



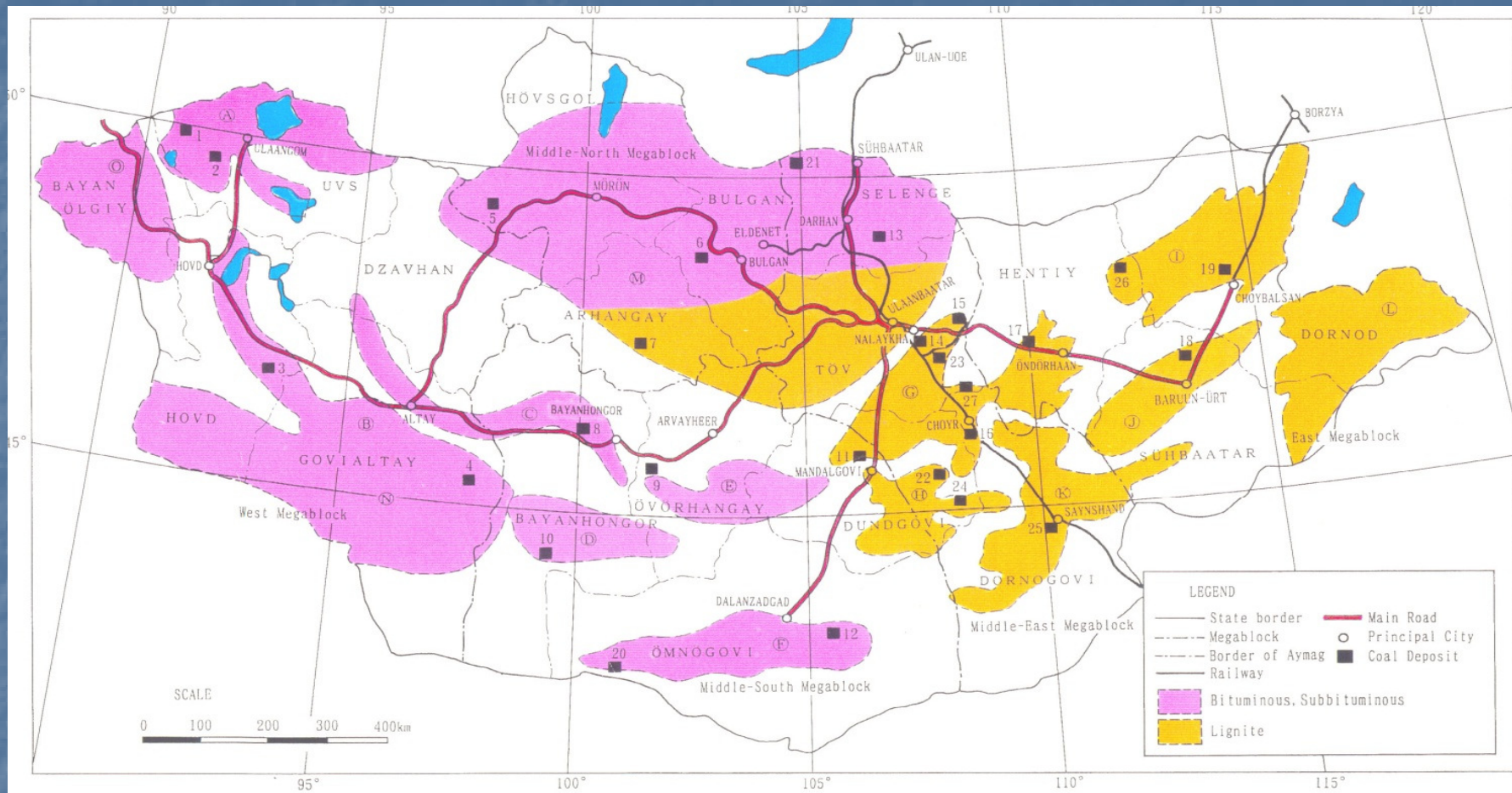
Coal Mining Methane Abatement Seminar and
Coal sub-committee meeting on 4-6 September,
2012 in Sydney, Australia

**Mongolian updates on CMM development .
to coal
sub committee meeting in Sydney, 4-5
September, 2012**

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Primary coal deposits in Mongolia



Names of basins

- (A): Kharkhiraa (C)
- (B): Mongol Altay (C)
- (C): South Khangay (P)
- (D): Big Bogdyn (J)
- (E): Ongiyngol (J)
- (F): South Govi (P)
- (G): Choir-Niarga (K)
- (H): Middle Govi (K)

- (I): Choybalsan (K)
- (J): Sukhe Bator (K)
- (K): East Govi (K)
- (L): Tamsak (K)
- (M): Orkhon-Selenge (J)
- (N): Altay-Chandmani (C)
- (O): Bayan-Ulegei (C)

Names of deposits

- 1 Nuursthotgor Deposit
- 2 Khartarvagatai Deposit
- 3 Khusheet Deposit
- 4 Zeegt Deposit
- 5 Mogoingol Deposit
- 6 Saihan-Ovoo Deposit
- 7 Bayantsagaan Deposit
- 8 Uburchuluut Deposit
- 9 Bayanteeg Deposit
- 10 Shinjinst Deposit

- 11 Tevshingovi Deposit
- 12 Tavantologoi Deposit
- 13 Sharyngol Deposit
- 14 Nalaykha Deposit
- 15 Baganuur Deposit
- 16 Shivee-Ovoo Deposit
- 17 Chandagantal Deposit
- 18 Talbulag Deposit
- 19 Aduunchuluun Deposit
- 20 Narynsohait Deposit

- 21 Ulaan-Ovoo Deposit
- 22 Khoot Deposit
- 23 Tsaidamnuur Deposit
- 24 Ovdok-Huduk Deposit
- 25 Sainshand Deposit
- 26 Hulstnuur Deposit
- 27 Tugrugnuur Deposit

* C-Carboniferous, P-Permian, J-Jurassic, K-Cretaceous

Coal Mining in Mongolia

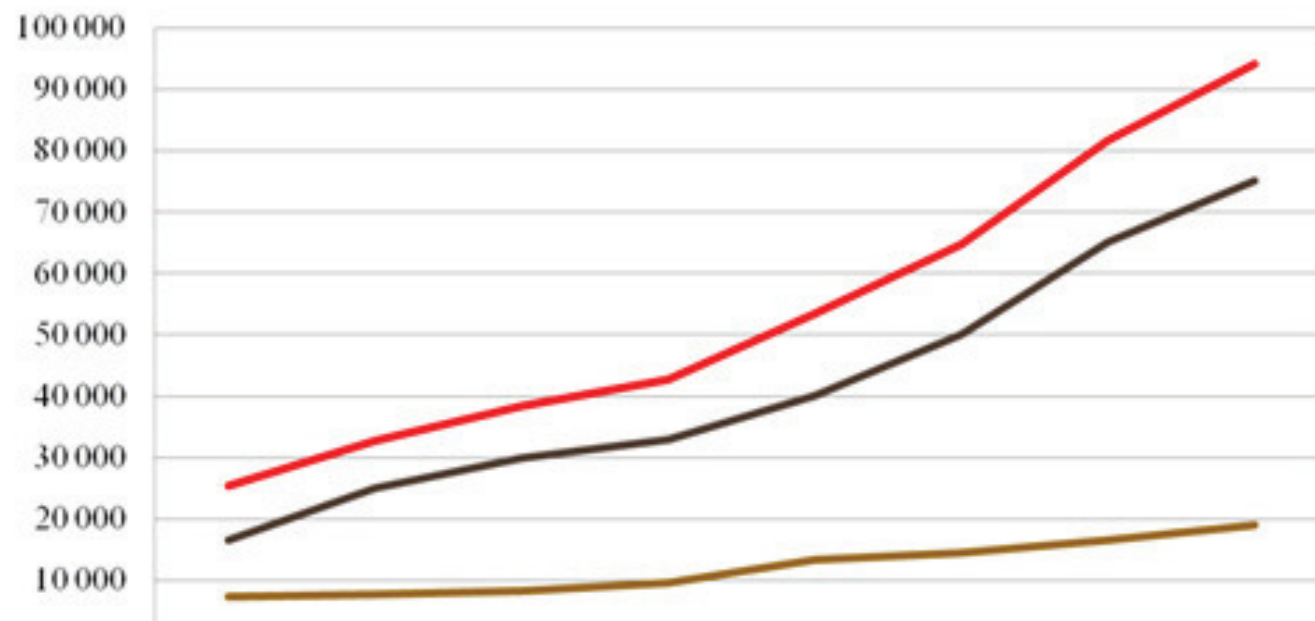





- Most coal deposits are suitable for open cast mining because of geological condition.
- More than 30 coal deposits are now under operation.
- Coal is most important primary energy source in Mongolia, because of great coal reserves, which dwarfs the reserves of other energy resources, such as oil and gas.
- In 2011, annual coal production was 32,9 million tons and coal export – 22,5 million tons.

Coal production of Mongolia since 1990



Coal production, consumption and export forecast of Mongolia for the period 2010-2025 by MRA, (million tons)



	2010	2011	2012	2013	2014	2015	2020	2025
 Total production	25344	32634	38340	42635	53355	64580	81587	94010
 Coal export	16635	25000	30000	33000	40000	50000	65000	75000
 Domestic consumption	7344	7634	8340	9635	13355	14580	16587	19010

Main problem/barriers for CMM development in Mongolia

- No experienced companies in Mongolia to manage this type of work
- Lack of technology and technical knowledge (*resources assessment, technology selection, formulating feasibility studies*)
- Lack of financing or capacity to obtain financing
- Lack of clarify about legal and regulatory issues, especially coal and gas ownership in Mongolia
- Lack of pilot projects to demonstrate site –specific economic recovery & utilization
- Not yet developed the investment opportunities in coal Mine methane project in Mongolia



What was done to remove barriers to CMM recovery and utilization in Mongolia

Implemented EPA grant award on Pre - feasibility study on possibilities of Methane recovery and utilization in Nalaikh in 2007-2008.

Results:

- The results of EPA's pre-feasibility study helps to identify three drilling sites in the Nalaikh mine area
- EPA's grant acted as seed money for developing CMM activities in Nalaikh mine
- Drilling in Nalaikh mining area being financed by Korean Gas Company of Republic of Korea
- It was first CMM project in Mongolia

What was done on CMM activities in 2009, Mongolia

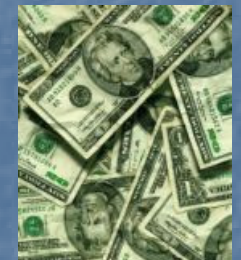
- CMM workshop has organized in Mongolia in 2009
- Workshop sponsored by the US EPA in support of the Methane to Markets Partnership, in collaboration with Mongolia's Ministry of Nature, Environment and Tourism and Ministry of Mineral Resources and Fuel, organized by the Mongolian Nature and Environment Consortium August 30-31, 2010
- Main subject of workshop were:
 - *Assessment and development of CMM resources*
 - *CMM end-uses*
 - *Policy and ownership issues*
 - *A moderated panel discussion regarding the needs of Mongolian mining companies such as regulatory clarity, technical assistance, and other issues.*
 - *Mongolian government plans for large scale development of coal resources and policies impacting methane recovery*
- Workshop participants included representatives of government, private sector, universities, research institutes and NGOs. (35 persons)

Planned activities on CMM activities in 2011 -2012

- EPA approved Grant award on CMM resources assessment and Emission inventory in Mongolia in 2010
- Activities of this EPA's grant are:
 - Select 5 mining sites where planned to conduct CMM assessment and conduct emission inventory
 - Collect geologic data from each selected mining sites
 - Provide the necessary equipment to collect coal samples
 - Conduct survey (take and analysis of coal sample) CMM assessment
 - Preliminary study on methane resources in each site
 - Promote National capacity of CBM development and emission inventory by organizing workshops in mine sites

What was done on CMM development 2011-2012 in Mongolia

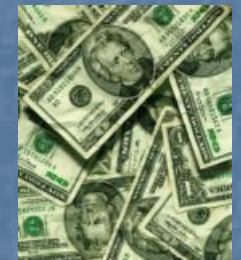
- MNEC developed “ CMM resources assessment project” and sent it to USA for approval. It was approved by EPA in 2010.
- According to USA government procedures, MNEC developed the Request for expression of interest (consultancy services) and announced it in website.mnec.org where invited legal entities to provide consultancy services
- MNEC received three proposals from three companies namely RRR Incorporate, USA, Green services, Czech Republic and Technical University of Mongolia.
- MNEC’s selection panel evaluated three proposals and select RRR Incorporated as subcontractor for implementation of EPA grant award.



What was done on CMM development in 2011 -2012

- MNEC and RRR did the following Geologic data collection via questionnaire and consultation with mine company of MAK and Baganuur Mine companies:
 - Coal characteristics: Rank, quality, permeability
 - Coalbed characteristics: Depth of occurrence, lateral extent of the coalbed, coalbed thickness
 - Other information: Presence of water, extent of disturbance of the coal near the highwall and the impact this has on the permeability, gas content of the unmined coal beneath the mine floor, etc.

What was done from 2011 to 2012 on CMM development in Mongolia



- Also, we have made three part (coal Company, RRR and MNEC) agreement for contacting field survey in field on CMM resources assessment
- Team of the MNEC and RRR had visit Nariin Suikhait, Erdenes TT and Baganuur mine sites and get samples for desorption test. Also we sent these samples t China for adsorption test.
- We have selected 5 mine companies namely Nariin Sukhait, Erdenes TT, (in South Goby), Shariin Gol (in northern part), Baganuur (in Central part) and Khushuut (in western part) where we will conduct CMM resources assessment in 2012 and 2013.



Data Required for CBM/CMM Resource Evaluation:

Coal Mine Provides:

- Coal resource data:
 - Depth, thickness, lateral extent- tonnes of coal by depth
 - Coal quality data (proximate analysis)-from samples tested


MNEC team provides:

- Desorption test:
 - Gas content of coal sample (m³/tonne of coal)
 - Field test- takes several days to a few weeks
- Adsorption test
 - Measures Gas Capacity of coal sample
 - Laboratory test- takes a few weeks
- Gas Chromatography
- Determines the gases composition: i.e., CH₄, CO₂, N₂, H₂S

Desorption Testing



RAVEN RIDGE RESOURCES
INCORPORATED



CANISTER #	SAMPLE TAG#	SAMPLE WT.	ENGINEER
96	50	50	
OPERATOR	SECTION	WELL NAME	COUNTY
M. J. B. Drilling	T	DL10-50	San Juan
INTERVAL / DEPTH: TOP	BTM	STATE	
460.15	460.90	New Mexico	
TIME TOP COAL SAMPLE DRILLED	1314	COAL SEAM NAME	3
TIME CORE BARREL STARTED UP HOLE	1315	SAMPLE TYPE	Coal cor
TIME COAL SAMPLE ARRIVED AT SURFACE	1320	HEAD SPACE	
TIME CANISTER SEALED	1729	BHT	BHP

DATE	TIME(hr.)	INITIAL VOLUME (ml)	FINAL VOLUME (ml)	T amb. Deg. C	Pat. In. h
8/27/09	13:17	460	485	22.2	24.5
	14:25	10	19.7	24.5	24.5
	15:25	500	405	19.6	24.4
	16:07	500	490	18.7	24.4
	17:42	500	498	19.5	24.4
	17:52	500	472	19.5	24.4
8/28/09	7:23	500	475	21.1	24.4
8/27	11:18	500	480	22.1	24.5
8/29	09:11	500	480	22.0	24.5
8/30	11:42	500	480	22.0	24.5



Inventory Approach for Mongolia

- Equip Mongolia with gas desorption equipment for gas content analysis
 - Can used in combination with geologic data to calculate gas resources contained within coal strata for methane resource assessment
 - Calculate basin-specific gas content based on coal analysis from select mines

Inventory Approach for Mongolia

- Adsorption isotherm testing samples
 - Taken from the desorbed coal sample at the end of the desorption test (sent to another laboratory)
 - Results are used to determine gas capacity of coal sample, or how much gas the coal can hold at reservoir temperature and pressure
 - Critical information can be interpreted from this test: pressure at which the gas will begin to desorb from the coal, maximum volume of recoverable gas; this data can be used to characterize the coal and estimate the amount of gas that may be present at a different pressure (depth).

Plan of activities 2013-2014

- Continue activities for detailed estimation of methane resources in selected 5 Mining sites in Mongolia.
- Improving and creating basic legal frameworks, that ensures flexible economic incentives to develop CMM development and attract foreign direct investment in the related field
- Capacity building and international cooperation, focusing on personnel training, resource evaluation and investigation facilities
- Conduct pre-feasibility study on CMM resources assessment which to be done by Raven Ridge Incorporated, USA
- Improve CMM emissions inventory assessment for each mining region

Plan of activities 2013-2014

- Once this analysis is complete, and gas contents and emission factors are determined, a set of spreadsheets will be developed that will facilitate completion of an annual inventory.
- Utilizing the latest coal production data available, the MNEC and other interested institutions staff will be trained on use of the spreadsheets to complete inventories in following years.
- Complete of Pre-feasibility study on CMM assessment in one of Mine site



**THANK YOU FOR
YOUR
ATTENTION**

