

APOGCE Panel Session

**PRMS and Professional
Qualification Issues**

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Today's Discussion

- PRMS and Coal Seam Gas (CSG)
- Consequences for reserves bookings and the Australian Gas Market
- Thoughts on professional qualifications for reserves estimators and auditors

Declaration

- *The following represents my opinion, for which I accept full responsibility*
- *You can agree or disagree, that is your informed choice*
- *If you make a choice, any consequences are also entirely your own responsibility*

What is the SPE PRMS?

- The Society of Petroleum Engineers Petroleum Resource Management System (SPE PRMS) is the oil and gas industry's global standard for resource classification and reporting
- The PRMS was approved by the board of the Society of Petroleum Engineers in March 2007 and was endorsed by the Boards of the America Association of Petroleum Geologists, the Society of Petroleum Evaluation Engineers and the World Petroleum Council.
- It is a system of technical standards which have five major principles as follows:

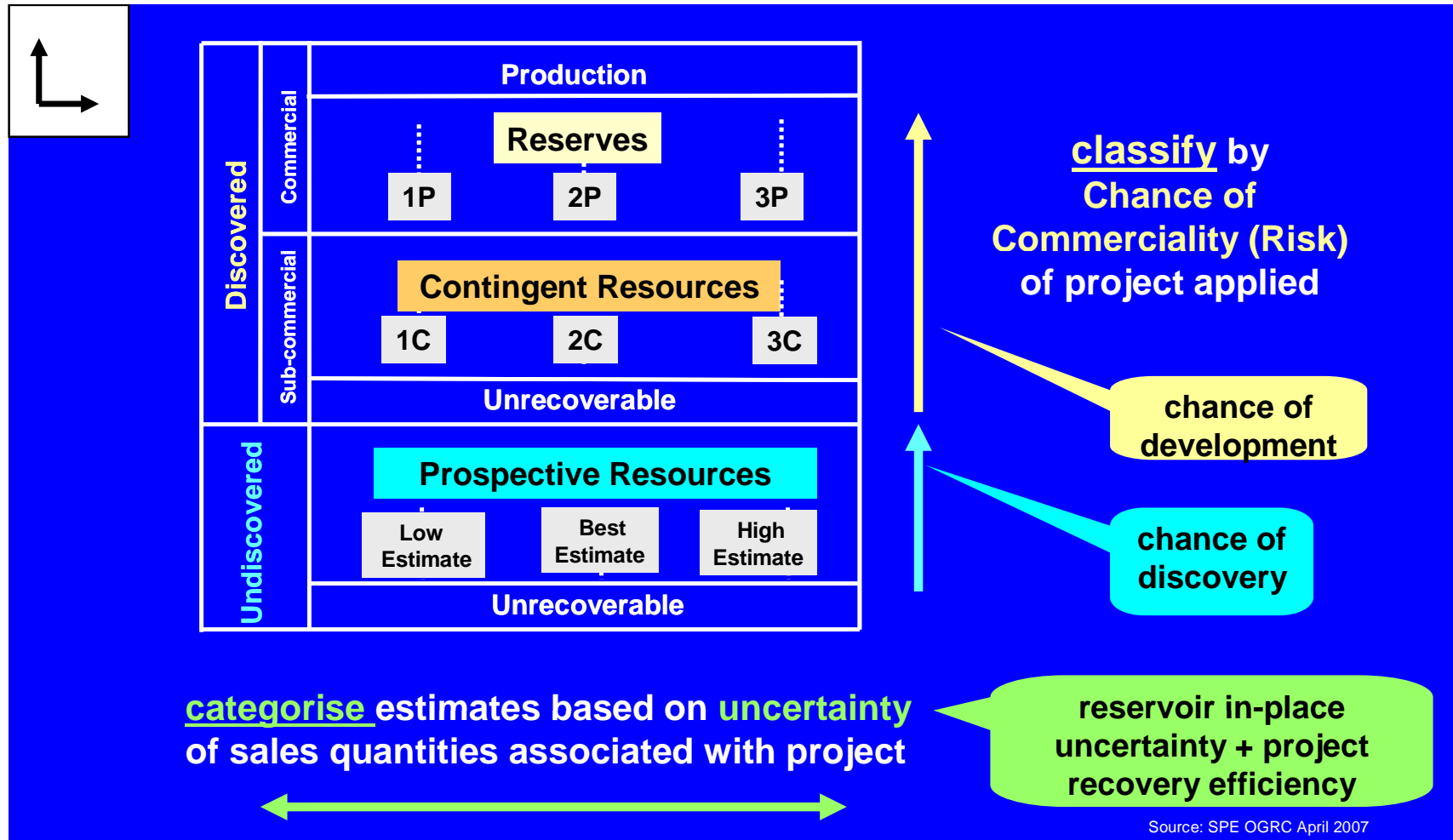


1. The PRMS uses a resources classification framework that is applicable to all naturally occurring conventional and unconventional petroleum
2. The PRMS is “Project–Based”
3. Resource classification is based on project chance of commerciality
4. Uncertainty in recovery of the defined project is evaluated separately from commercialisation risks
5. Tests of commerciality can be based on evaluator's best estimate forecast of future economic conditions

What is a Project in the SPE PRMS?

- Activity or activities that recover petroleum when applied to reservoir or reservoirs
- A project generates petroleum production and cash flow schedules
- The sum of the project future production and cash flow schedules when taken to economic or contractual limits defines the resource recovery

PRMS Separate Classification & Categorisation



Source: PRMS 2007

PRMS Reserves Guidelines

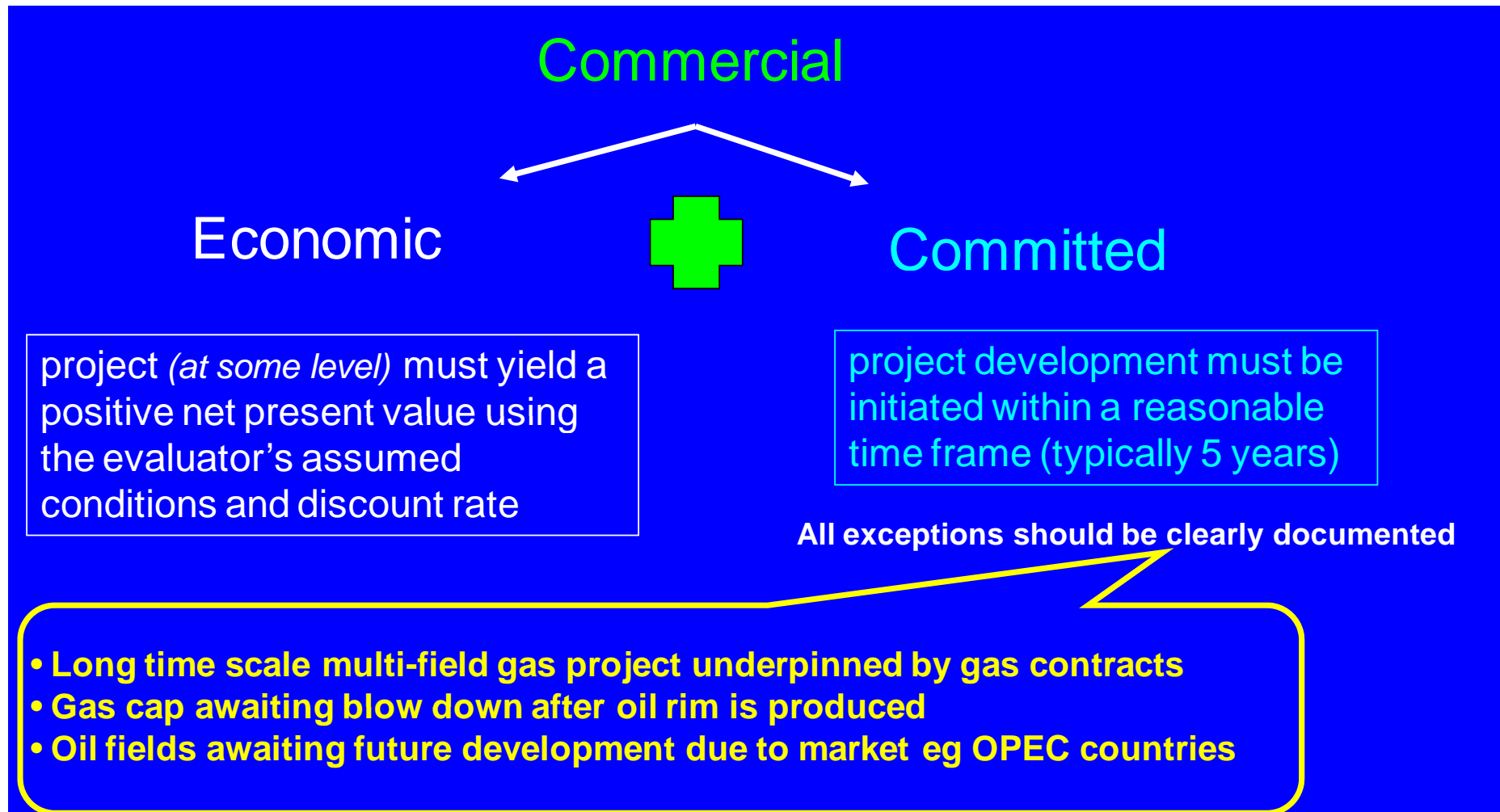
To be included in the Reserves class:

- a project must be sufficiently defined to establish its commercial viability.
 - there must be a reasonable expectation that all required internal and external approvals will be forthcoming
- And
- there is evidence of firm intention to proceed with development within a reasonable time frame.

Reasonable Expectation: Indicates a high degree of confidence that the project will proceed with commercial development

Source: PRMS 2007

PRMS Commercial Criteria for Reserves Booking



Source: PRMS 2007 and RISC analysis

PRMS Reserves & Resources: Risk vs. Uncertainty

- Under the PRMS, risk and uncertainty are treated separately
- Risk applies to the **commercial maturity** of a project hence:

Exploration (Prospective Resource):

=> Chance of Discovery (risk of dry hole)

Discovery (Contingent Resource):

=> Chance of Development (risk of non-commercial discovery)

- Uncertainty is considered in **recovery** for a given project hence:

High Confidence

=> Proved Reserves (1P or P90)

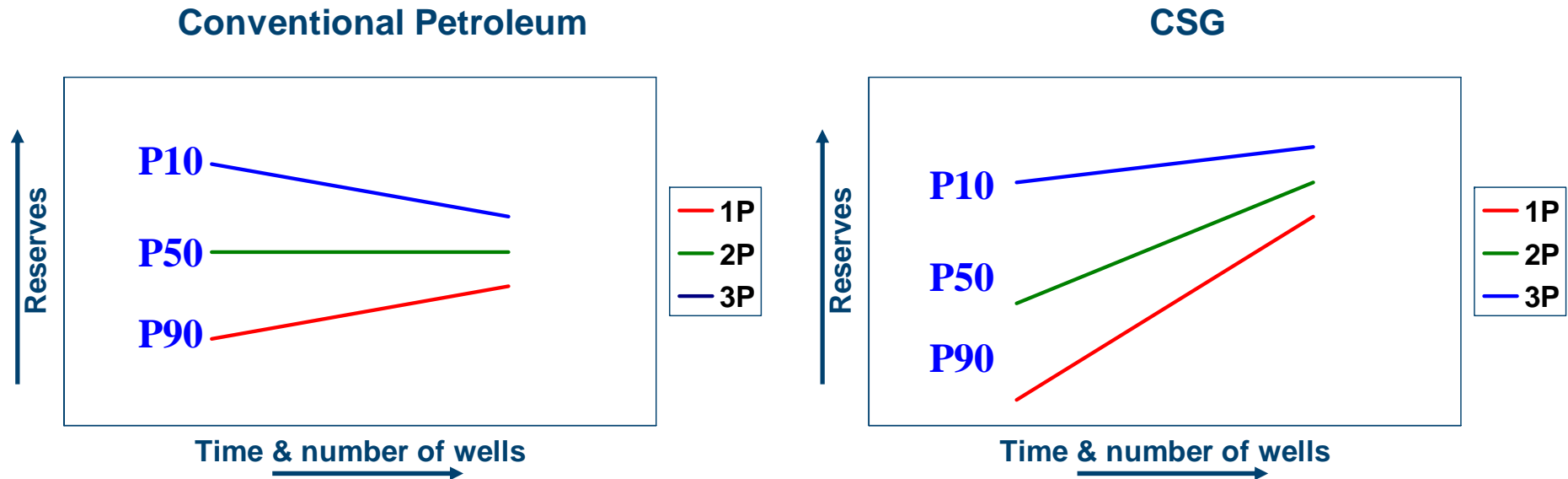
Best Estimate

=> Proved+Probable Reserves (2P or P50)

Low Confidence

=> Proved+Probable+Possible Reserves (3P or P10)

CSG Reserves Growth Paradox



- Trends towards 2P
- Makes sense if 2P is roughly a P50 or 'equally likely' value

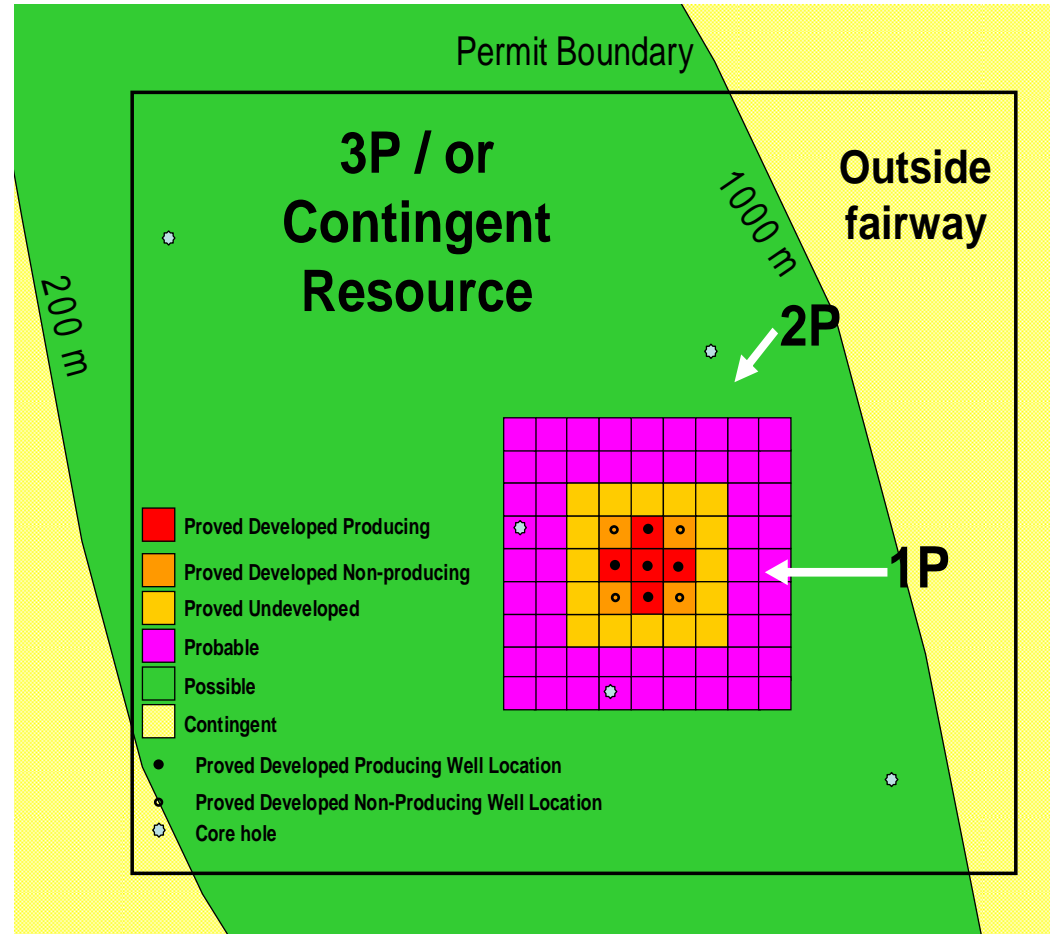
- Trends towards 3P value which may also experience growth in immature areas
- Inconsistent with "equally likely" principle
- Why? – the 2P as stated is not "equally likely" and the 3P is not low probability outcome!!!

Why is CSG 3P (so far) not a low probability?

- Areal extent of coals generally much greater than permit area
=> greater potential for resource growth
- Conservative N American “well spacing” rules (SEC driven) and mining conventions
 - => significant understatement of higher confidence resources
- “Low” probability 3P may in fact include “higher” probability resources not recognised due to certification process used
- Full life of permit vision not disclosed
- Questionable application of SPE PRMS – even by independent reserves certifiers!!!

How are CSG Reserves booked now?

- Deterministic approach based on “mining” conventions and “well spacing” rules
- Legacy from old US SEC and N. American regulations that may not be relevant elsewhere
- Proved undeveloped reserves (PUD): within 1-2 drainage radii from productive well
- Probable: 2 drainage radii away from Proved
- 3P: 2 drainage radii away from Probable – or greater if data allows
- For typical offset well spacing rules, once 1/9 of the acreage has been drilled up on an evenly spaced, all of the acreage will be deemed proved!!

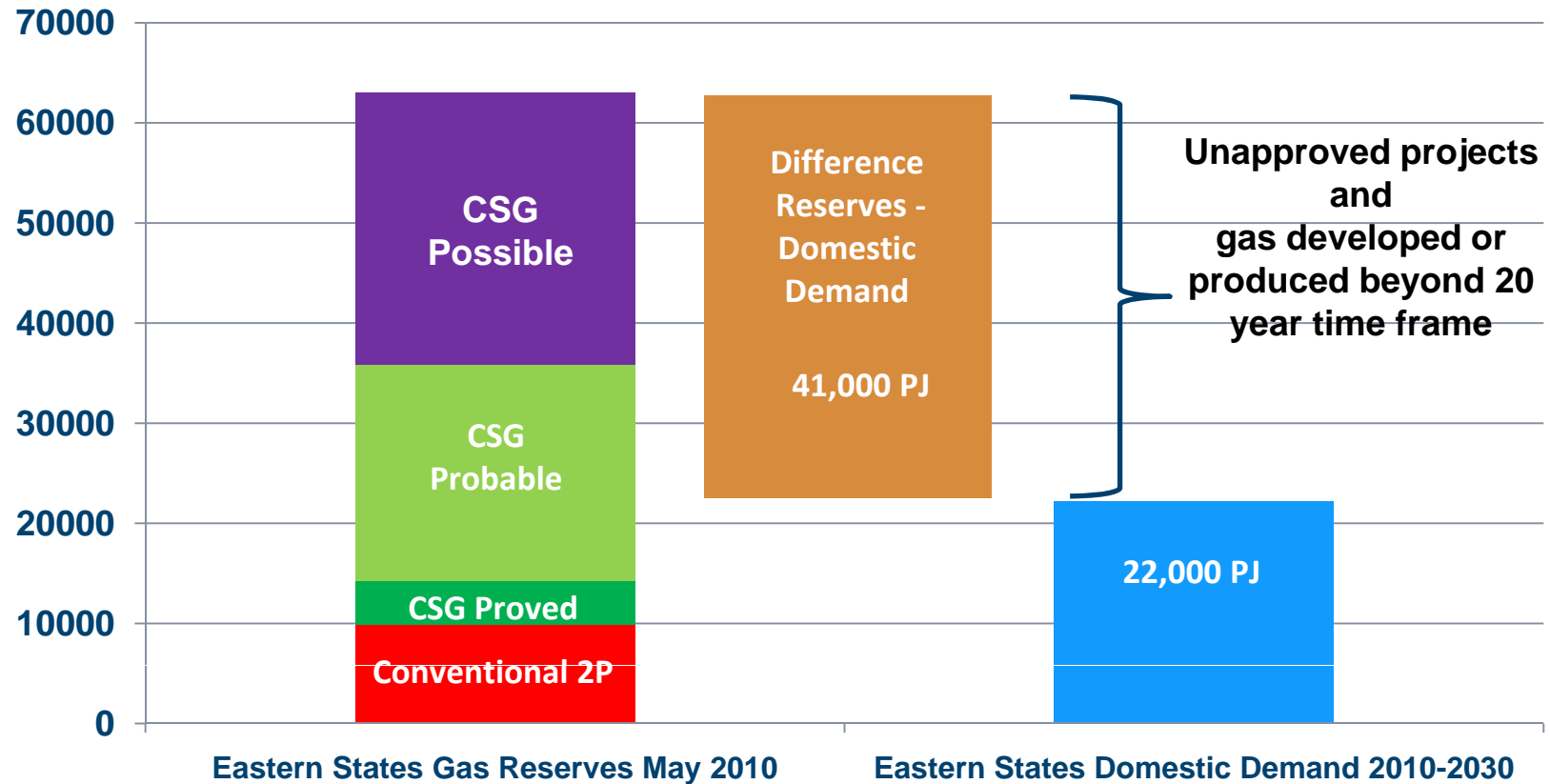


Comments on Current Practice

- May be no direct link between project and reserve
 - Often may have no link between reality of project scope in terms of well numbers / areas to be developed and reserve range quoted
 - can be 1-2 orders of magnitude difference between 1P and 3P reserves for a given property
 - Vastly different scale of development between 1P and 3P e.g. 10's to 1000's of wells
 - Vastly different market implied ie bcf's/low Tcf's to tens of Tcf's
 - Vastly different scale of investment between 1P and 3P e.g. \$10's of millions to \$1000's of millions
- Current approach confuses the risk of project being commercial and the uncertainty surrounding project recovery
- Does not provide realistic assessment of project risks and uncertainties
- There is an alternative: refer SPE 117124 Application of PRMS to Coal Seam Gas

CSG Reserve Bookings and the Eastern Australian Gas Market

Gas Reserves (PJ)



Source: Company websites, ABARE 2010 and RISC Analysis

Eastern States Gas Reserve Statistics

- **In aggregate, reserves bookings are 2.8 times Eastern States 20 year gas demand**
 - Surplus of 41,000 PJ over 20 year demand
 - PRMS has “reasonable development timeframe” guideline (5-year recommended)
 - If not 5 years, how long is reasonable – 20, 50, why not 100 years?
- **Current CSG unproved reserves/production ratios (R/P) are out of line with norms**
 - CSG 1P R/P 25 years
 - CSG 2P R/P 149 years
 - CSG 3P R/P 305 years
 - Conventional R/P 2P 13 years
 - Note that no CSG-LNG projects have yet achieved FID (remember Shell and Gorgon?)
- **CSG measure of uncertainty ratios are out of line with norms**
 - CSG 2P/1P 6.0
 - CSG 3P/1P 12.3
 - Typical conventional LNG project 2P/1P ratio at sanction would be 1.25 - 1.5
- **Conclusion? - 1P CSG quantities understated and/or some of the reserves are in fact contingent resources based on project maturity criteria**

SPE - Qualifications for Reserves Estimators and Auditors

Revised SPE standards for Auditors & Estimators

- PE, PG or physical science degree or professionally registered
- Estimator - 3 yrs professional experience + 1 yr in estimating
- Auditor - 10 yrs prof. experience + 5 years in responsible charge

AND

- Appropriate competence to assess the properties in question (if not, should decline the assignment)
- Obligated to have ongoing training requirements

Source: SPE Reserves Audit Guidelines 2007

Comparative Standards – Qualifications for Reserves Estimators and Auditors

Qualifications for Reserves Estimator & Auditors

Entity	Role	Qualifications		Training	Min Experience (yrs)
		Relevant degree	Licenced		
SPE	Estimator	either	or	not specified	3 (1 in estimating)
	Auditor	either	or	not specified	10 (5 in estimating)
SPEE	Member	Y	Y	not specified	10 in evaluation
ASX	Estimator	Y	not specified	not specified	5
	Auditor	not specified	not specified	not specified	Not specified
Canada	Estimator	Y	Y	not specified	3 (1 in estimating)
	Auditor	Y	Y	not specified	10 (5 in estimating)
UK	Competent Person	Y	Y	not specified	5 in estimating
SEC	Estimator	not specified	not specified	not specified	Not specified
	Auditor	not specified	not specified	not specified	Not specified
Co A	Estimator	Y	not specified	not specified	5 (2 in estimating)
	Auditor	Y	not specified	not specified	10 (5 in estimating)
Co B	Estimator	Y	not specified	not specified	3 (1 in estimating)
	Auditor	Y	not specified	not specified	10 (5 in estimating)
Co C	Estimator	Y	not specified	Yes	3 (1 in estimating)
	Auditor	Y	not specified	Yes	Usually more than 20
Co D	Estimator	Y	not specified	Yes	Not specified
	Auditor	Y	not specified	Yes	Usually more than 20

Source: RISC Analysis

Qualifications for Reserves Estimators and Auditors?

Suggested Minimum Standards ?

- PE, PG or physical science degree or professionally registered
- Estimator - **5** yrs professional experience + **3** yrs in estimating
- Auditor - 10 yrs prof. experience + 5 years in responsible charge
- **Successful completion of training and accreditation**

AND

- Appropriate competence to assess the properties in question (if not, should decline the assignment)
- Obligated to have ongoing training requirements
- Freedom to deliver bad news as well as good => organisation considerations



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