



Coalbed Methane Resources of Mongolia

Goals, Scope, Classification

Ulaanbaatar, Mongolia



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Purpose of Course

- Consider what overall goals are for any resource assessment
- Review the Scope and Goals of THIS resource assessment
- Review resource classifications and concept of analogue
- Review resource estimate techniques
- ✤ Hydrogeology
 - Concepts for CBM
 - ✤ Water production
 - ✤ Mongolian examples
- Review of Methods and Results of THIS resource assessment
- Next steps: Recommendations



Coalbed Methane Resources of Mongolia Workshop

		total time						
from	То	(hr:min)	Торіс	Presenter				
9:00	9:15	0:15	Opening Remarks					
9:15	10:45	1:30	BACKGROUND	Tim A Moore				
9:15	9:30	0:15	Goals of Any Resource Assessment					
9:30	9:45	0:15	Scope and Goals of This Resource Assessment					
9:45	10:15	0:30	Resource Classification (OGIP vs Prospective Resources) and Concept of an Analogue					
10:15	10:45	0:30	Resource Estimation Techniques Review					
10:45	11:00	0:15	Coffee Break					
11:00	13:00	2:00	HYDROGEOLOGY	Ryan D Morris				
11:00	11:30	0:30	- Hydrogeology concepts for CBM					
11:30	12:00	0:30	Case Study: Australia					
12:00	12:30	0:30	- What Happens With Water During Production					
12:30	13:00	0:30	- Mongolian Examples					
13:00	14:00	1:00	LUNCH					
14:00	17:00	3:00	REVIEW OF METHODS AND RESULTS OF RESOURCE REPORT	TAM				
14:00	14:40	0:40	- Delineation of Areas for Assessment and Selection Criteria					
14:40	15:10	0:30	- Data Types and Limitations					
15:10	15:30	0:20	- Evaluation & Input Parameters					
15:30	15:45	0:15	Coffee Break					
15:45	16:30	0:45	- Results of Assessment					
16:30	16:50	0:20	NEXT STEPS, RECOMMENDATIONS & DISCUSSION	TAM, All				
16:50	17:00	0:10	Closing Remarks					

NOTE: Times are in UB, Mongolian Times

Goals of a Resource Assessment

Q: What are the goals for a resource assessment?

A: Depends on what or who you are.

Exploration Companies:

- > Identify the resource
- > Develop the potential to a low level (original gas in-place [OGIP], possibly Prospective Resources)
- > Little to no drilling
- Sell permit based on <u>potential</u> (i.e. undiscovered resources)

Production Companies (small):

- Certification of resources AND reserves
- Initial Public Offer (IPO) to raise capital for further development
- Production leading to farm-outs/merger/sale

Production Companies (private/large):

- > Assessment of resource for internal economic assessments
- > Move to working pilots (proof of concept) and production



Goals of a Resource Assessment (cont'd)





Goals of THIS Resource Assessment



SCOPE:

Assessment of CBM Resources for all of Mongolia

GOALS:

90°E 110°E 50°N 50°N 50°N 50°N 60°N 60°N

High-Level Goals

- > Encourage exploration and investment in coalbed methane development in Mongolia
- > The assessment is open to interrogation and revision
- > Data and methodology are transparent, repeatable and public

Practical Goals

- Adopt a workflow system for assessment
- Collect enough data for analogues to be used
- Build local capability so that assessment can be ongoing and so evaluation of private sector resource determinations can be thoroughly evaluated and understood





- Very comprehensive
- Expensive for a complete copy

- Concise
- Some ambiguity
- Easy to access

- Comprehensive
- Free to access
- Updated regularly

(these three systems are compared and contrasted in Moore & Friederich, 2021)





Why are classifications needed & which one to use?

- To give common criteria and terminology
- Make assessments and comparable between projects/permits and companies
- Provide transparency of assessments to potential investors

- Required by governmental regulators
- Required of public companies by some stock exchanges





PETROLEUM RESOURCE MANAGEMENT SYSTEM

Undiscovered Gas (CBM)

Original Gas In-place (OGIP)

Potential gas in potential reservoirs, requires only confirmation of the presence and possible ranges of coal thickness, distribution and 'rank' (does not require gas measurement)

Prospective Resources

Same criteria as OGIP, but removes <u>unrecoverable</u> gas, such as in areas of inaccessibility and makes estimates of ranges of deliverability (i.e. producibility) of the gas (does not require gas measurement)







Analogues are used in CBM resource estimation when there is little to no initial data on the reservoirs – i.e. during initial exploration and resource assessments.

"Analogs are widely used in resources estimation, particularly in the exploration and early development stages when direct measurement information is limited. The methodology is based on the assumption that the analogous reservoir is comparable to the subject reservoir in regard to reservoir description, fluid properties, and most likely recovery mechanism(s) applied to the project that control the ultimate recovery of petroleum. By selecting appropriate analogs, where performance data of comparable development plans are available, a similar production profile may be forecast. Analogs are frequently applied for aiding in the assessment of economic producibility, production decline characteristics, drainage area, and recovery factor (for primary, secondary, and tertiary methods).' – PRMS (2018)

"Comparison to several analogs, rather than a single analog, often improves the understanding of the range of uncertainty in the estimated recoverable quantities from the subject reservoir." – PRMS (2018)





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Levels of Analogues are:

1. Same basin, same formation, same rank, close proximity (e.g. adjacent permits)



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- 3. Same rank, similar tectonic setting and reservoir character



Resource Estimation Technique







VARIABLE	DISTRIBUTION
Surface Area	Linear/uniform
Coal Thickness	
Density	
Gas Content	
Recovery Factor	



Input of ranges for parameters









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	Prospective	P50	4,841	137 BCM
	Resources (BCF)	P10	8,823	250 BCM



Resource Estimation Technique





Australia Mongolia Extractives Program Phase 2 (AMEP 2) is supported by the Australian Government through the Department of Foreign Affairs and Trade (Australian Aid) and implemented by Adam Smith International.

Adam Smith International



Tim Moore is currently the Managing Director of Cipher Consulting Pty Ltd specializing in advising on coal and coalbed methane exploration. He is also Adjunct Associated Professor at the School of Earth and Atmospheric Sciences, Queensland University of Technology, Brisbane, Australia and a Distinguished Visiting Professor at the School of Resources and Geosciences, China University of Mining and Technology, Xuzhou, China. Tim is also on the Editorial Boards for the International Journal of Coal Geology and the Indonesian Journal on Geoscience. He has over 260 published papers, reports and abstracts. Over the last 40 years, Tim has worked in production companies, academia and government positions in many parts of the world. (tmoore@ciphercoal.com)

If you want to know more go to the Cipher website & Blog: <u>https://www.ciphercoal.com</u>







Got Questions?

Please visit our website for more information about activities or contact Oyunbileg Purev, Partnership Manager at oyunbileg@amep.mn.

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