

ELIXIR ENERGY LIMITED (EXR)

'So twice five miles of fertile ground'

Elixir Energy Limited ('EXR' or the 'Company') is an ASX listed, explorer of coal bed methane in the South Gobi Basin, Mongolia. EXR exercised its option to acquire Golden Horde Limited ('GOH') in 2018, who has since 2011 obtained Coal Bed Methane (CBM or Coal Seam Gas) rights from the Mongolian Government.

The project covers 7m acres in the South Gobi Basin. EXR entered a production sharing contract (PSC) with the Mongolian Government in September 2018. The PSC covers a major Permian coal bearing basin and encircles the Tavan Tolgoi coal mine. An independent assessment of the prospective resource was undertaken for Golden Horde by resources auditor ERC Equipose Pte. Ltd. in 2018. The report highlighted a best estimate unrisked recoverable gas prospective resource of 40Tcf, with a risked best estimate recoverable coal seam gas prospective resource of 7.6Tcf.

Pipeline of news flow over the next 6-12 months.

The key aim now is to establish a contingent resource by early 2020. The Company has in the past 12 months had the exploration license awarded and the Environmental Impact Assessment and Environmental Management Plan approved. This allowed the Company to commence a targeted 2D seismic acquisition in August 2019. Following up the seismic, the Company plans to drill 2-3 (two firm with an option on a third) core holes. The core holes (and seismic) are designed to test the presence and thickness of coal, the gas content, gas composition and permeability, with the aim of booking an initial contingent resource in 2020. The first well (Ugtaal-1) is due to spud around the end of September or the start of October.

Our 12-month forward valuation is A\$0.10 per share.

Getting a commercial CBM project up and running in Mongolia will not be quick or easy, however the local and export market opportunities if successful are material (high demand and high price potential). At the moment, EXR seem to be as advanced as any competing local CBM project and with an experienced management team, large gas-in-place footprint and an active funded appraisal programme, is an interesting investment play on North East Asian gas demand (at the right entry price).

With a current market capitalisation of circa \$25m, the market is factoring in a very low conversion of the large current best prospective resource to contingent resources. While acknowledging that early stage CBM explorers are extremely difficult to value, we forecast an increase in project value towards \$55m over the next 12 months (based on a conversion of just 10% of the BPR to contingent resources and a greater than 50% EV/GJ valuation versus ASX peers and comparable transaction multiples). Subtracting a valuation for corporate costs and potential future equity dilution, results in a 12-month target price of 10c per share. Based on the current share price discount to this target and near-term catalysts as outlined, we initiate coverage of EXR with a Speculative Buy recommendation.

7 Oct 2019

Share Price:	\$0.051
12mth Price Target:	\$0.100

Brief Business Description

EXR is a CBM explorer focused on the Nomgon IX PSC in Mongolia.

Hartleys Brief Investment Conclusion

The Nomgon IX coal bed methane PSC (CBM production sharing contract) was entered into with the Mongolian Government in September 2018. The Company is about to commence its exploration (seismic plus 2-3 test wells) program. The targeted coals seem to be laterally extensive, thick and with a high gas content. The local market opportunity is attractive and above ground risks seem manageable.

Key Personnel

Richard Cottee	Non-Executive Chairman
Neil Young	Managing Director
Stephen Kelemen	Non-Executive Director
B. Byambasaikha	Non-Executive Director

Top Shareholders

Neil Young	4.1%
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Company Address:

Level 10, 50 Pirie street
Adelaide, SA, 5000

Target Price:	\$0.0995
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Issued Capital:	487.2m
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- fully diluted	637.4m
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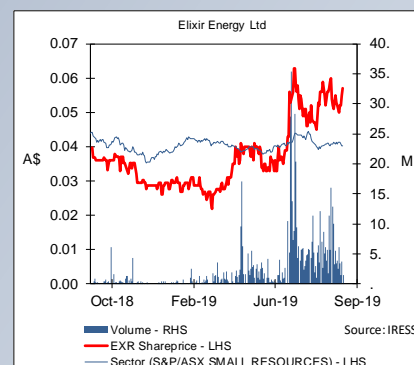
Market Cap:	\$24.8m
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- fully diluted	\$32.5m
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Current Cash (end June)	\$4.4m
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Current Debt	\$0m
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Source: Hartleys Research



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Hartleys has assisted in the completion of a capital raisings in the past 12 months for Elixir Energy Limited ("Elixir") for which it has earned fees.

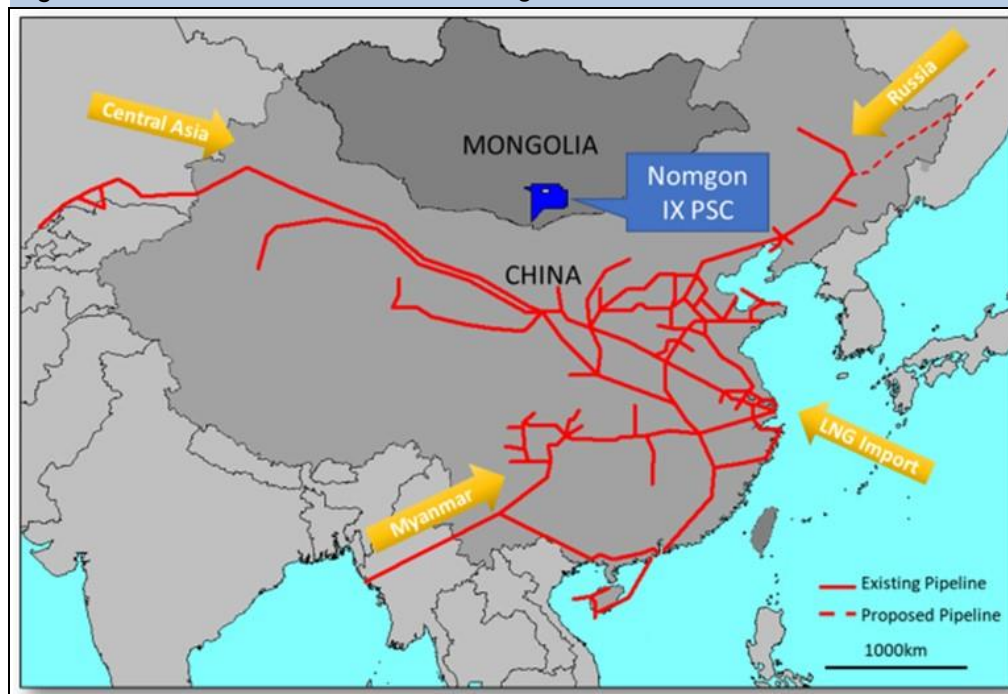
SUMMARY MODEL

Elixir Energy Limited EXR		Share Price \$0.0510		7 Oct 19 Speculative Buy	
Key Market Information				Directors	
Share Price		\$0.0510		Company Details	
Market Capitalisation		\$25m		Richard Cottee Non-Executive Chairman	
Net Cash (30 June 2019)		\$4.4m		Neil Young Managing Director	
Issued Capital		487.2m		Stephen Kelemen Non-Executive Director	
ITM options		0.0m		Bayanjargal Byambasaikha Non-Executive Director	
Options		150.2m			
Issued Capital (fully diluted ITM options)		487.2m			
Issued Capital (fully diluted all options)		637.4m			
EV		\$20.4m			
Valuation*		\$0.100			
12Mth Price Target		\$0.100			
* Valuation is based on a risked value for Mongolian acreage.					
Valuation Summary					
Asset		Valuation			
		A\$m	cps		
Nomgon IX CBM PSC (Mongolia)		55	11.24		
Other Assets - Corporate		-6	-1.28		
Total		48	9.95		
Key Permits / Prospects					
Net Interest		Value based on \$/GJ multiples			
Mongolia					
Nomgon IX CBM PSC		100%		A\$55m	
France					
Moselle Permit		100%		A\$0m	
USA					
Petra project		25%		A\$0m	
Investment Summary					
The Nomgon IX coal bed methane PSC (CBM production sharing contract) was entered into with the Mongolian Government in September 2018. The Company is about to commence its exploration (seismic plus 2-3 test wells) program. The targeted coals seem to be laterally extensive, thick and with a high gas content. The local market opportunity is attractive and above ground risks seem manageable.					
Expected News flow				Project	
CY 18-19	PSC executed			Completed	
CY 18-19	Exploration License awarded			Completed	
CY 18-19	Detailed EIA and EMP approved			Completed	
3Q CY 19	2D Seismic acquisition			Completed	
3Q CY 19	Seismic Interpretation			Mongolia	
2H CY 19	2+1 Drilling program			Mongolia	
2H CY 19	Gas Desorption and testing			Mongolia	
1H CY 20	Book Contingent Resource			Mongolia	
CY 20-21	Pilot Project			Mongolia	
CY 20-21	Farm Out			Mongolia	
Analyst: Aiden Bradley Phone: 08 9268 2876					
Sources: IRESS, Company Information, Hartleys Research					
Last Updated: 06/10/2019					

HIGHLIGHTS

Elixir Energy Limited ('EXR' or the 'Company') is an ASX listed, explorer of coal bed methane in the South Gobi Basin, Mongolia.

Fig. 1: Location of EXR's acreage



Source: EXR

EXR exercised its option to acquire Golden Horde Limited ('GOH') in October 2018, who from 2011 has obtained Coal Bed Methane (CBM or Coal Seam Gas) rights from the Mongolian Government. Golden Horde is a private Australian company which was established in 2011 with the sole focus of building a coalbed methane (CBM) business in Mongolia. The project covers circa 7m acres in the South Gobi Basin. EXR acquired GOH by issuing 79m shares to its shareholders.

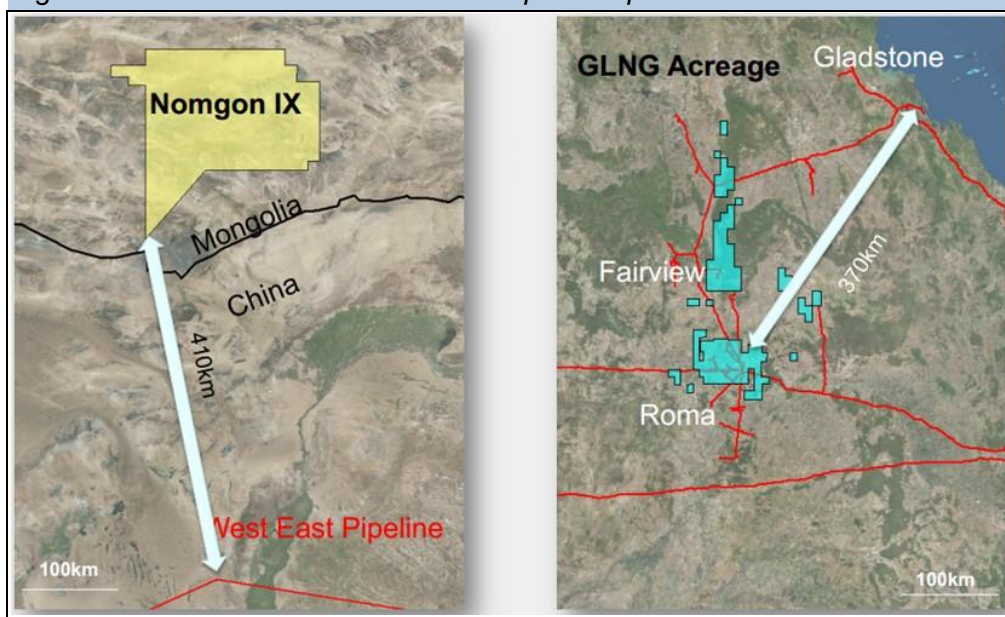
Fig. 2: Location of the Khiimori coal bead methane project



Source: EXR

The CBM PSC, which covers an area of circa 7 million acres, lies adjacent to the Chinese border and is ideally placed for future gas sales into the Northern China gas transmission and distribution network. The southern border of the acreage is approximately 410km away from the West East China gas pipeline. An export pipeline is only one option for EXR. Other potential markets include Ulaanbaatar (circa 550km away), the highly polluted capital of Mongolia, and the Rio Tinto operated Oyu Tolgoi mine (which lies within the PSC). Existing large-scale electricity transmission running through the PSC has large spare capacity and longer term there is a proposed further Russia-China gas pipeline with a potential route through Mongolia and the Asian Super Grid project has plans for large scale new transmission lines through the Gobi region.

Fig. 3: Location to West East Pipe compared to Roma-Gladstone



Source: EXR

EXR entered a production sharing contract (PSC) with the Mongolian Government in September 2018. This was the first unconventional PSC issued by Mongolia pursuant to the country's updated Petroleum Law, which was passed by Parliament in 2014 and materially reduces some of the regulatory and fiscal risks of operating in Mongolia.

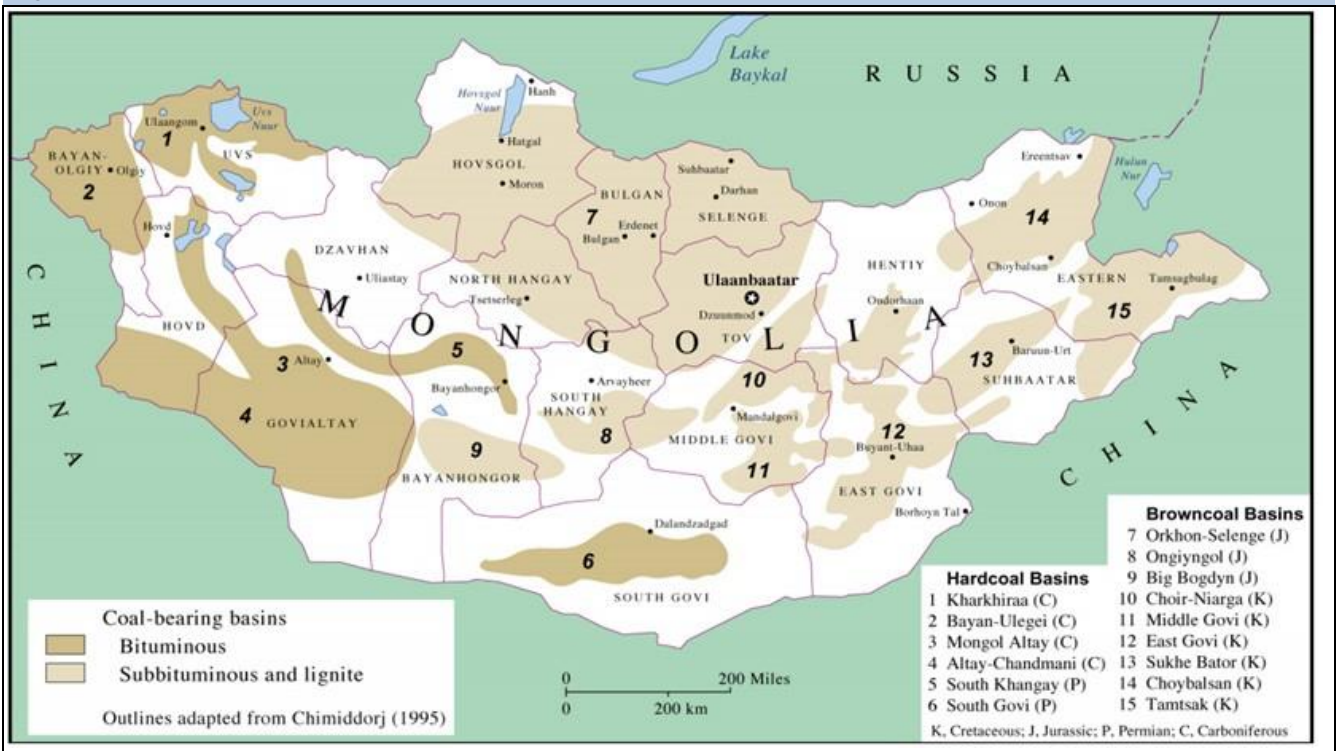
Fig. 4: First CBM PSC in Mongolia

Exploration term	10 – 15 years
Production term	30 years +
Royalty	5 – 10 %
Govt share of profits	Up to 40%. No income tax
Back-in rights	None

Source: EXR

The PSC covers a major Permian coal bearing basin and encircles the Tavan Tolgoi coal mine.

Fig. 5: Mongolia's Coal Basins



Source: https://www.globalmethane.org/documents/toolsres_coal_overview_ch22.pdf. Chimiddorj (1995)

Tavan Tolgoi is one of the largest coal mines in the World with an estimated resource of over 6 billion tonnes and annual production of over 14 million tonnes. An independent assessment of the prospective resource was undertaken for Golden Horde by resources auditor ERC Equipose Pte. Ltd. in 2018. The report highlighted a best estimate unrisks recoverable gas prospective resource of 40Tcf, with a risks best estimate recoverable coal seam gas prospective resource of 7.6Tcf. The resource assessments were estimated using probabilistic methods from information including gravity and magnetic data, detailed field mapping and interpretation of relevant core-hole logs within the PSC.

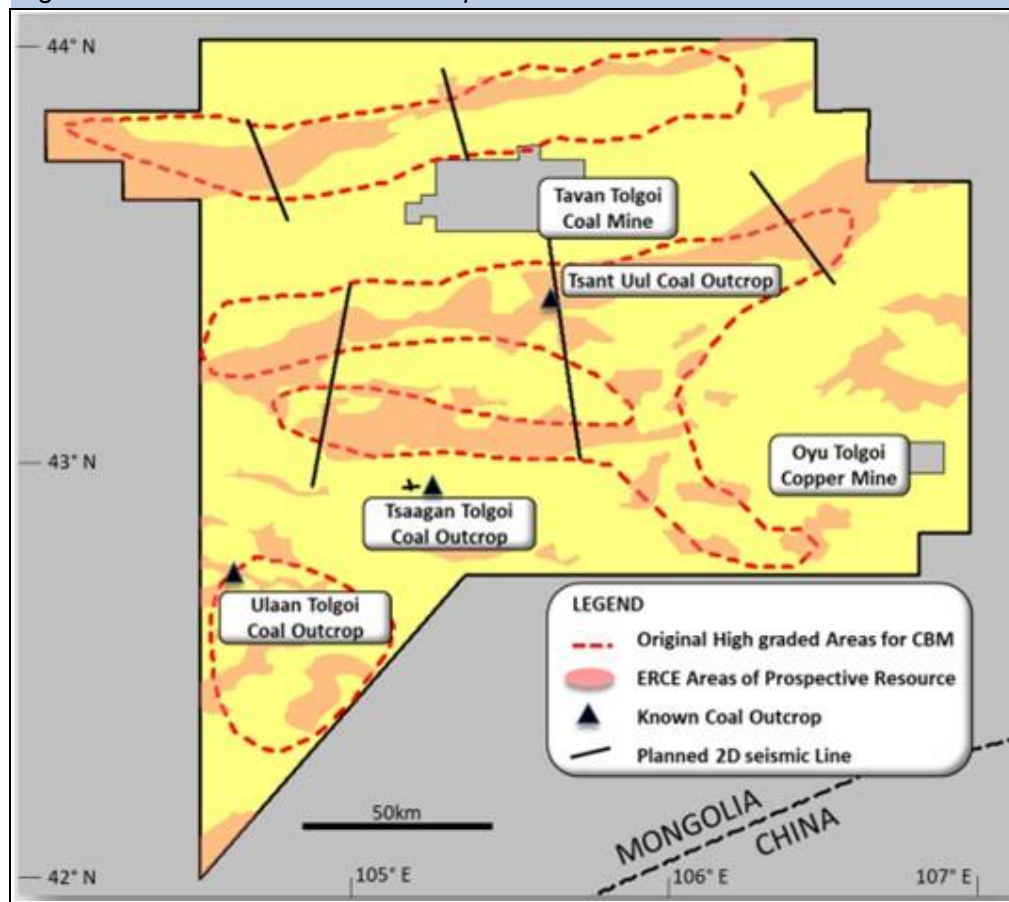
Fig. 6: Independent Prospective Resource Report

Nomgon IX CBM PSC: Mongolia (EXR:100%)	Unit	Low	Best	High
Probabilistic Calculations		(1U)	(2U)	(3U)
Unrisked Recoverable Prospective Resources	TCF	13.6	40.1	117.2
Chance of Geological Discovery		0.19		
Risked Recoverable Prospective Resources*	TCF	2.6	7.6	22.2

Source: EXR

The input parameters included net coal thickness, coal density, gas content, ash, and moisture content.

Fig. 7: ERCE Areas of Prospective Resource



Source: EXR

Initial indications are that the coals are similar in nature to the Permian coals of the Bowen Basin in Queensland.

Fig. 8: The Bowen and South Gobi Basins Compared

PROPERTIES	BOWEN BASIN (QUEENSLAND)	SOUTH GOBI (MONGOLIA)	COMMENTS
Seam thickness	Maximum single seam thickness 30m	>55m found in multiple locations	✓ World class seam thickness and hence very high GIP per acre
Gas content	7-14 m ³ /tonne in most productive areas	Up to 15m ³ /tonne at Tavan Tolgoi	✓ High gas content
Permeability	Varies from 2-600MD	Unknown, but coal samples show good cleat formation with no calcite	? Requires corehole testing
Presence of coal at depth	Considered optimally productive down to 900-1,000m, with potential deeper	Vast acreage position and evidence of substantial area with thick coal seams < 1,000m	✓ Compares favourably to world class CBM basins
Coal quality – ash content	Varies significantly but is ~30% in the most productive fields	~24% ash content	✓ Within ideal range
Coal quality – rank	Sub-bituminous to bituminous	Sub-bituminous to bituminous	✓ Analysis shows VR consistent with coals that have undergone gasification

Source: EXR

The aim now is to establish a contingent resource by early 2020.

Fig. 9: Road to Contingent Resource Booking

	ACTIVITY	OUTCOME	RESOURCE CATEGORISATION UPON SUCCESS
COMPLETED	Geological Modelling	40 TCF unrisked) Recoverable (Best Case)* COS: 19% *	Prospective Resource (Lead) ¹
	Additional Data from Mineral Exploration Programs	More evidence of coal - COS could increase	Upgrades Prospective Resource ²
	2D Seismic Acquisition	Map coal over a larger area	Upgrades Prospective Resource ²
REMAINDER OF 2019	Core Drilling and Core Recovery	Total Gross Coal thickness	Success case delivers a DISCOVERED PETROLEUM ACCUMULATION which could be a Contingent Resource ² – this will be independently verified around year end
	Laboratory Core Desorption	Gas Content and Gas Composition & Adsorption Isotherm (gas saturation)	
	Core Proximate Analysis	Dry Ash & Moisture Content	
	Wireline Logging	Total net coal thickness and distribution	
	Drill Stem Testing and Injectivity	Flowability and permeability measurements	

Source: EXR. ¹ Independently Verified by ERCE. ² Internal estimates.

The Company has in the past 12 months had the exploration license awarded and the Environmental Impact Assessment and Environmental Management Plan approved.

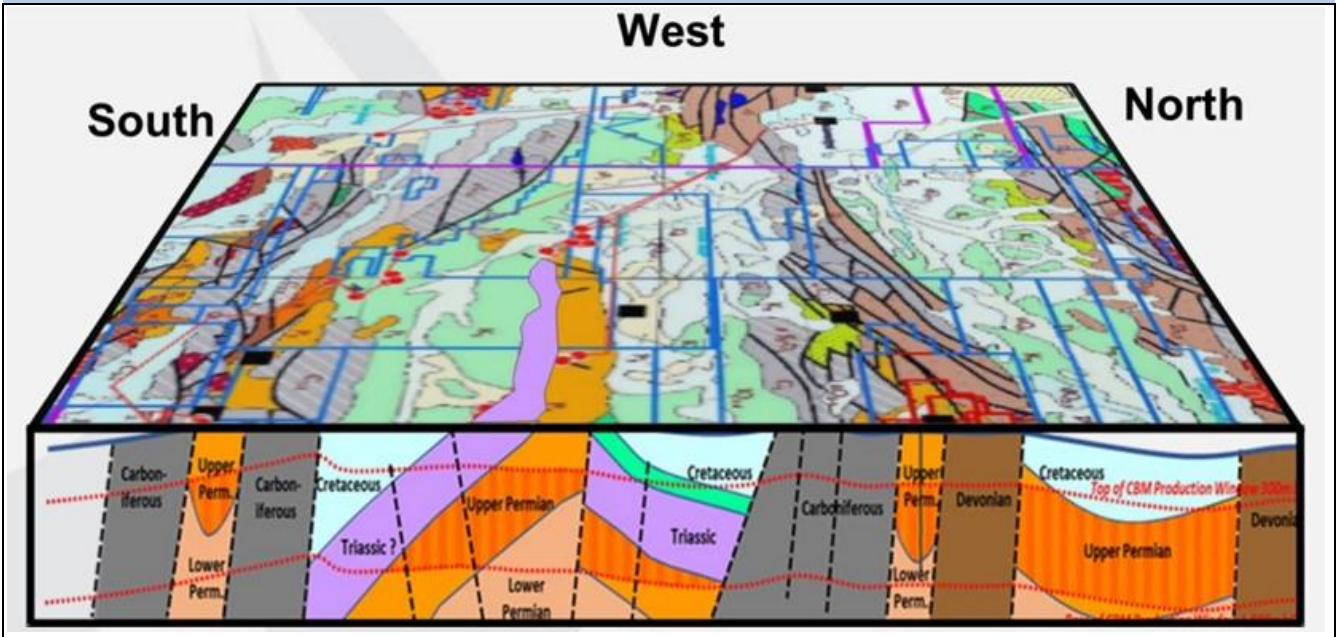
Fig. 10: Regulatory Approvals Completed



Source: EXR

This allowed the Company to commence a targeted 2D seismic acquisition in August 2019. The survey was undertaken by local Mongolian contractor Micro Seismic LLC, who acquired circa 130km of 2D seismic over key CBM leads (Ugtaal Uul, Nomgon North and Bag) identified by EXR. The Company will be focussing on coal seams between 500 and 1,000m depth.

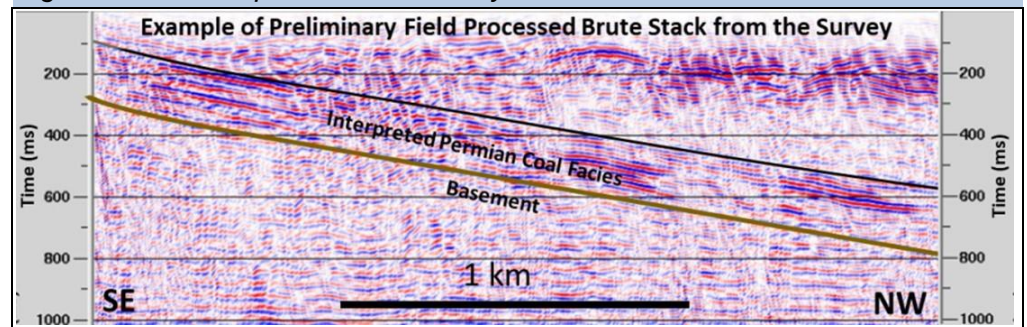
Fig. 11: Schematic cross section with vertical exaggeration



Source: EXR

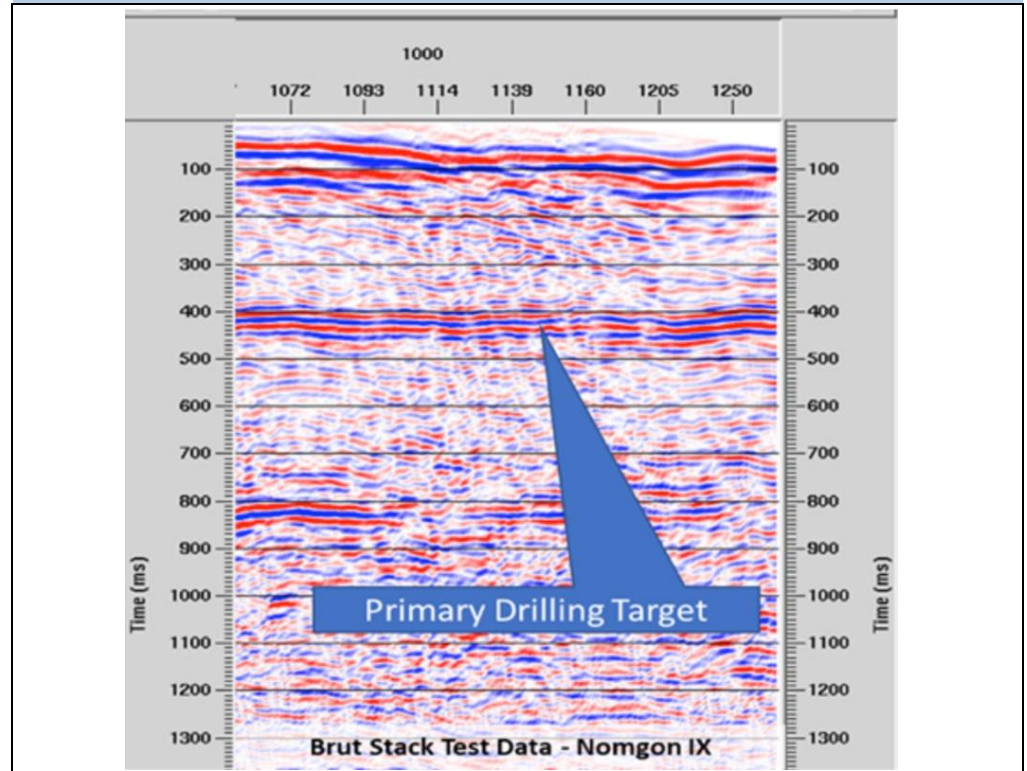
The acquisition took circa 30 days, with processing and full interpretation is expected to be a further 20 days each.

Fig. 12: Example of Preliminary Field Processed Brute Stack



Source: EXR. Brute stack has undergone only cursory velocity analysis.

Early results are indicating coal seams at the right depths. Following up the seismic, the Company plans to drill 2-3 (two firm with an option on a third) core holes.

Fig. 13: Coal Seams at the Right Depths

Source: EXR

The core holes (and seismic) are designed to test the presence and thickness of coal, the gas content, gas composition and permeability, with the aim of booking an initial contingent resource in 2020.

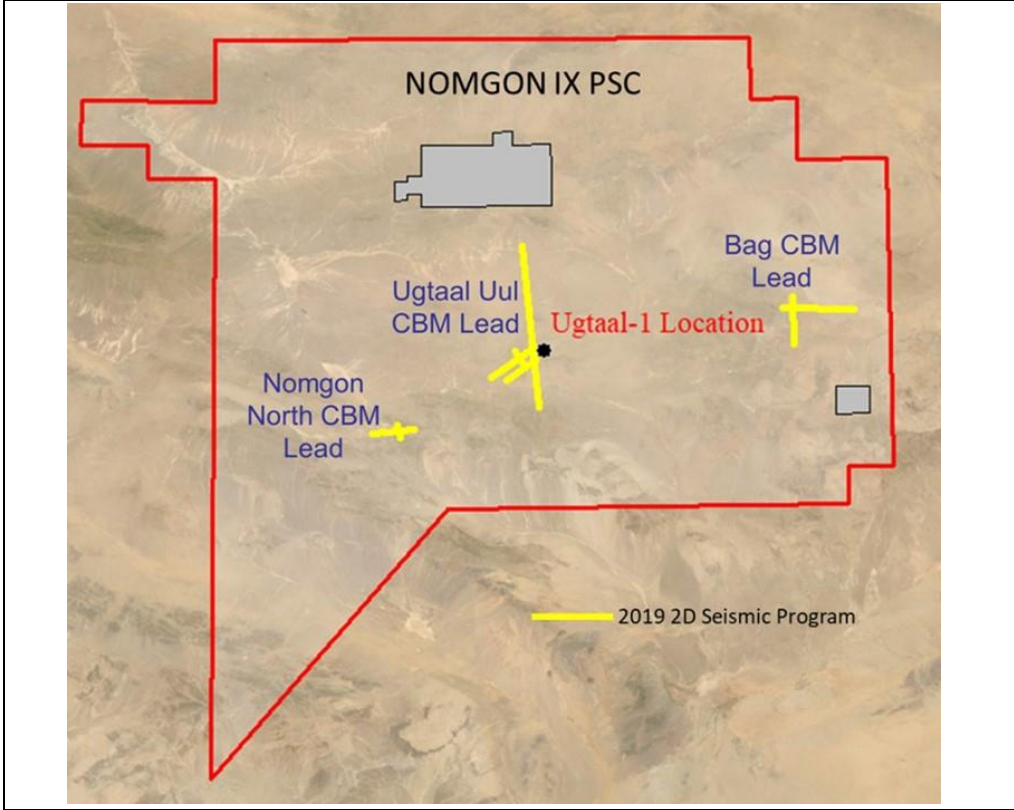
The current program we expect to cost between \$3.0-3.5m in total. The Company would seem fully funded for this current program with net cash of \$4.4m at the end of June.

Fig. 14: 2019 Exploration Program

Source: EXR

The first well (Ugtaal-1) is due to spud around the end of September or the start of October. A second well location will be selected by around the end of September. Again, a local contractor, Erdenedrilling LLC will be used. The wells are expected to take 15-20 days to drill per well and will include 300-400m of coring. Desorption tests will be to Australian standards using imported US equipment and permeability testing equipment which has been sourced from Australia.

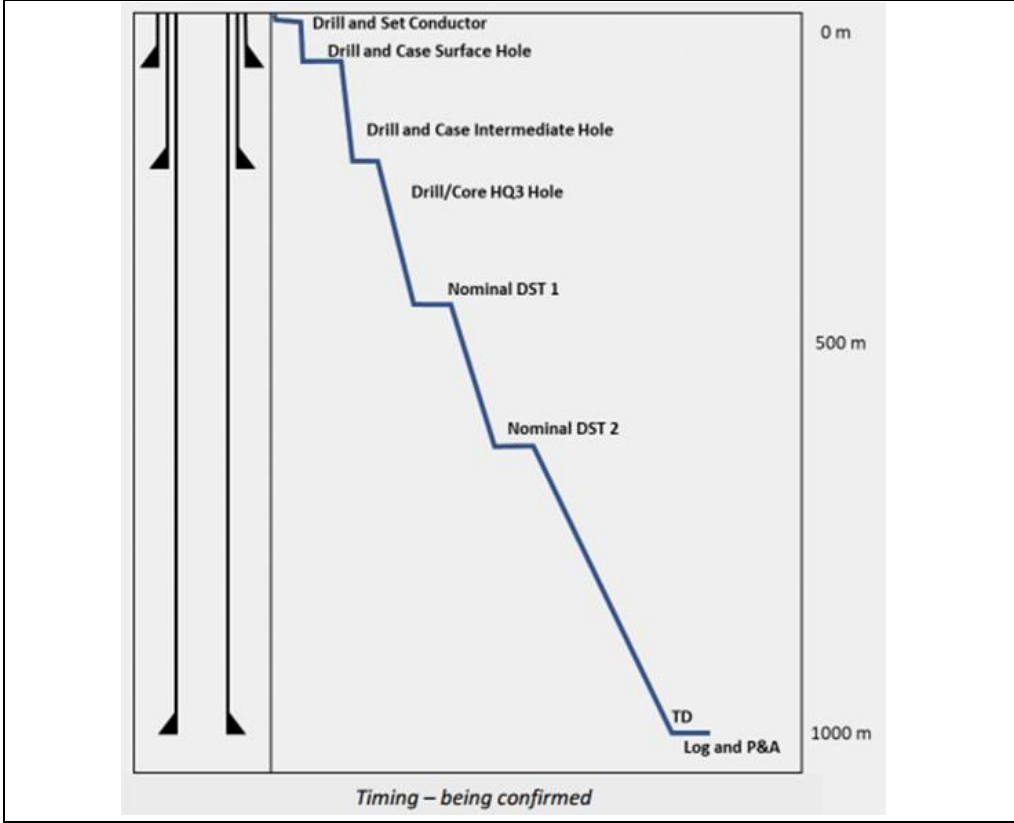
Fig. 15: CBM leads and location of Ughtaal-1



Source: EXR

EXR is also utilising CSG experienced rig supervisors and other technical support from Australia and the USA.

Fig. 16: Preliminary drill plan



Source: EXR

INDUSTRY EXPOSURE

EXR (excluding the non-core assets) is exclusively focused on CBM in Mongolia. There is currently no CBM (or gas) production in Mongolia. The management team do however have vast experience in monetising CBM projects in Australia. There is also a maturing CBM sector in neighbouring China. The potential for CBM/CMM in Mongolia has however been studied for decades on a desktop basis. The Nomgon IX PSC is the first unconventional PSC issued under Mongolia's updated petroleum law.

The coal sector is well established in Mongolia and coal is currently the main source of electricity power domestically as well as exported to China. The large Tavan Tolgoi coal mine (~7.5bt of contained coal) is also surrounded by EXR's permits.

GEOGRAPHIC EXPOSURE

EXR is exclusively exposed to Mongolia. Mongolia is located in Asia with China to its south and Russia to its north. Its population is ~3.2m with an estimated GDP of US\$12bn.

<https://www.cia.gov/library/publications/the-world-factbook/geos/mg.html>

Transparency International rank Mongolia 93rd out of 180 countries in their 2018 Corruption Perceptions Index (level of public sector corruption), scoring 37 out of 100 (scale of 0 (highly corrupt) to 100 (very clean)).

Mongolia's most notable foreign investment in terms of the energy and resource sector would be Rio Tinto's Oyu Tolgoi copper mine, with EXR's permit surrounding it.

Other ASX listed Companies operating in Mongolia include copper explorer Xanadu Mines (XAM.asx), coal producer Terracom Resources (TER.asx) and coking coal developer Aspire Mining (AKM.asx).

KEY SUPPLIERS & CUSTOMERS

EXR is still a number of years away from selling gas. Initial sale volumes will likely be targeted in the vicinity of the project. The large Oyu Tolgoi copper mine (RIO.asx owns ~34% and is the operator) currently sources its power from over the border in China, however the Mongolian Government has stated that the mine must source power from within Mongolia by February 15th 2022. The most likely solution of power in the region would be a coal fired power plant sourcing its coal from the nearby Tavan Tolgoi mine. This would appear to present an opportunity for EXR given RIO Tinto's lack of appetite for coal, if they are able to prove up a resource.

<https://www.afr.com/business/mining/mongolia-wants-rio-to-work-with-tavan-tolgoi-20181031-h17cdm>.

<https://www.afr.com/business/mining/mongolia-forces-rio-tinto-to-build-power-station-20180216-h0w70d>

Mongolia is a large coal producer and hence has quite a developed service sector for this industry. Fortuitously for EXR there is quite a bit of overlap in regards to the service requirements for the CBM sector. They have used a local company, Micro Seismic LLC, for their 2D seismic shoot and the upcoming drill program was awarded again to a local contractor, Erdenedrilling LLC. Six contractors put in quotes for the drilling which included five local Mongolian companies.

MANAGEMENT, DIRECTORS AND MAJOR SHAREHOLDERS

Outside of management, there are no substantial shareholders currently.

The Board and Senior management have over 100 years of combined experience in the Oil and Gas sector, with a particular focus on CBM. The local management team also have deep experience operating in the coal mining sector within Mongolia.

Richard Cottee – Non-Executive Chairman

Over 32 years in the industry. Richard was the former Managing Director of Queensland Gas Corporation (QGC.asx), taking it from a market capitalisation of \$20mn to \$5.7bn. Other former senior positions include CS Energy, NRG Europe, Central Petroleum and Nexus Energy. Richard was appointed Executive Chairman of State Gas Limited (GAS.asx) in June 2019.

Neil Young - Managing Director and Chief Executive Officer

Over 20 years' experience in Senior Management positions in the Oil & Gas sector. Former Business Development Manager at Santos focused on building their industry leading CSG business. Neil founded Golden Horde Ltd in 2011 with a view to exploring for gas on the Chinese border in Mongolia.

Stephen Kelemen - Non-Executive Director

38 years at Santos. Stephen led Santos' coal seam gas team from its inception in 2004 and drove the growth in this area that allowed Santos to become one of Australia's leading CSG companies. Current Non-Executive Director at CSG focused Galilee Energy (GLL.asx) and Advent Energy Ltd.

Bayanjargal Byambasaikha - Non-Executive Director

Chairman of Business Council of Mongolia (BCM). Former CEO of Mongolia's sovereign investment company, Erdenes Mongol (EMGL).

Fig. 17: Management Shareholdings

Economic Exposure of Board and Key management				
Directors	Position	Ord Shares	Options / Perf Shares	Total
Richard Cottee	Non-Executive Chairman	250,000	22,500,000	22,750,000
Neil Young	Managing Director	19,873,036	17,500,000	37,373,036
Stephen Kelemen	Non-Executive Director	0	4,000,000	4,000,000
Total		20,123,036	44,000,000	64,123,036
Percentage of issued capital		4%		10%

Source: EXR and Hartleys.

Local Management Team includes;

Achitsan Buyannemekh – Country Manager: served as one of the deputy directors of Erdenes Methane LLC, a state-owned corporation pursuing coal bed methane exploration rights in Mongolia.

Bayarsaikhan Zagdaa - Geophysical Supervisor – 15 years in seismic data acquisition and processing.

Zorigtbaatar Rentsen – Consultant Mining Engineer - worked at Tavan Tolgoi as an Engineer and Deputy Director of Production.

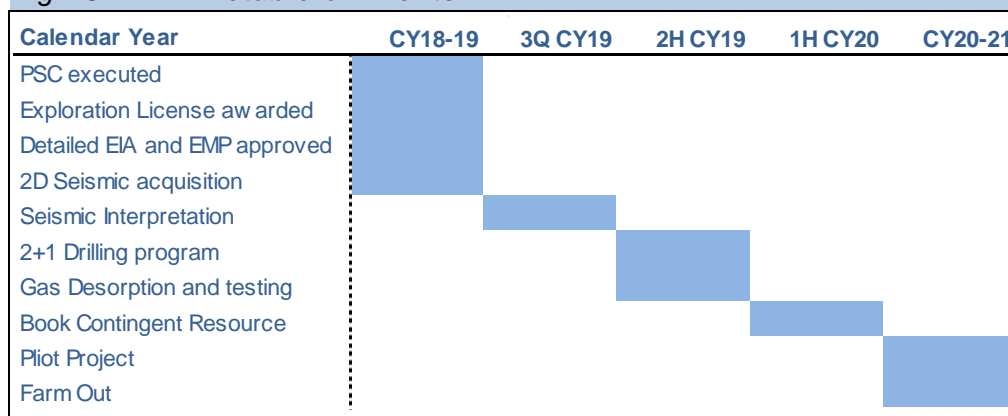
Tumurbaatar Zagar - Consultant Mining Engineer - head of the Sharyn Gol coal mine. From 1991-2008 he served as the Deputy Director General, Policy and Planning Department at the Ministry of Fuel and Energy. He was also the General Director of the Mining Department at the Ministry of Mining and Geology.

RECOMMENDATION & RISKS

INVESTMENT THESIS & RECOMMENDATION

EXR has secured the first unconventional PSC (for CBM) in Mongolia under the updated Petroleum Law and with it a circa 7m acre land position. The Directors have been operating in the CBM industry for over 20 years and in Mongolia since 2011. The local Mongolian management have an equivalent deep history of operating in the coal sector within Mongolia. The acreage surrounds a world scale coal mine and the Company has an independently certified prospective risked resource of over 7Tcf. EXR intends over the next 12 months to start converting this to a contingent resource through an initial 2-3 core hole programme. If successful a larger pilot project in 2H20 is the objective. Getting a commercial CBM project up and running in Mongolia will not be quick or easy, however the local and export market opportunities if successful are material (high demand and high price potential). At the moment, EXR seem to be as advanced as any competing local CBM project and with an experienced management team, large gas in place footprint and an active funded appraisal programme is an interesting play on North East Asian gas demand (at the right price).

Fig. 18: Timetable of Events



Source: Hartleys and EXR.

We believe successful E&P companies have a combination of a focused, well thought out strategy combined with the competitive advantages to pursue it and the right management (with incentives aligned with shareholders) in place to implement it.

Strategy

EXR's strategy is currently focused exclusively on the CBM opportunity in the South Gobi region of Mongolia. The long-term goal is to develop a commercially viable CBM project to supply both the local and potentially the export markets. The nearer term objective is to maximise the value of the acreage through a staged development. Stage 1 is to drill 2-3 core holes to test the CBM production potential of the vast coal deposit in their acreage. If the testing is successful this should allow EXR to convert a proportion of their gas to a contingent resource. Stage 2 would likely involve further wells / a small scale pilot to test the producibility of the coals. At this stage the Company would likely need significant funding and a farm out of their current 100% holding is a possibility. Stage 3 would be a broader field development with a gas contract with a local customer key at this stage of development. It is our opinion that smaller E&P companies are likely to be more successful if they have a strategy focused on one particular area or play type.

Competitive Advantage

EXR currently has 100% ownership of the PSC covering circa 7m acres. The coal in the PSC is known to have a high gas content (data from wells within the Tavan Tolgoi mine indicate gas contents of up to 15m³/tonne (480 cf/ton) at depths of 467 metres below surface). The Directors have been operating in the CBM industry for over 20 years and in Mongolia since 2011. The local Mongolian management have an equivalent deep history of operating in the coal sector within Mongolia. The acreage surrounds a world scale coal mine and the Company has an independently certified risked prospective resource of over 7Tcf. Mongolia is a proven major producer of coal and has a mature (if inefficient) local power market and export routes to China.

EXR has gained considerable experience operating in Mongolia since its foundation and has an experienced team on the ground, supported by a similarly qualified Board. The decision to focus exclusively on CBM in Mongolia has allowed it to focus all their resources on trying to be successful in what is a frontier market with considerable risk and challenges.

Management & Alignment

EXR's Board and Management team includes very experienced Oil & Gas Executives, including a number who have spent most of their careers focused on the CBM sector or operating in Mongolia. However, it is a small Board and the Company is likely to require additional appointments as they move towards becoming a production company. Beyond the Directors, management and staff (appropriately) tend to be locally based.

While again, additional staff will be required as EXR's activity ramps up, the relatively modest fixed cost corporate overheads have been appropriate during what turned out to be prolonged period of negotiations and preparation. The Company spent \$586,000 on Staff Costs in the 12 months to the end of June and a further \$572,000 on Administration and Corporate Costs.

Board and management alignment with other shareholders are equally important to us when evaluating E&P companies. The Board at EXR have material exposure to the share price through their respective holdings.

Fig. 19: Directors' Beneficial Interest in Shares and Options

Economic Exposure of Board and Key management				
Directors	Position	Ord Shares	Options / Perf Shares	Total
Richard Cottee	Non-Executive Chairman	250,000	22,500,000	22,750,000
Neil Young	Managing Director	19,873,036	17,500,000	37,373,036
Stephen Kelemen	Non-Executive Director	0	4,000,000	4,000,000
Total		20,123,036	44,000,000	64,123,036
Percentage of issued capital		4%		10%

Source: EXR and Hartleys

Overall, we rate EXR an 'Above Average' (versus our coverage universe) on our indicative measures of performance. The focused strategy on Mongolia is a positive as is their prior management experience in CBM. Management also have alignment with shareholders through their material shareholdings.

VALUATION AND RECOMMENDATION

Valuing early stage CBM companies is generally difficult, especially before drilling as a large number of key parameters for success remain unknown. This is especially true for a new frontier region such as the South Gobi, where there is no existing oil and gas industry at all (never mind CBM). Global comparisons are difficult as each region can be vastly different (different coal, access to infrastructure, services, market opportunity, regulatory and fiscal risk, realisable prices etc.). There is a growing CBM industry in China, which is now dominated by the large SOE's. However, smaller players have targeted new projects with varying degrees of success. ASX listed players such as DTE.asx and TNP.asx both tried to develop CBM/CMM projects in China, with limited success. Perhaps the best known international junior CBM player in China is G3 Exploration. Despite investing over US\$270m and their large booked developing resource base, their market capitalisation has collapsed in recent years to less than 50m Sterling.

Fig. 20: G3E Reserves and Resources in PRC

	GDG		G3E	
	(Blocks GSS and GCZ)		(Blocks GGZ, GSN, GQY A & B, GFC, GPX)	
	Bcf	NPV10 US\$M	Bcf	NPV10 US\$M
1P	129.1	653.1	5.1	28.6
2P	338.4	1,652.7	70.7	815.7
3P	1,083.3	4,941.9	1,002.3	7,648.5
2C	-	-	667.8	-
BPR	-	-	1,328.5	-
GIIP	3,453.0	-	23,666.8	-
	No of Wells		No of Wells	
Wells drilled	1,442		349	

Source: Company estimates as of yearend 2018. Average gas price US\$8.98/Mcf for producing blocks. USD/RMB FX Ratio of 6.8.
Note: Net gas reserves and NPV estimates are based on company's participating interest in the blocks.
Note: 5% escalation applied per year to future operating costs, capital costs and sales prices.

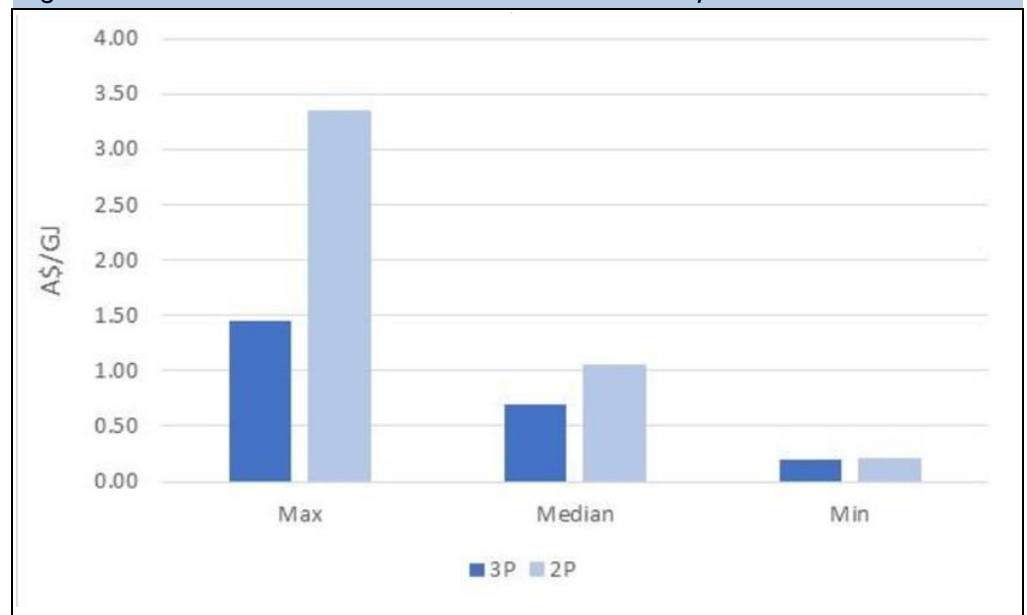
Source: G3E as at 31 December 2018

We looked at valuing CBM/CSG companies in our research on SXY, see 'Two-up' - A Transformational Year of Growth' (6th May 2019). We value undeveloped reserves and resources based upon historical transaction values for CBM assets.

Transaction values can be unreliable as the price paid for specific assets can be influenced by a multitude of factors. Negative influences on EXR's acreage would likely be the perceived high sovereign risk and lack of infrastructure. On the positive side there is the potential low cost and high realisable prices. On balance, EXR's resource would we expect be likely valued at the lower end of the EV/GJ range by ASX investors. The first step in a re-rating will be to book a contingent resource. Based on historical transaction values and current ASX listed peers we would expect the market to value a contingent resource in the PSC at less than the peer group average of 20c/GJ. Assuming 5-10c/GJ, the current market capitalisation of EXR implies a potential contingent resource of circa 250-500PJ (compared to a risked BPR of 7.6Tcf). If the core testing is successful, then this is obviously a conservative assumption. Post a successful flow test and the booking of reserves, the valuation

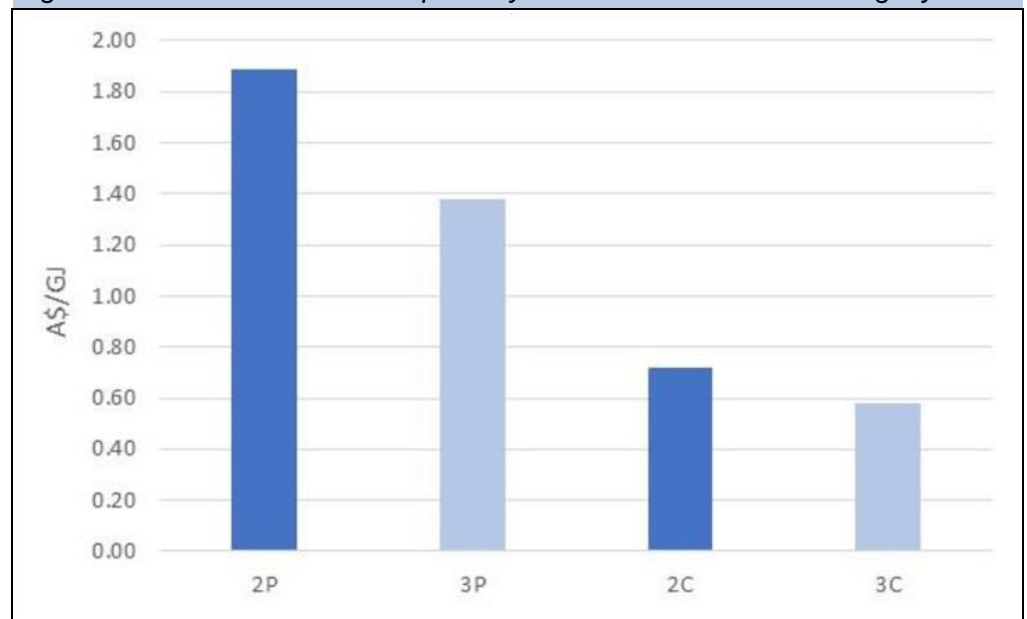
would increase dramatically as shown. As a relevant example, Lone Star acquired Sino Gas and Energy (SEH.asx) in 2018 for close to \$1.50/GJ per 3P reserve.

Fig. 21: CSG/Onshore Gas Transaction Multiples*



Source: Hartleys and Industry Releases. * Transactions include STO/Kogas, QGC/BG, Pure Energy, Bow Energy, Arrow/Shell, ORG/Conoco and STO/Petronas.

Fig. 22: Transaction Multiples by Reserve/Resource Category



Source: Hartleys and Industry Releases.

Over the next 6-12 months the key objective will be to book an initial contingent resource. If the current core testing is successful (in highlighting the potential producibility of the coal bed) then the next stage will be to drill further step out core holes or move directly to a pilot production test. The Company looks to be funded for the current 2-3 well core hole program, although further capital will be required beyond this regardless of outcome. With a current market capitalisation of circa \$25m, the market is factoring in a very low conversion of the large current best prospective resource to contingent resources. While acknowledging that early stage CBM explorers are extremely difficult to value we forecast an increase in project value towards \$55m over the next 12 months (based on a conversion of just 10% of the BPR

to contingent resources and a greater than 50% EV/GJ valuation versus ASX peers and comparable transaction multiples). Subtracting a valuation for corporate costs and potential future equity dilution, results in a 12-month target price of 10c per share. Based on the current share price discount to this target and near-term catalysts as outlined we rate EXR as a Speculative Buy.

RISKS

The key risks for EXR (like most junior oil & gas Companies including those with unconventional assets) is a combination of exploration/development success and performance of the production assets (if any).

Sovereign risk of operating in Mongolia is also important to consider. We also note that there no local gas producers within Mongolia (PetroChina and Sinopec do produce crude in the country) and it would force EXR to be a pioneer in the region.

Although some disappointments can be short term and are only a timing issue, other disappointments can be materially value destructive and can sometimes overhang stocks for a long period of time (for example over-estimating long-term flow rates). Such disappointments can be very difficult to predict and share price reactions can be severe and immediate upon disclosure by the company. High financial leverage (as exists at this time) would add to the problem. Investing in unconventional explorers/developers is very risky given the value of the company assumes that the market will recognise a portion of potential future value of wells not yet drilled before the results are known.

Fig. 23: Key assumptions and risks for valuation

Assumption	Risk of not realising assumption	Downside risk to share price if assumption is incorrect	Comment
Unsuccessful core tests. Inability to convert BPR to a contingent resource.	Medium	High	There remains a number of key parameters we do not know, that will determine whether the coals in the South Gobi region could support a CBM development. Poor results from the imminent drill program would obviously be a setback. Different seams/locations would need to be selected and tested.
Funding Risk	Medium	High	EXR looks to be funded for the current stage of exploration (~A\$4.4m in estimated cash at the end of June). However, the next phases of appraisal will likely require additional funding, securing this at not too high a cost will obviously depend on success in the preceding stage.
Sovereign Risk	Medium	High	Mongolia ranks as a high-risk country to do business in. However, EXR have secured the country's first unconventional PSC under the updated Petroleum Law and we assume Mongolia remains a relatively stable country for foreign investment.
Equipment Risk	Low	Medium	To date EXR has secured the necessary equipment to undertake its appraisal and testing with relative ease. Perhaps surprising to some given Mongolia's lack of an oil and gas industry. We assume this continues to be a non-issue.

We believe our contingent resource and relative valuation assumptions are reasonable, however EXR like many smaller unconventional explorers is a high-risk investment.

Conclusion

Source: Hartleys Research

SIMPLE S.W.O.T. TABLE

Strengths	<p>Extensive acreage position of circa 7m acres (100% held) in the South Gobi basin, Mongolia.</p> <p>Substantial coal deposits in the region with proven contained methane.</p> <p>Potential local demand and Chinese export market opportunity.</p> <p>Relatively low-cost appraisal.</p> <p>Access to local service industry (seismic and drilling).</p> <p>PSC environment lowers regulatory risk.</p> <p>Strong in country relationships built up since 2011.</p> <p>Experienced CBM Board.</p> <p>Operating in Mongolia since 2011 and with strong local management.</p>
Weaknesses	<p>Unproven commercial flow rates.</p> <p>No local gas production in Mongolia, would be the pioneer in the industry.</p> <p>Further funding required.</p> <p>Lack of infrastructure.</p> <p>CBM developments can have a long lead time to development.</p>
Opportunities	<p>Location to Chinese gas market</p> <p>M&A potential.</p> <p>Strong domestic political desire to replace high emission coal power and heat generation with low emission clean-burning gas fired generation.</p> <p>100% ownership provides flexibility.</p>
Threats	<p>High Sovereign risk.</p> <p>Market price for any gas produced remains uncertain.</p> <p>Conflict with the domestic coal sector a possibility.</p> <p>Conflict with other domestic stakeholders (including environmental) a possibility.</p> <p>Shifting regulatory environment.</p>

Source: Hartleys Research

APPENDIX

CBM in Mongolia

Mongolia has the potential for world scale CBM/CMM (Coal Bed Methane / Coal Mine Methane) resource potential. It has been estimated previously that the total estimated CMM resources of Mongolia's coal basins are 3,117 billion cubic meters (MNEC 2016). Currently there is no CBM or CMM production in Mongolia, this is despite the fact that various private and governmental studies for over 20 years have highlighted its potential. The following are some key papers and references on CBM/CMM in Mongolia;

- Coal Resources in Mongolia and Some Probable Potential Areas for Coalbed Methane, Ayurzana Chimiddorj (1995)
- The International Coal Seam Gas Report, Steve Schwochow (1997) editor;
- Geologic settings, coal characteristics, distribution, and resources, Bat-Orshikh Erdenetsogt etc., (2009)
- Tentative Reserves of Coal Bed Methane Gas in Mongolia, Bazardorj Bayarsaikhan (2012);
- Erdenes Tavan Tolgai JSC – Graeme Hancock, COO (2012)
- Mongolian Surface Mines Assessment, Dr. B. Namkhainyam (2013);
- The Pre-feasibility Study on Methane Recovery & Utilization in Nalaikh Coal Mine, U.S. Environmental Protection Agency (2013)
- Pre-feasibility Study for Coal Mine Methane Recovery and Utilization at Naryn Sukhait Mine, U.S. Environmental Protection Agency (2013)
- Pre-feasibility Study for Coal Mine Methane Recovery and Utilization at Baganuur Mine, U.S. Environmental Protection Agency (2013)
- Coal Mine Methane (CMM) Resource Assessment and Emissions Inventory Development in Mongolia, Mongolian Nature and Environment Consortium, MNEC (2014);
- Legal and Regulatory Status of CMM Ownership in Key Countries: An Overview Provided for Decision Makers in Mongolia, United States Environmental Protection Agency, EPA (2014);
- The Potential for Methane Gas Development in Mongolia, Ch. Otgochuluu and R. Bold-Erdene, "Erdenes Mongol" LLC (2015)
- CBM and CMM Development in Mongolia–New Policies to Stimulate Clean Energy Projects. Global Methane Forum, Washington DC. Badarch, M. (2016).

EXR exercised its option to acquire Golden Horde Limited (GOH) in October 2018.

In 2016, Erdenes Methane was established by Erdenes Mongol to identify coal bed methane (CBM) reserves. The Ministry of Mining and Heavy Industry has 'ordered them' to work with Erdenes Tavan Tolgoi on extracting methane from the mine. Together with Elgen LLC (Mongolian drilling contractor), they had a cooperation

agreement with Korea Gas Corporation (KOGAS) to develop a feasibility study on the use of the CBM in the Tavan Tolgoi coal deposit. More recently they signed an agreement in May 2019 with a private Australian company, Jade Methane LLC, to evaluate the Tavan Tolgoi deposit (which is encircled by EXR's PSC).

Prior to all this, Storm Cat Energy Corp., was granted a PSC with the Petroleum authority of Mongolia in February 2004 for the Nemegt-VI and Borzon-VII exploration permits (which are to the West of EXR's current permit). Storm Cat drilled 11 core holes to evaluate the coals in six areas and followed up with 5 deep core holes to assess the gas content of the coal. Results of coring and desorption show gas contents which ranged from 2.34-11.8m³/t. Overall Storm Cat reported potential CBM resources in the region of 17 to 34 bcm (600-1,200bcf). This resource estimate was based on the volume of coal estimated at depths shallower than the 1,500m drill depth, combined with average gas contents obtained from desorption analyses.

<https://www.businesswire.com/news/home/20050713005217/en/Storm-Cat-Update-Mongolia-CBM-Projects>

Various desorption / gas content tests have been carried out. As highlighted Storm Cat were the first to undertake a comprehensive review in 2004.

The results of the coring and desorption are as follows;

- Total coal thickness is 50 meters, locally up to 70 meters;
- Vitrinite reflectance Ro=0.62% to 0.87%;
- 15 coal seams are present in the Nariin Sukhait area coal measures;
- The main seam is 20 meters to 50 meters thick;
- The coal rank is high-volatile C bituminous to high volatile A bituminous;
- Ash content is low, 8–15%;
- Gas content ranges from 2.4 cubic meters /tonne to 11.9 cubic meters /tonne.

Despite these encouraging results, Storm Cat at the time seemed to conclude that no economic reserves had been identified (Noyon Mongolia CBM project, December 2005, Storm Cat Energy Corporation).

Storm Cat followed up these tests in 2005 by acquiring a CBM PSC for Block Tsaidam-XXVI, just south of Ulaanbaatar. This was likely a move to be closer to a potential end market and hence to improve the economic viability of any discovery. The results of these tests were disappointing. Net coal thickness observed in the coring was 125.4 meters, with a gas content of just 0.03 to 0.06 cubic meters/tonne (Tsaidam Mongolia CBM Project, 23 October 2005, Storm Cat Energy Corporation). Post these results Storm Cat exited Mongolia in late 2005.

In 2010, KOGAS signed a "Joint Geological Survey of Coalbed Methane" contract for the Nalaikh coal mine. KOGAS drilled three wells to around 350m, and prepared 17 gas analysis samples. The estimated gas content was viewed as disappointing below 5 cubic meters/tonne. (Exploration Drilling & Gas Analysis of CBM in Mongolia Final Report, 5 April 2011, KIGAM).

Through 2012, the US EPA helped fund three studies looking at the potential for CMM recovery at three coal mine sites.

- The Pre-feasibility Study on Methane Recovery & Utilization in Nalaikh Coal Mine, U.S. Environmental Protection Agency (2013)
- Pre-feasibility Study for Coal Mine Methane Recovery and Utilization at Naryn Sukhait Mine, U.S. Environmental Protection Agency (2013)
- Pre-feasibility Study for Coal Mine Methane Recovery and Utilization at Baganuur Mine, U.S. Environmental Protection Agency (2013)

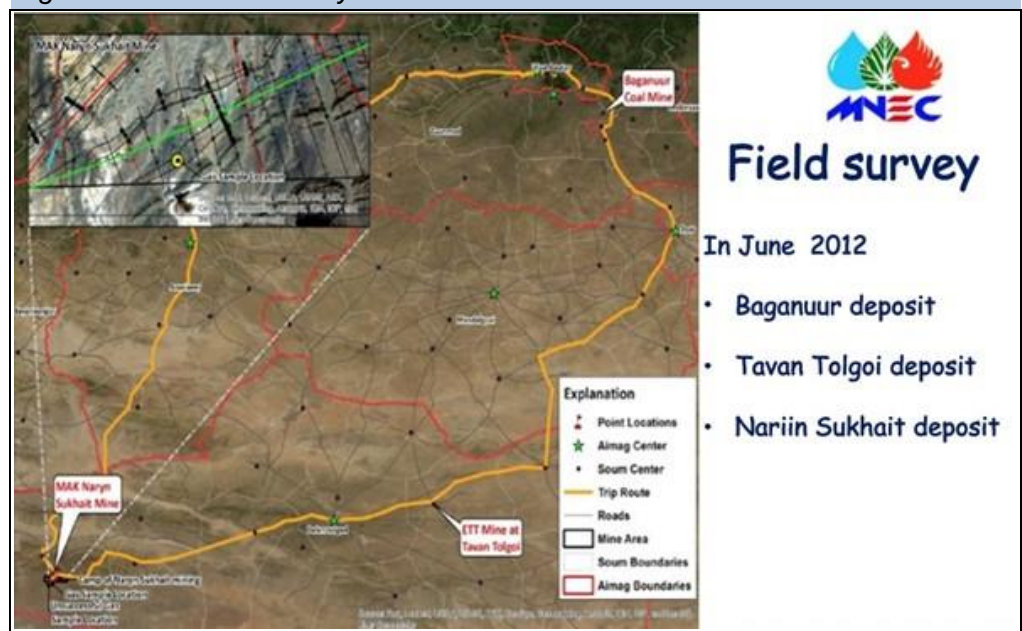
Fig. 24: Sampling and Testing Activity Summary

Site	Owner	Location	Testing Performed
Naryn Sukhait	Mongolyn Alt (MAK) Corporation	Ömnögovî aimag, South Gobi	<ul style="list-style-type: none"> • 3 coal samples: desorption testing • 1 coal sample: adsorption isotherm • 1 coal sample: proximate analysis • 3 coal samples: gas chromatography
Baganuur	Baganuur JSC	Baganuur düüreg, Ulaanbaatar, 127 km east of Ulaanbaatar center	<ul style="list-style-type: none"> • 3 coal samples: desorption testing • 1 coal sample: adsorption isotherm • 1 coal sample: proximate analysis
Tavan Tolgoi	Erdenes Tavan Tolgoi	Ömnögovî aimag, South Gobi	<ul style="list-style-type: none"> • 1 coal sample: adsorption isotherm • 1 coal sample: proximate analysis
Khotgor	Mongolia Minerals Corporation	Uvs aimag, northwestern Mongolia	<ul style="list-style-type: none"> • 2 coal samples: adsorption isotherms • 2 coal samples: proximate analysis

Source: MNEC

In mid-2012 a team comprised of MNEC and Raven Ridge Resources organized and carried out the series of field visits to the three surface coal mines: Baganuur, Tavan Tolgoi, and Naryn Sukhait.

Fig. 25: Field Survey

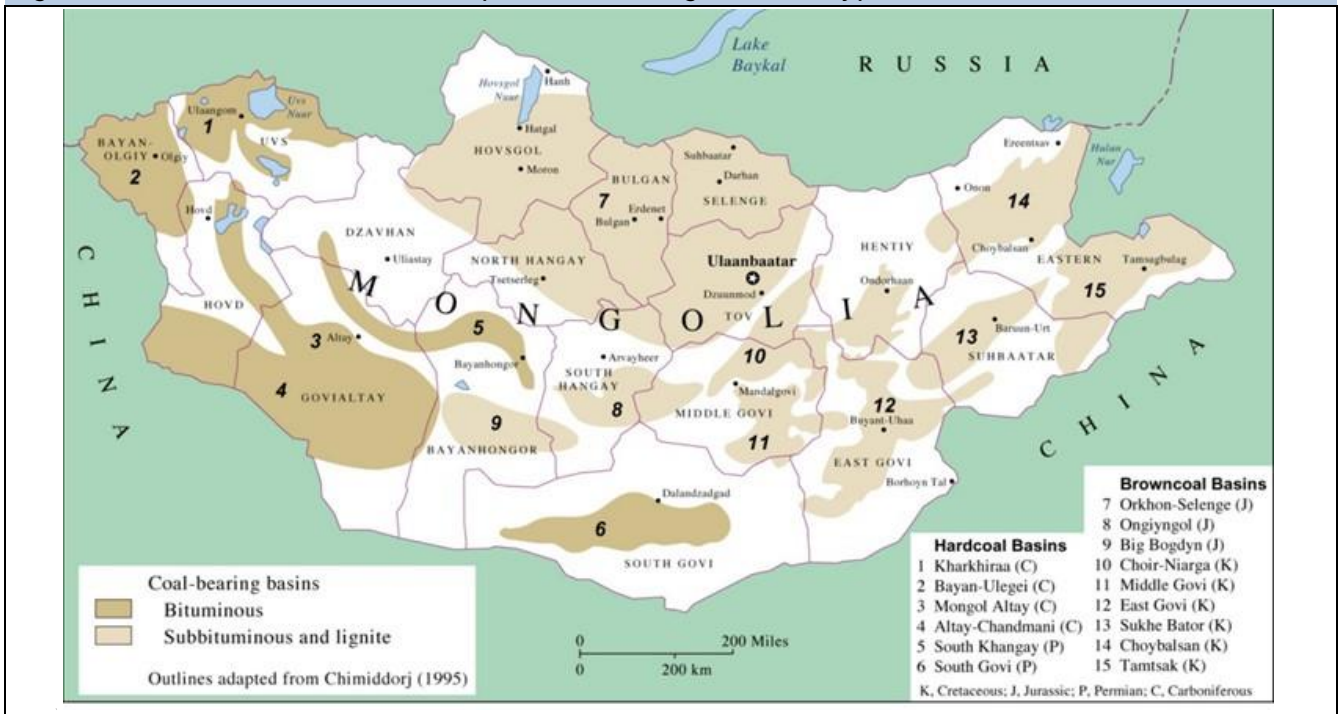


Source: MNEC

The South Gobi coal basin, home to the Tavan Tolgoi deposit, is the southernmost Mongolian coal basin. The basin covers approximately 40,000 km² of area extending 600 km in an east to west direction. It is worth noting that the 'complex geologic structure of the South Gobi basin disrupts the continuity of the coal seams'. Structurally, the foreland basin consists of fold and thrust belts, normal faulting and has experienced continental growth and accretion through erosion of nearby volcanic

arc systems. The main coal resources are Permian to Jurassic in age, and generally range in rank between subbituminous to medium-volatile bituminous; however, the majority of the coal resource is high to medium-volatile bituminous (the coal rank is 81% bituminous).

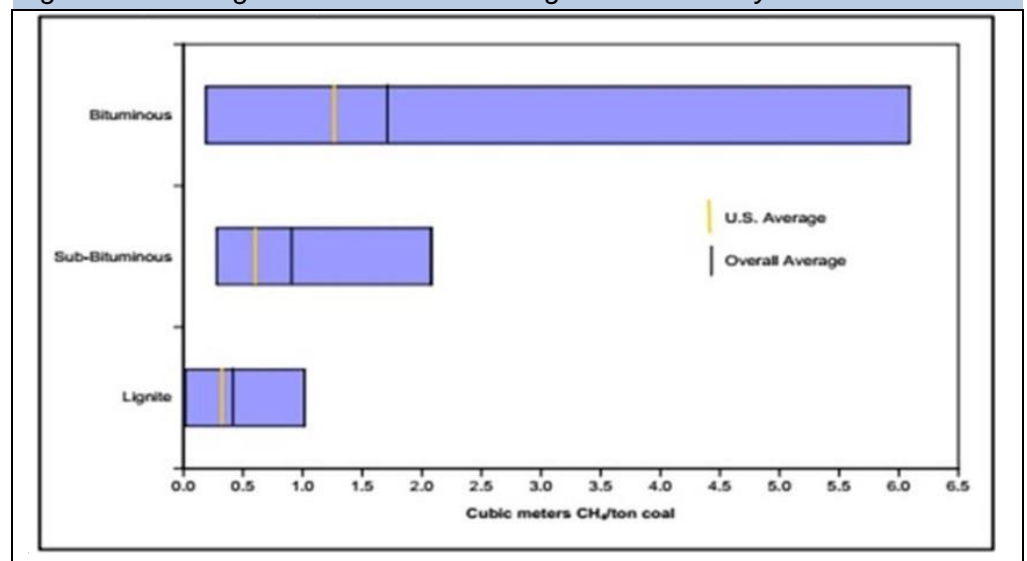
Fig. 26: Locations of Main Coal Deposits: Coal Age / Coal Type



Source: Mineral Resources Authority of Mongolia

Figure 27 shows the US and global average gas content by coal rank. Storm Cat, in 2005 reported for Naryn Sukhait area (now the Ovoot Tolgoi mining complex in Western portion of South Gobi) a gas range of 2.4 – 11.8 cubic meters per metric ton. Mongolyn Alt Corporation LLC, the operator of the mine from desorption testing conducted in 2012, reported 3.8 cubic meters per metric ton.

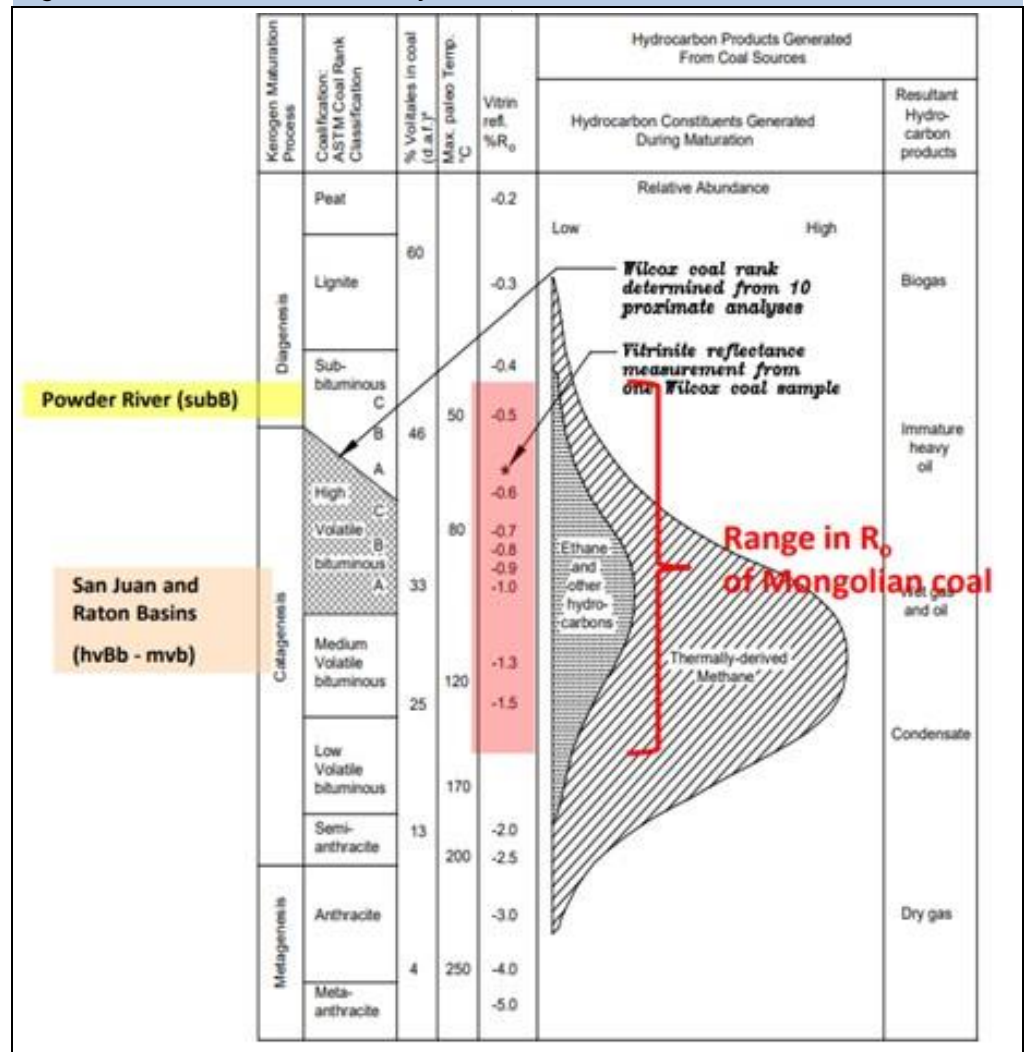
Fig. 27: Range of Worldwide CH₄ gas contents by Coal Rank



Source: MNEC

Johnson and others, (2003) have shown that the lower to middle Jurassic coal and coaly mudstone analyzed from samples taken in the South Gobi are important source rocks for hydrocarbon generation.

Fig. 28: Coal Rank and Hydrocarbon Generation

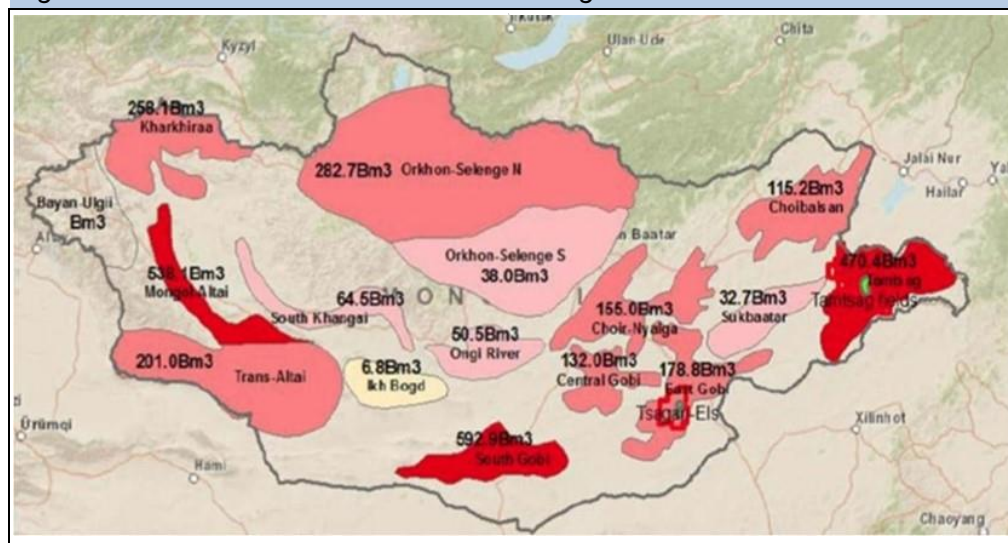


Source: MNEC

The 'Coal Mine Methane (CMM) Resource Assessment and Emissions Inventory Development in Mongolia' published the following findings, and as shown in Figures 28 and 29, highlighting that the largest CBM resources are likely found within the South Gobi, Mongol-Altai, Tamsag and Kharkhiraa basins, as was also predicted by Chimiddorj in his article titled Coal Resources in Mongolia and Some Probably Potential Areas for Coalbed Methane (1998).

The coal resources of the South Gobi basin, total 15,900 million metric tons (Erdenetsogt et al, 2009). The p50 CMM resource estimation of the coal resources potentially lying within 1,200 m of the surface is 592,936 million cubic meters.

Fig. 29: P50 CMM Resources of Mongolian Coal Basins



Source: MNEC

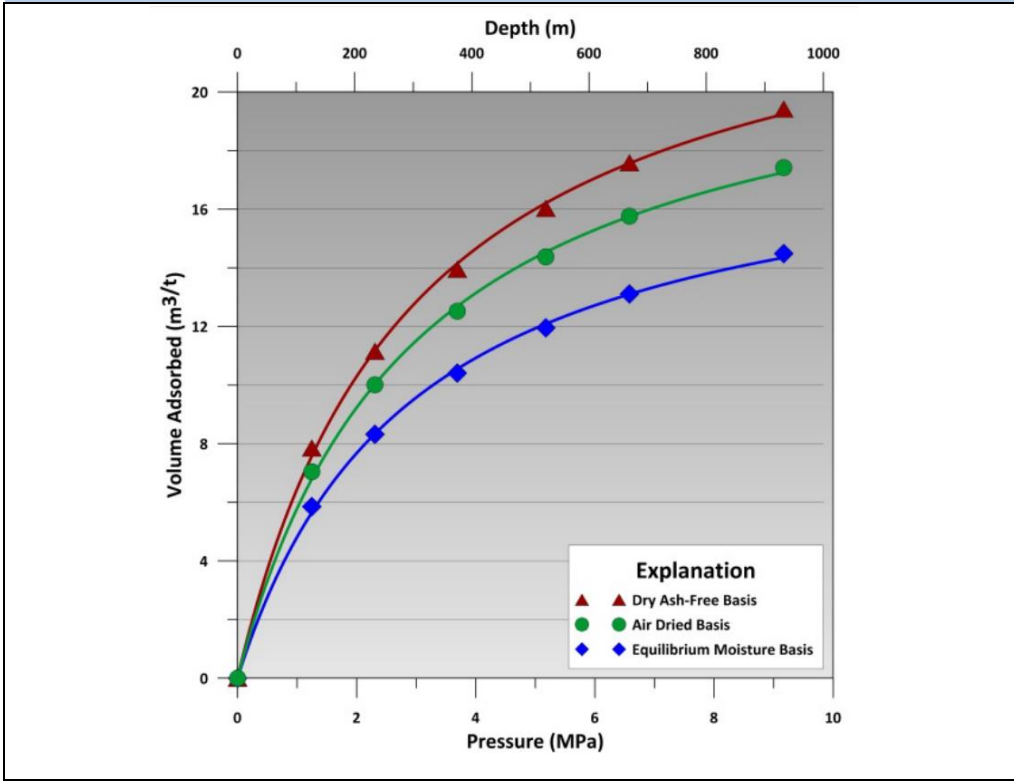
Fig. 30: Result estimated CMM Resources by Coal Basin and Depth p50

Coal Basin	p50 CMM Resources 0 – 300 m (billion m ³)	p50 CMM Resources 300 – 600 m (billion m ³)	p50 CMM Resources 600 – 900 m (billion m ³)	p50 CMM Resources 900 – 1200 m (billion m ³)
Bayan-Ulgii	-	-	-	-
Central Gobi	12.2	31.9	41.1	46.8
Choibalsan	11.8	26.9	35.5	41.0
Choir-Nyalga	14.1	36.7	48.4	55.8
East Gobi	15.7	42.5	56.0	64.6
Ikhs Bogd	0.7	1.7	2.1	2.3
Kharkhiraa	30.8	63.7	77.8	85.8
Mongol-Altai	64.3	132.8	162.2	178.8
Ongi River	5.2	12.6	15.5	17.2
Orkhon-Selenge (North)	34.0	69.9	85.1	93.7
Orkhon-Selenge (South)	4.2	9.2	11.6	13.0
Southern Khangai	7.6	15.9	19.5	21.5
South Gobi	61.8	148.6	181.8	200.7
Sukhbaatar	2.9	7.8	10.2	11.8
Tamsag	52.5	113.8	143.3	160.8
Trans-Altai	20.9	50.5	61.6	68.0
TOTAL	338.7	764.5	951.8	1,061.9

Source: MNEC

At Tavan Tolgoi; a coal sample from previous core drilling was collected by the EPA backed team for adsorption isotherm testing.

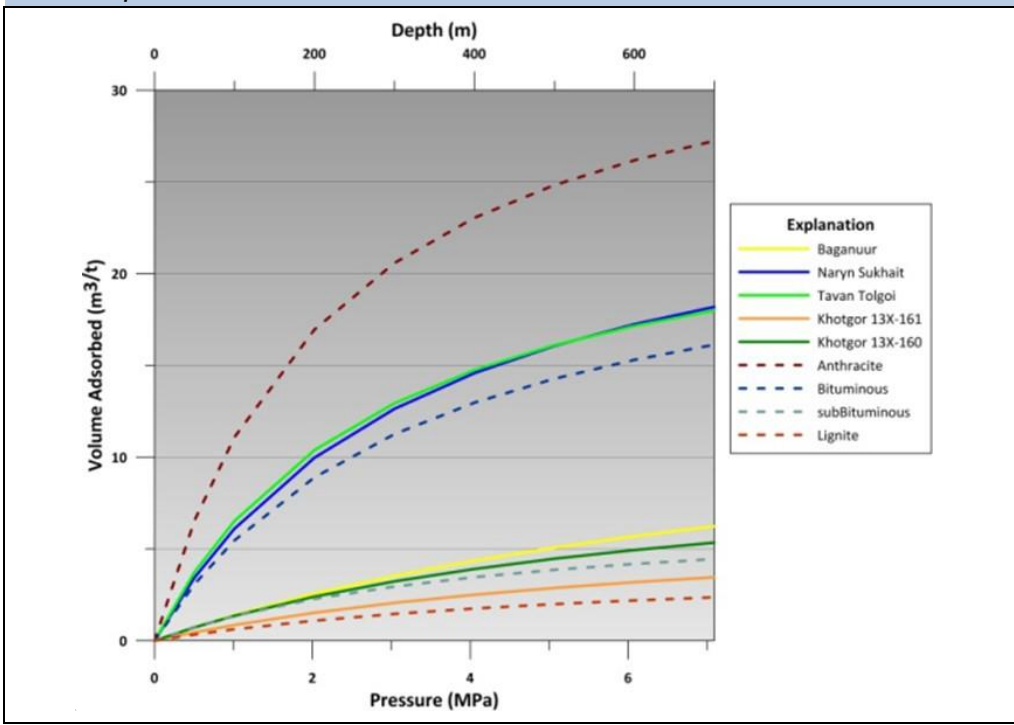
Fig. 31: Adsorption Isotherm Result in Tavan Tolgai



Source: MNEC

Figure 32 depicts the p50 type curves by rank and the isotherm curves for the Mongolian coal samples collected during the gas sampling activities.

Fig. 32: Adsorption Isotherm Type Curves by Rank and Mongolian Coal Deposits



Source: MNEC

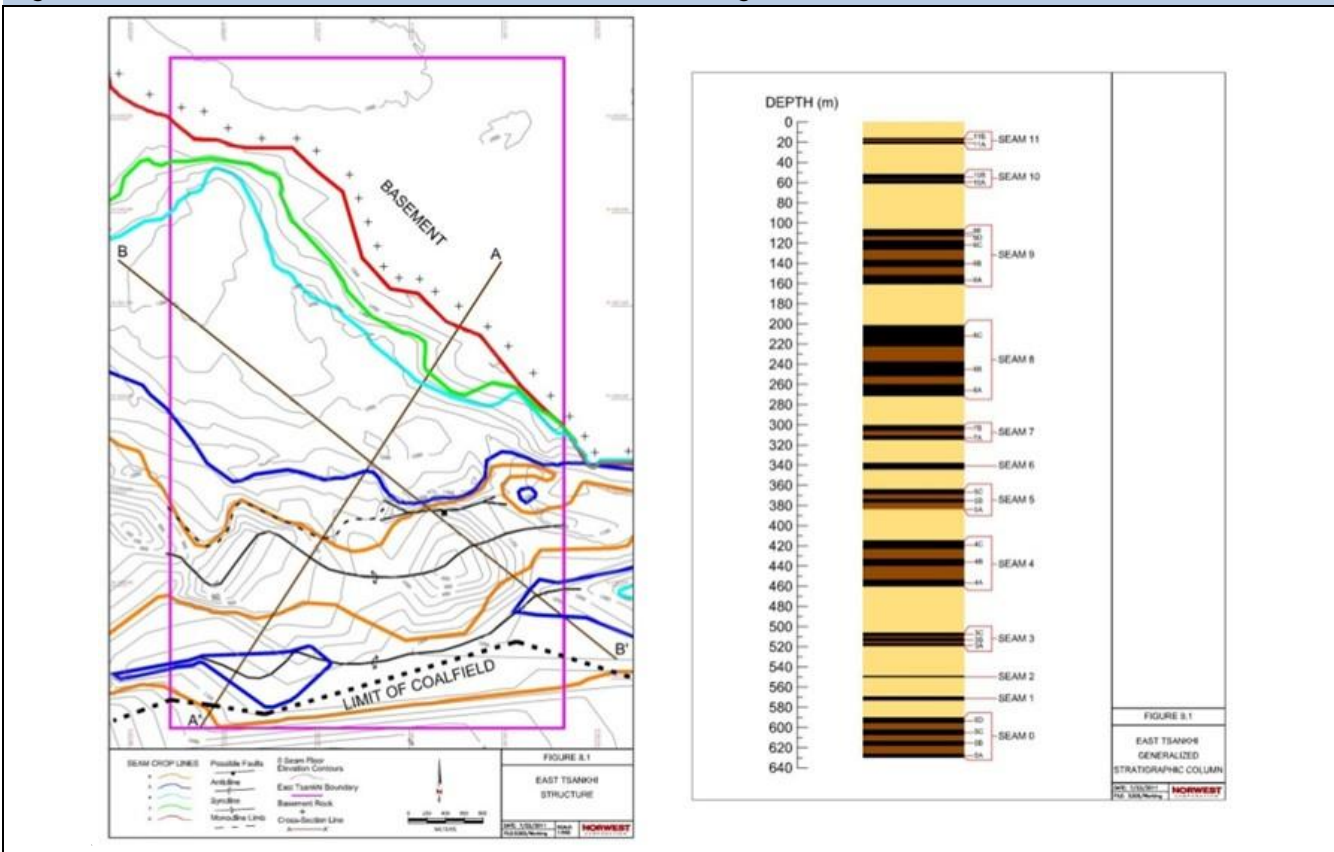
The Tavan Tolgoi deposit falls outside the EXR PSC, but it is the most extensively mined and studied area in the vicinity of where EXR will be testing. The deposit is the largest in Mongolia (total resources of 6 billion tonnes of coal, of which, 4.6 billion tonnes is thermal coal and 1.4 billion tonnes is coking coal) and extends for 60 km east-west and 6-16 km north-south, over an area of 600 km². The coal seams are found within the upper part of the Tavantolgoi Formation of Late Permian age. The Tavantolgoi Formation is 1,500m thick, with the upper coal-bearing section ranging in thickness from 600-1,000 m. The basic geologic structure is comprised of several gentle synclinal structures with faulting. The formation mainly trends east to west, and dips 0-15° at the north and 30° at the south. The coal-bearing sequence contains a total of 16 seams ranging in thickness from 3 to 30, with an overall average thickness of 165m. The coal seams are numbered from Seam 0 to Seam XV in ascending order, with twelve of the seams of minable thickness. Most of the coal seams vary in thickness laterally, often splitting and/or pinching out. Figure 33 lists the seam thickness and intervals of the mineable coal seams within the Tavan Tolgoi deposit (Source of information - Erdenes Tavan Tolgai JSC – Graeme Hancock, COO (2012))

Fig. 33: Tavan Tolgoi Coal Occurrence and Thickness

Coal Seam	Thickness (m)	Interval(m)	Coal Seam	Thickness (m)	Interval (m)
IX	2 – 72	60 - 70	XV	2 – 5	20 – 30
VIII	2 - 50	40 – 60	XIV	2 – 6	20 – 30
V	2 – 10	40 – 50	XIII	2 – 20	60 – 80
IV	3 – 20	60	XII	2 – 20	60 – 100
III	2 – 15	20 – 40	XI	2 – 10	60 – 110
0	2 – 30		X	2 – 10	50 - 70

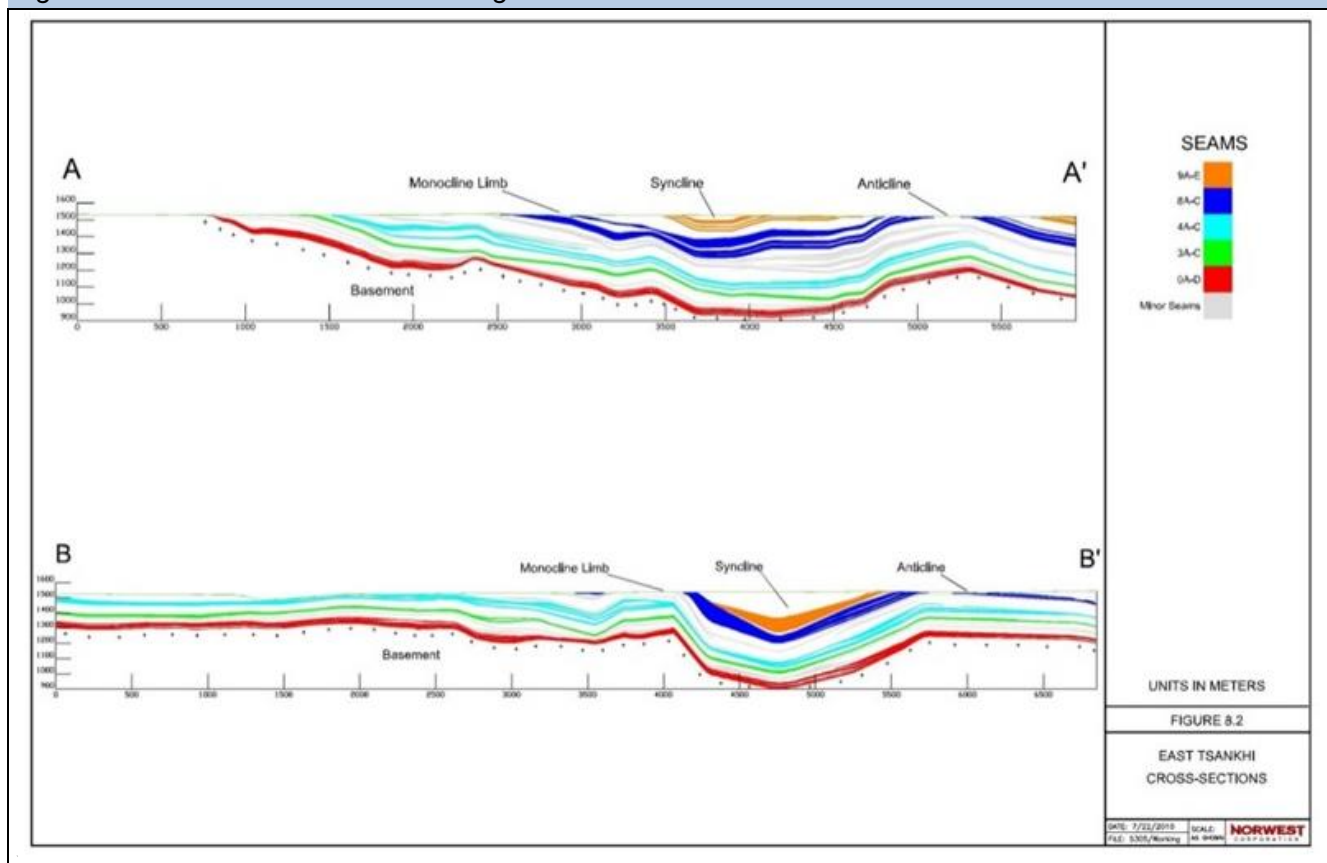
Source: Erdenes Tavan Tolgai JSC – Graeme Hancock, COO (2012)

Fig. 34: Coal Seams and Cross Section at Tavan Tolgai



Source: Erdenes Tavan Tolgai JSC – Graeme Hancock, COO (2012)

Fig. 35: Cross section of Tavan Tolgai



Source: Erdenes Tavan Tolgai JSC – Graeme Hancock, COO (2012)

In 2011 Dr. Sc. B. Bayarsaikhan, of MRA's Coal Research Department, calculated the Tavan Tolgoi deposit contained a 54 billion cubic meter methane gas resource. It was by far the largest of the 22 coal mines in the study.

Fig. 36: CBM Resources of the main coal deposits in Mongolia

Coal basins	Resource, Million tonnes	CH ₄ content, m ³ /tonnes	CH ₄ resource, million m ³
Nuurst Khotgor	143.3	4.53	715.7
Khar Tarvagatai	19.73	2.41	52.3
Khushuut	88	4.81	467
Zeegt	4.58	3.26	16.4
Mogoiingol	4.1	2.55	11.5
Saikhan Ovoo	28.3	6.51	203.2
Uvurchuluut	3.8	1.42	5.9
Bayanteeg	29.7	2.83	92.7
Tevshiingovi	588	2.83	1835.4
Tavantolgoi	6,400	7.65	53,938.1
Shariingol	61.3	2.97	200.9
Nalaikh	58.85	2.97	192.9
Baganuur	511	2.92	1,642.9
Shivee Ovoo	563	2.97	1,845.2
Chandganatal	123	1.84	249.6
Talbulag	81.5	2.69	241.7
Aduunchuluun	241.26	1.42	376.5
Nariin Sukhait	21.84	3.4	81.8
Ulaan Ovoo	53.98	3.68	219
Khuut	87.5	1.84	177.5
Uvdughudag	159.2	1.84	323
Amangol	1,500	3.11	5,150.3
Total	10,771.94		68,039.5

Source: Dr. Sc. B. Bayarsaikhan

Most recently, in 2014, Erdenes Tavan Tolgoi signed a MOU with KOGAS to conduct a CBM survey in the Borteeg block of Tavan Tolgoi coal deposit. Borteeg is located in the southern part of the deposit. In 2014, two boreholes with depths of 783.5 (M-05) and 933 (M-01) meters were drilled for the purpose of investigating coal-bed methane content.

Fig. 37: M-05 Well, Gas Analysis

Depth (m)	N ₂ (%)	CH ₄ (%)	CO ₂ (%)
363.0~363.4	9	88.8	2.2
570.0~571.0	11.6	84.8	3.5
623.0~623.3	23.2	73.3	3.5
626.5~626.7	68.7	30.4	1
630.0~631.5	3.9	92.1	4.1
635.5~635.7	49.5	48	2.5
654.5~655.6	0.8	93.3	5.8

Source: Erdenes Tavan Tolgoi, KOGAS, *The Potential for Methane Gas Development in Mongolia*

In 2015, the boreholes were further tested to estimate methane reserves. The coal resource in the Tavan Tolgoi Coalfield is estimated to be 6,400 million tonnes (to 1,000 meters) and around 6,120 million tonnes are from the major coal seams numbers 7, 10, 14, 15, 16, and 17, at about 300–1,000 meters depth. The gas resource in these six seams was estimated at 51bn Nm³.

Fig. 38: M-05 Well, Gas Analysis

Seam	Depth, m	Thickness, m	Coal Resource, tonnes	Averaged gas, Nm ³ /tonne	CBM Gas Resource (GIP)*	
					Nm ³	Million tonnes
#7	309.0-318.1	9.1	693,333,333	0.06	41,600,000	0.033
#10	462.1-497.8	35.7	2,720,000,000	11.69	31,796,800,000	24.929
#14	623.2-637.0	13.8	1,028,571,429	12.06	12,404,571,429	9.725
#15	654.1-656.8	2.7	205,714,286	3.06	629,485,714	0.494
#16	691.5-705.5	14	1,066,666,667	5.19	5,536,000,000	4.34
#17	708.1-714.0	5.9	411,428,571	1.63	670,628,571	0.526
Total		81.2	6,125,714,286		51,079,085,714	40.05

Source: Erdenes Tavan Tolgoi, KOGAS, *The Potential for Methane Gas Development in Mongolia*

It should be noted that there is a wide range of CH₄ and gas contents measured across the different seams.

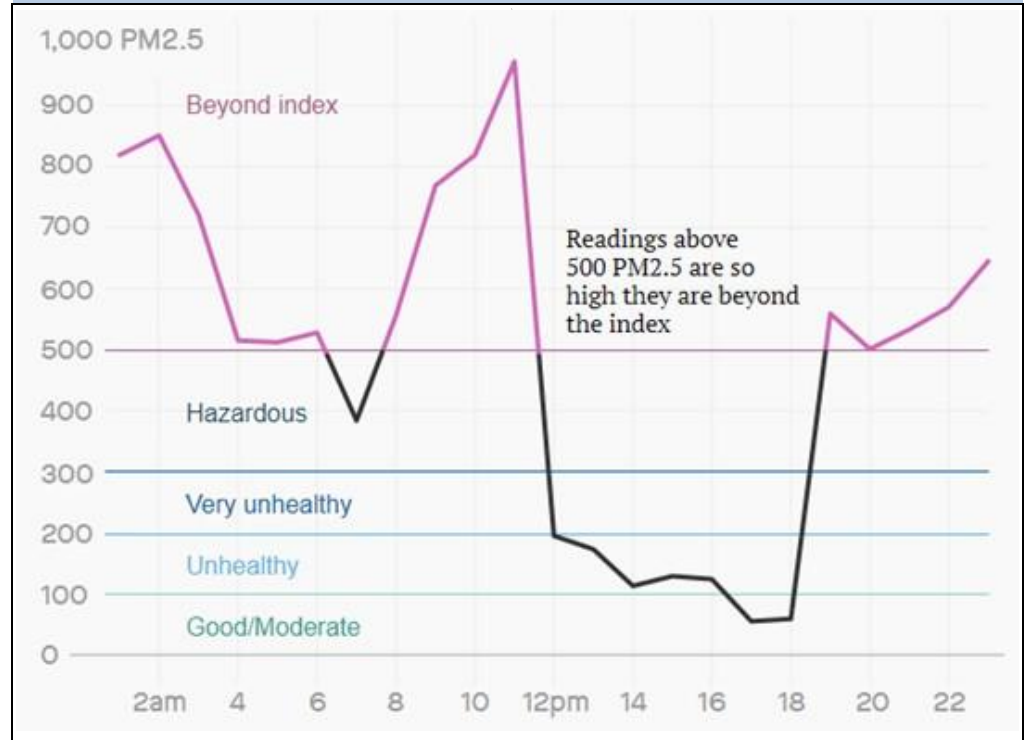
Domestic Opportunity for CBM

Coal mining is one of the largest industries in Mongolia and is a major contributor to GHG emissions (particularly methane).

Mongolia contains vast coal resources within 15 large-scale coal bearing basins. There are around 320 coal deposits and occurrences (80 deposits and 240 occurrences). Total geological coal resources are estimated at approximately 150 billion tons, including about 24 billion tons explored. Currently, there are 29 operating coal mines.

The result is that the majority of power generation and heating in Mongolia is sourced from coal. This has resulted in Ulaanbaatar (45% of Mongolians now live here) being regarded as the most polluted capital Cities in the World.

<https://time.com/longform/ulan-bator-mongolia-most-polluted-capital/>

Fig. 39: Hourly Air Quality Readings in Ulaanbaatar, 09/01/2019

Source: US Embassy, Ulaanbaatar. Lines denote simplified EPA air quality guide levels

As a result, starting in May, the government of Mongolia has introduced a raw coal burning ban in the capital, as part of their efforts to clean up the city's air.

<https://www.who.int/bulletin/volumes/97/2/19-020219/en/>

The potential to displace coal with gas for heating and power generation is obvious.

It has been proposed that CMM (or CBM) could be used domestically as compressed natural gas (CNG) for vehicle fuelling, liquefied natural gas (LNG) for vehicles and other uses, as a chemical feedstock along with electricity generation

Fig. 40: CMM Utilization and Gas Quality

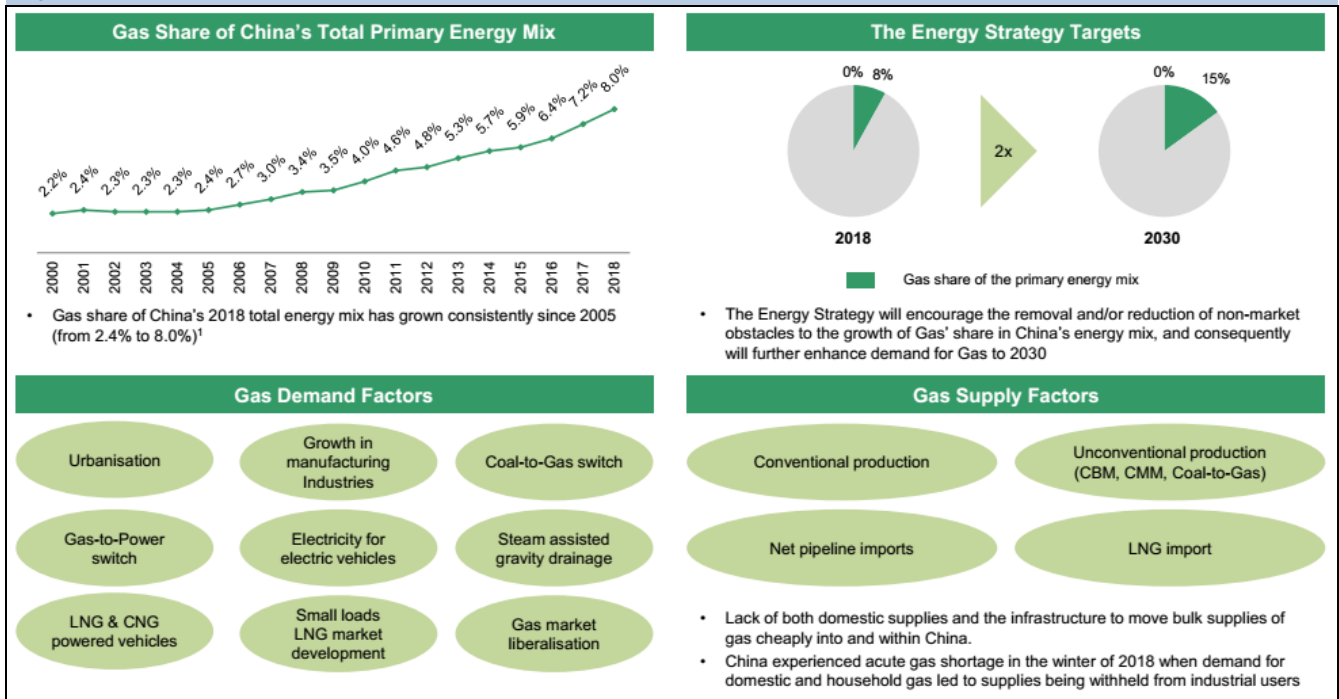
Option	Gas Quality Necessary	Applicability
Direct use on-site	Medium	Suitable for most mines, can be used to fuel coal preparation plants, heat space and water, and treat water.
On-site electricity generation	Medium	Most suitable for mines with large electricity needs, especially those which already produce their own electricity.
Sale into an Existing Gas Distribution Transmission System	High	Most suitable for mines using pre-mining degasification and located near existing high quality gas pipelines.
	Medium	Most suitable for mines located near medium quality pipelines.
Sale directly to an industrial, residential, or commercial user	Medium	Suitable for mines located near industrial or commercial facilities, or near residential areas.
Chemical Feedstock	High	Most suitable for very gassy mines using degasification techniques that recover nearly pure methane and are located near chemical plants.

Source: MNEC

The China Export Opportunity

China's demand for gas has grown strongly over the past decade, as the country also tries and move away from coal and reduce pollution.

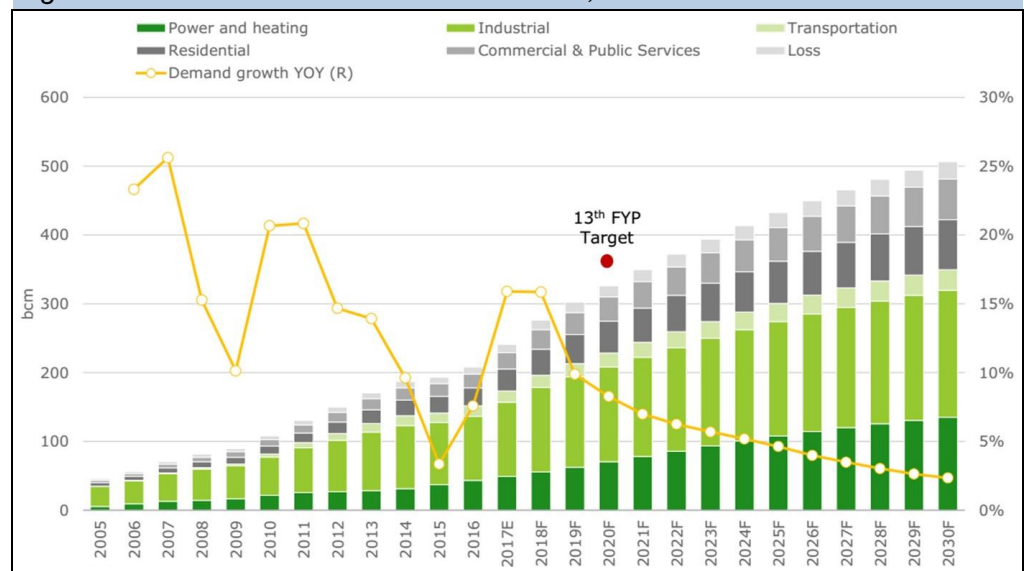
Fig. 41: China Gas Fundamentals



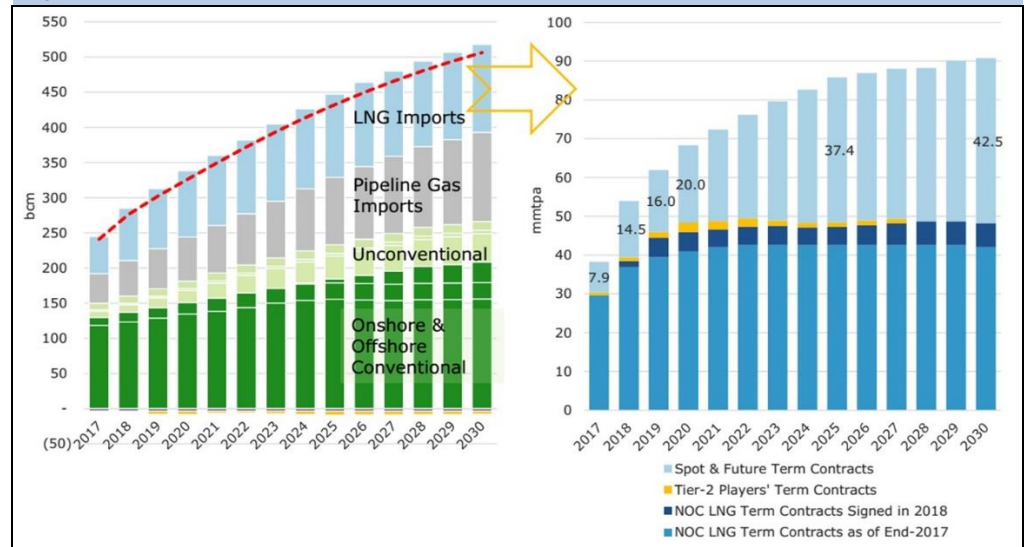
Source: G3E

Underpinned by Government targets, Chinese demand growth shows no sign of slowing.

Fig. 42: China Gas Demand Forecast, 2030

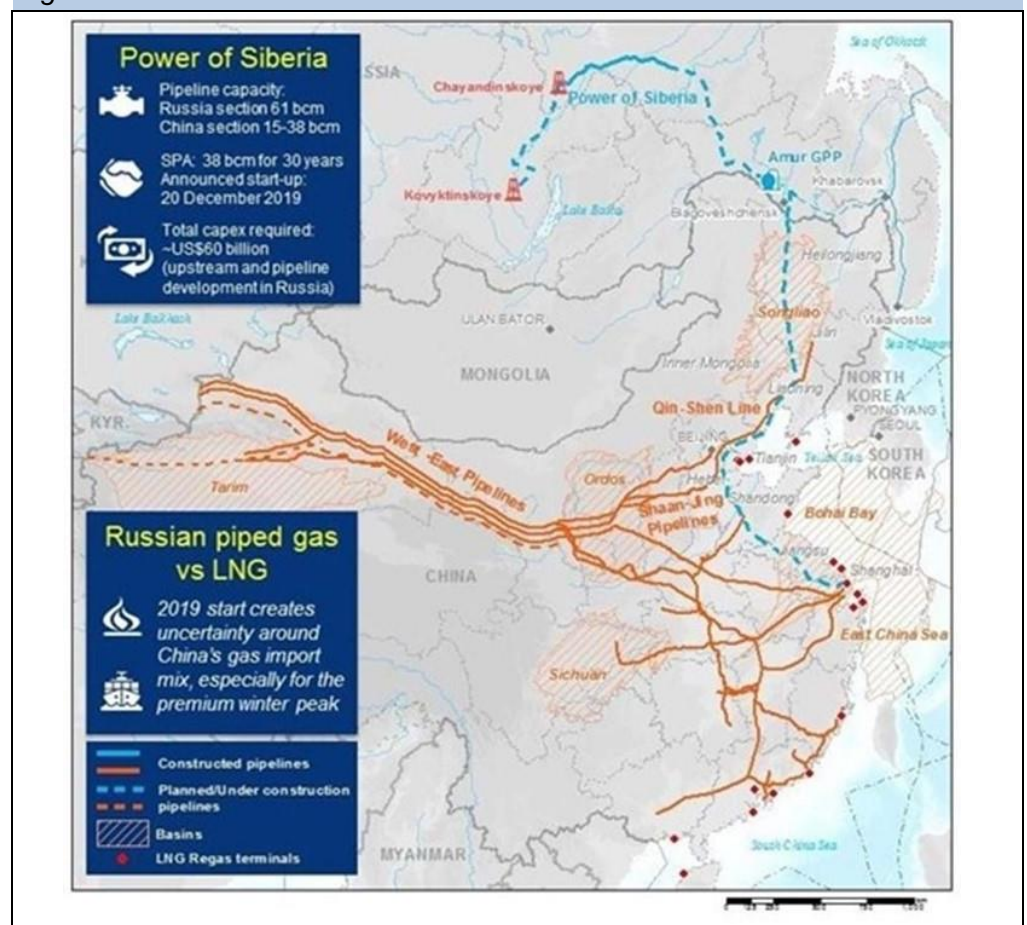


With domestic supply unable to keep pace with demand, China has become a major importer of gas.

Fig. 43: China Gas Supply-Demand and Imported LNG

Source: SIA Energy

China focused energy consultants, SIA Energy, estimate that LNG imports will grow to 82Mtpa by 2025, 98Mtpa by 2030 and 126Mtpa by 2040. On top of this cross-border pipeline capacity could increase from 65 bcm/a to 181 bcm/a. The next import pipeline to come onstream will be the 'Power of Siberia', expected to start up in December 2019.

Fig. 44: Power of Siberia

Source: SIA Energy

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