, and
Entity commitment to project (Y/N), if Y then Commitment factor is "1", if "N", then number <1 at discretion of Entity	N	0.9	Y required for Reserves, otherwise <1
$Pd = fn(CC_{factors}) \times \text{Commitment factor}$		77%	Notes:
Class	Contingent Resources		Likely to mature to reserves though is Dev Unclearified at this time while development options are being assessed.
Sub-class	Development Unclearified		



Example B: High CO₂ and Fraccing in area not encountered before



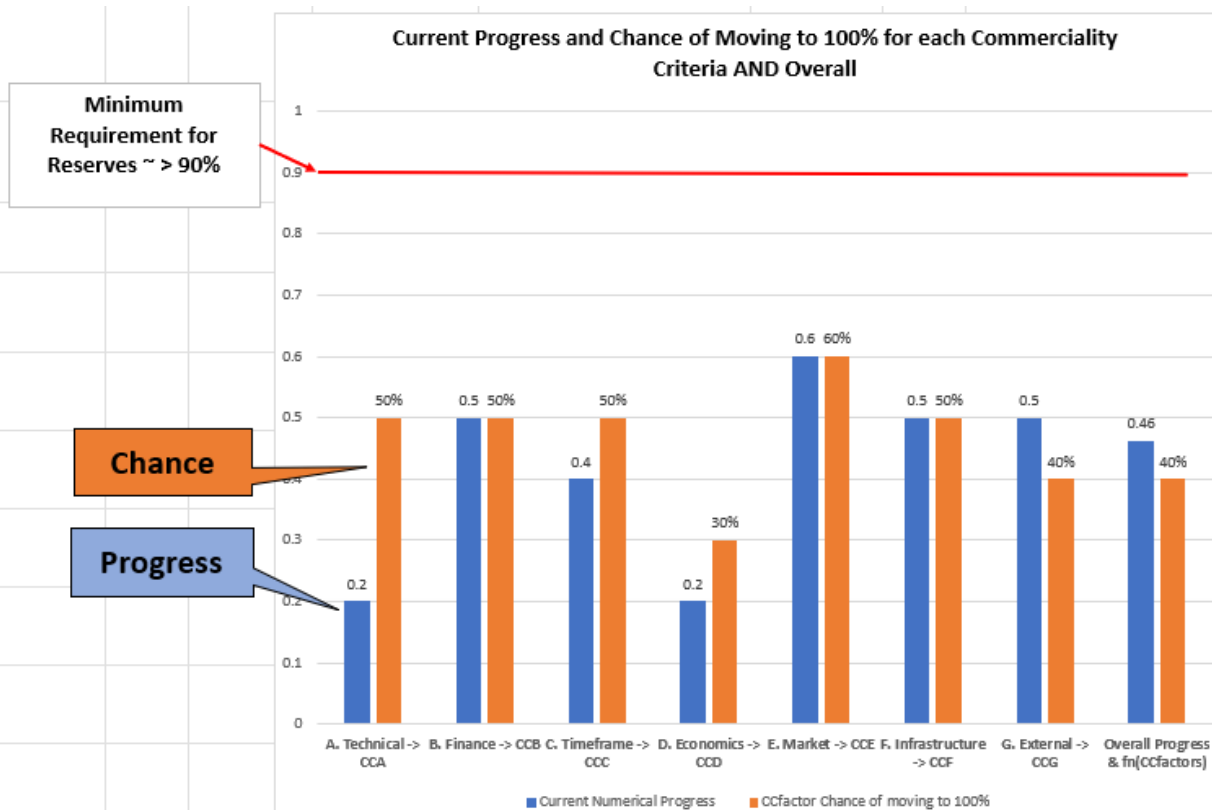
Example B: High CO2 and Fracking (1/4)



Results for Example Situation: Immature, gas discovery with high CO2 and fracking required

- Assumes a recent, immature, smallish discovery in an existing petroleum producing area.
- However, it has high COs and need for fracking both of which have not been encountered before in the area and by the Entity.
- The recovery technology has some requirements of TUD.
- No issues expected with appraisal, however other issues for concept select etc.
- Whilst there is a Market for the gas, Finance, disposal of the high CO2, implications for Infrastructure and External factors have challenges that may not be overcome.
- The economics and ability of the project to achieve acceptable investment and operating criteria are challenged.
- The Entity and some other JV parties have commitment reservations.
- None the less, the Entity and JV have decided to progress the project at this time and will review progress in 12 months.

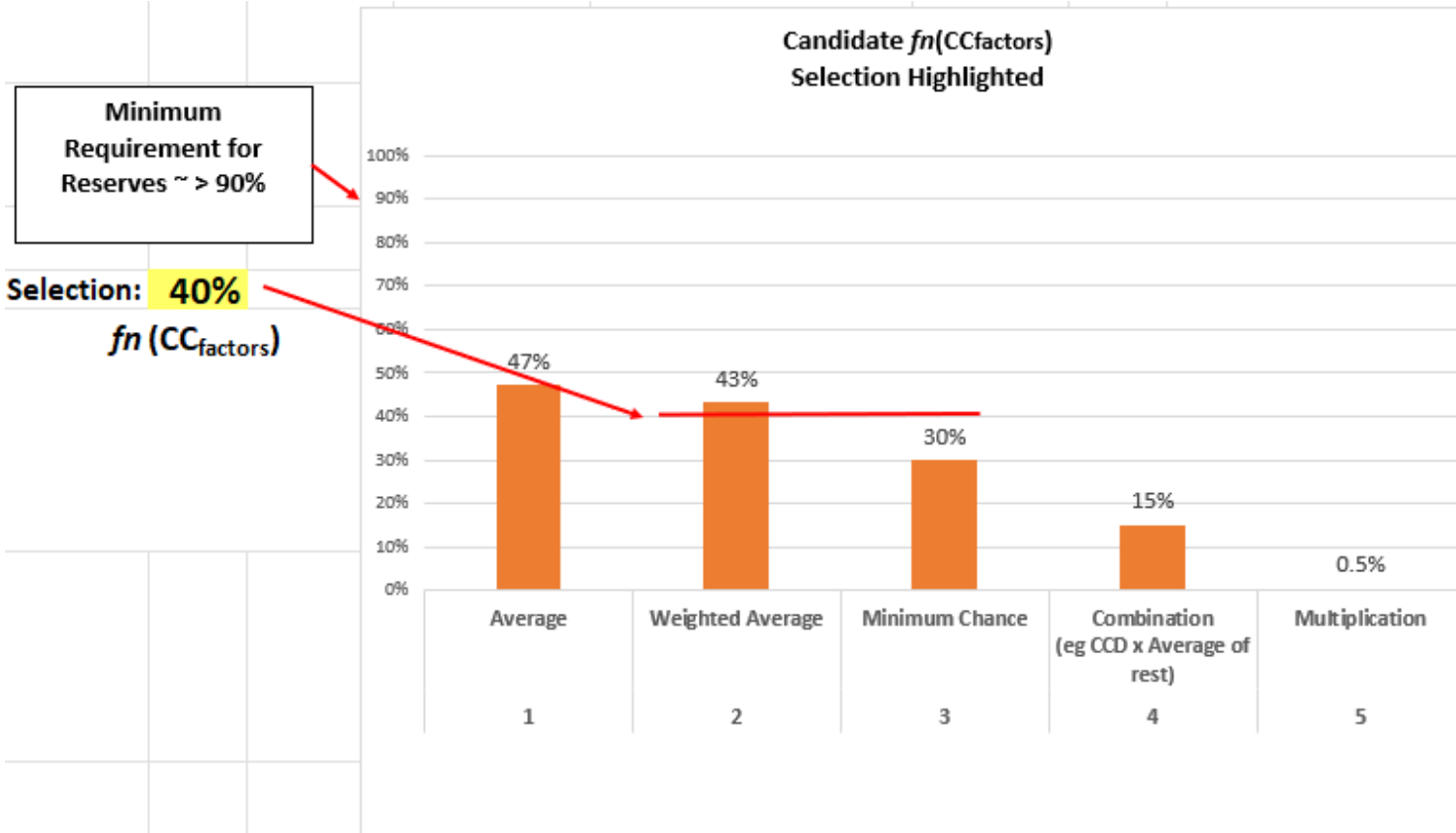
Example B: High CO2 and Fraccing (2/4)



From Progress x Chance Matrices for each Commerciality Criterion - see to right for selections ...

	PRMS 2018 2.1.2 Commerciality Criteria requirements -> CC _{factors}	Current Qualitative Progress	Current Numerical Progress	CC _{factor} Chance of moving to 100%	Weighting	Comment
C o m m e r c i a l i t y C r i t e r i a	A. Technical -> CCA	Low Progress	0.2	50%	1	
	B. Finance -> CCB	Medium Progress	0.5	50%	1	
	C. Timeframe -> CCC	Medium Progress	0.4	50%	1	
	D. Economics -> CCD	Low Progress	0.2	30%	1	
	E. Market -> CCE	Medium Progress	0.6	60%	1	
	F. Infrastructure -> CCF	Medium Progress	0.5	50%	1	
	G. External -> CCG	Medium Progress	0.5	40%	10	
	Overall Progress & fn(CC_{factors})	Medium Progress	0.46	40%		
			(Wt. Average)	(Refer graph for selection)		

Example B: High CO2 and Fraccking (3/4)



Combining Approach (ie approach for combining all $CC_{factors}$ for the Project)		Candidate $fn(CC_{factors})$	*Appropriateness of Approach Highest (5) to Lowest (1)
1	Average	47%	3
2	Weighted Average	43%	5
3	Minimum Chance	30%	4
4	Combination (eg CCD x Average of rest)	15%	2
5	Multiplication	0.5%	1

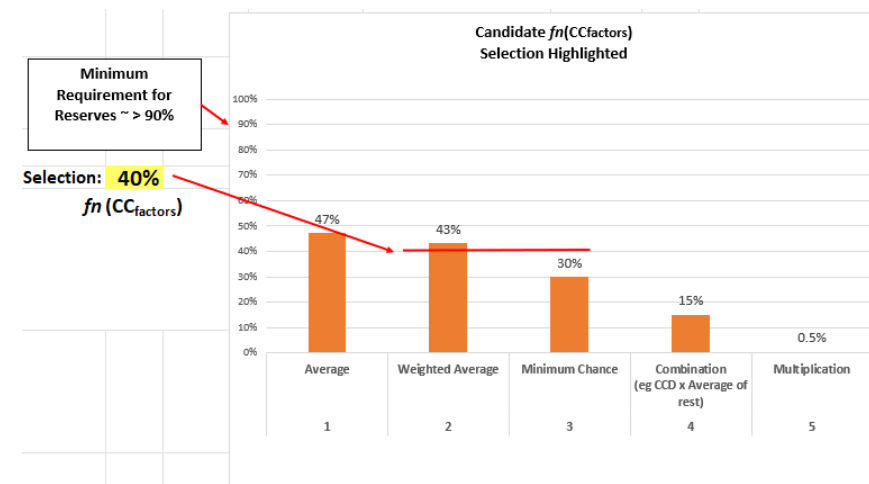
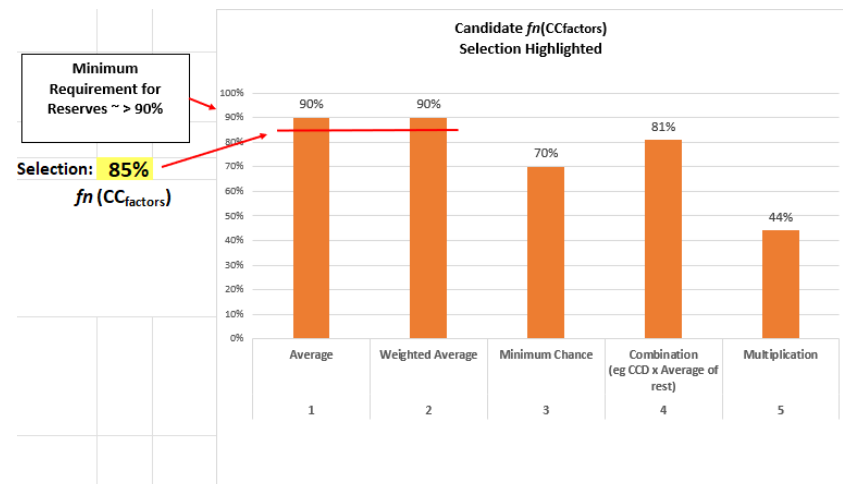
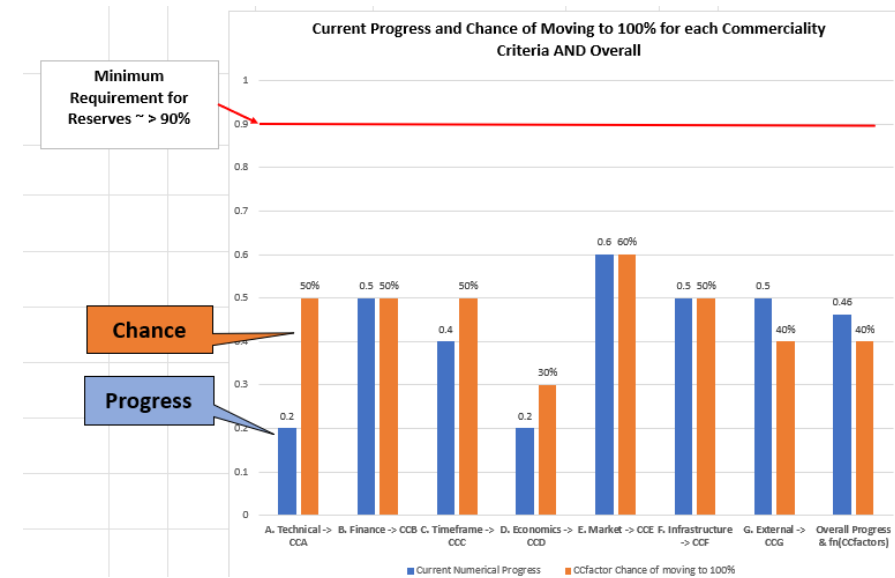
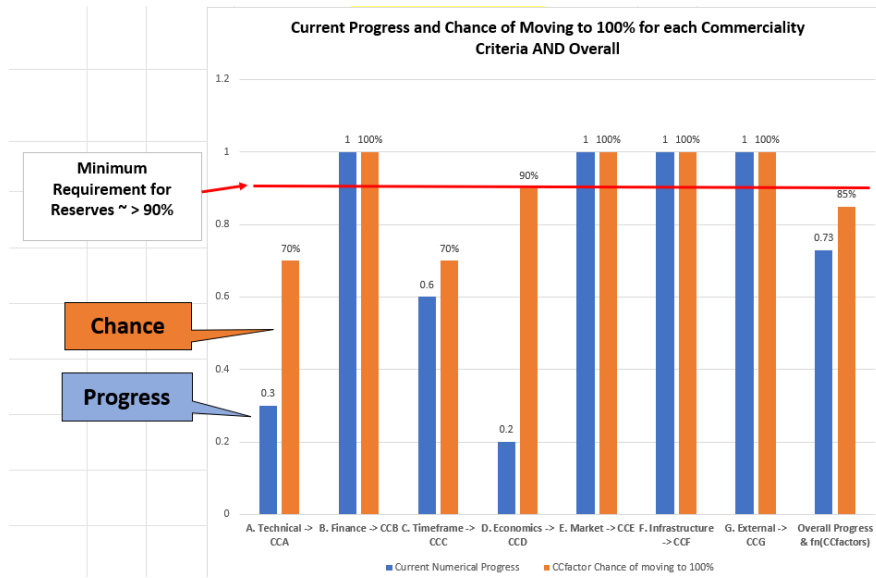
Example B: High CO2 and Fraccing (4/4)

PROJECT DESCRIPTION		Example Situation: Immature Discovery with high CO2 and need for fraccing		
<p>Assumes a recent, immature, smallish discovery in an existing petroleum producing area. However it has high COs and need for fraccing both of which have not been encountered before in the area and by the Entity. The recovery technology has some requirements of TUD. No issues expected as the appraisal, however other issues for concept select etc. Whilst there is a market for the gas, securing Finance, disposal of the high CO2, implications for Infrastructure and External factors have challenges that may not be overcome. The economics and ability of the project to achieve acceptable investment and operating criteria are challenged. The Entity and some other JV parties have commitment reservations. The Entity and JV have decided to progress the project at this time and will review progress in 12 months.</p>				
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	Less than Min Progress for Reserves and $CC_{factor} \sim \geq 90\%$	0	Project CC's that are on track to achieve Reserves	
	Exceed Minimum Progress for Reserves	0	Must = 7 for Reserves to be considered, and	
Current Overall Progress (Qual, Num)		Medium Progress	0.46	> ~0.9 for Reserves, and
$fn(CC_{factors})$ (%)			40%	> ~90% for Reserves, and
Entity commitment to project (Y/N), if Y then Commitment factor is "1", if "N", then number <1 at discretion of Entity		N	0.75	Y required for Reserves, otherwise <1
$Pd = fn(CC_{factors}) \times$ Commitment factor		30%		Notes:
Class		Contingent Resources		Unlikely to mature to reserves and is Dev Unclarified at this time while the impact of emissions issues and fraccing are examined.
Sub-class		Development Unclarified		



Example A v B

Example A v B (1/2)



Example A v B (2/2)

PROJECT DESCRIPTION		Example Situation: Simple Immature Discovery	
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Entity commitment to project (Y/N), if Y then Commitment factor is "1", if "N", then number <1 at discretion of Entity	N	0.9	Y required for Reserves, otherwise <1
$Pd = fn(CC_{factors}) \times \text{Commitment factor}$	77%		Notes:
Class	Contingent Resources		Likely to mature to reserves though is Dev Unclarified at this time while development options are being assessed.
Sub-class	Development Unclarified		

PROJECT DESCRIPTION		Example Situation: Immature Discovery with high CO2 and need for fracing	
Assumes a recent, immature, smallish discovery in an existing petroleum producing area. However it has high COs and need for fracing both of which have not been encountered before in the area and by the Entity. The recovery technology has some requirements of TUD. No issues expected as the appraisal, however other issues for concept select etc. Whilst there is a market for the gas, securing Finance, disposal of the high CO2, implications for Infrastructure and External factors have challenges that may not be overcome. The economics and ability of the project to achieve acceptable investment and operating criteria are challenged. The Entity and some other JV parties have commitment reservations. The Entity and JV have decided to progress the project at this time and will review progress in 12 months.			
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