

Jade Gas Holdings aims to support Mongolia's clean energy transition

Jade Gas Holdings Limited (JGH) wants to be part of the global momentum shift toward the use of cleaner fuels in the energy supply chain. Mongolia currently relies on high CO₂ emission and high air polluting brown coal for its primary energy source. The current market conditions provide a positive backdrop for JGH to advance the Tavan Tolgoi Coal Bed Methane (TT CBM) Project in Mongolia that it has a 60% investment in.

Given the co-investor (40%) in the TTCBM permit is the Mongolian State-owned entity Erdenes Methane LLC, we believe the project is likely to be progressed as quickly as feasibly possible.

How much gas does the TTCBM permit have?

Based on an assessment by RISC, an independent technical specialist advisory firm, the “Best” case estimate for TTCBM has:

- **a gross prospective resource of over 1.0 Tcf,**
- supporting up to 4,043 wells,
- producing on average 0.45 Bcf of gas per well (i.e. ultimate recovery per well) over the life of a well.

Who's going to buy the gas?

JGH has signed a non-binding gas offtake memorandum of understanding (MOU) for potential gas sales to Mongolia's largest liquified natural gas (LNG) importer and gas distributor, UB Metan LLC (UBM). We note UBM is also a 7.9% shareholder in JGH.

The MOU plans to work towards establishing a commercial long term gas sales agreement post the proposed 2023 pilot production program. As part of the proposal, JGH may look to UBM to provide the above ground infrastructure for the compression of the gas before UBM sells it through its own distribution network.

Valuation

We initiate with a base case valuation of A\$0.20.

Our valuation is based on JGH ramping up production at its 60% owned Tavan Tolgoi Coal Bed Methane (TTCBM) Project) to 400 producing wells by FY33 with the wells having an average daily production rate of ~62 thousand standard cubic feet per day (mscfd) and 20-year lives.

We note that JGH prospective resource estimate for the Tavan Tolgoi area would ultimately recover 1,828 Bcf from 4,043 wells.

We note if we assume JGH ramps up production wells to 2,000 by FY37, our valuation lifts to \$0.69.



Jade Gas Holdings Limited (JGH) is a gas exploration company focused on the coal bed methane (CBM) potential of Mongolia. JGH's flagship project is the Coal Bed Methane gas project over the Production Sharing Agreement (PSA) area of Tavan Tolgoi XXXIII unconventional oil basin, (the Tavan Tolgoi Coal Bed Methane (TTCBM) Project). JGH's strategy is to seek to develop the project so that gas produced may provide a reliable supply option to the oil and gas market and to the power sector in Mongolia.

Stock	JGH.ASX
Price	A\$0.06
Market cap	A\$73m
Valuation	A\$0.20

Company data

Shares on issue	1209.4m
Cash (Dec 2021)	A\$4.4m

Next news

Q2 CY2022- Red Lake-5 & 6 well results to provide coal seam permeability and gas saturation levels for TTCBM permit

2H CY2022 - Independent 2C contingent resource for Red Lake area of TTCBM

2H CY2022 - Independent 2U prospective resource for Shivee and Eastern Gobi permits

JGH Share Price (A\$)



Source: FactSet

David Fraser
david.fraser@mstaccess.com.au

Financial data table

Jade Gas Holdings						JGH-AU					
Year end 31 December											
MARKET DATA		A\$				12 month relative performance versus S&P/ASX 200 Energy Index					
Price	A\$										
52 week high / low	A\$		0.09	0.04							
Valuation	A\$										
Market capitalisation	A\$m										
Shares on issue (basic)	m										
Options & performance shares	m										
Potential diluted shares on issue	m										
INVESTMENT FUNDAMENTALS		FY21	FY22E	FY23E	FY24E	PROFIT AND LOSS (A\$m)		FY21	FY22E	FY23E	FY24E
EPS Underlying	¢	(1)	(4.6)	(1.2)	(0.1)	Sales	\$m	0.0	0.0	0.7	3.3
EPS Reported	¢	(0.7)	(4.6)	(1.2)	(0.1)	Operating costs	\$m	(5.9)	(2.2)	(2.3)	(2.4)
P/E Underlying	x	n/m	n/m	n/m	n/m	EBITDAX	\$m	(5.9)	(2.2)	(1.6)	1.0
P/E Reported	x	n/m	n/m	n/m	n/m	Exploration & development	\$m	0.0	0.0	0.0	0.0
Dividend	A¢	0.0	0.0	0.0	0.0	EBITDA	\$m	(5.9)	(2.2)	(1.6)	1.0
Payout ratio	%	0%	0%	0%	0%	Depreciation & amortisation	\$m	(0.1)	(0.1)	(0.1)	(0.3)
Yield (Y/E / spot)	%	0.0	0.0	0.0	0.0	EBIT	\$m	(5.9)	(2.3)	(1.7)	0.7
Franking	%	0.0	0.0	0.0	0.0	Net interest	\$m	(0.0)	(0.0)	0.0	0.1
Gross Yield	%	0.0	0.0	0.0	0.0	PBT pre impairments / unusual	\$m	(5.9)	(2.3)	(1.7)	0.7
Free cash flow	\$m	(4)	(4)	(4)	(3)	Impairments	\$m	0.0	0.0	0.0	0.0
Free cash flow per share	¢	(0)	(8)	(2)	(1)	Pretax Profit	\$m	(5.9)	(2.3)	(1.7)	0.7
Free cash flow yield	%	n/m	n/m	n/m	n/m	Tax expense	\$m	0.0	0.0	0.0	0.0
Year end share price / Spot	A\$	0.070	0.060	0.060	0.060	NPAT	\$m	(5.9)	(2.3)	(1.7)	0.7
Year end shares	m	-	100	190	226	Minority interests	\$m	(0.2)	0.0	(0.0)	(1.0)
Average shares on issue	m	859	50	145	203	Reported NPAT	\$m	(5.8)	(2.3)	(1.7)	(0.3)
Market cap (Y/E / Spot)	\$m	0	6	11	14	BALANCE SHEET(A\$m)		FY21	FY22E	FY23E	FY24E
Net debt /(cash)	\$m	(4)	(5)	(5)	(6)	Cash	\$m	4.4	4.8	5.3	6.1
Enterprise value	\$m	-4	1	6	9	Receivables	\$m	0.1	0.1	0.2	0.2
EV/EBITDAX	x	n/m	n/m	n/m	9.1	Other	\$m	0.7	0.7	0.7	0.7
Net debt / Enterprise Value	x	1.0	(3.3)	(0.8)	(0.7)	Current assets	\$m	5.2	5.7	6.1	6.9
NTA	cps	#DIV/0!	10.50	6.72	7.19	Plant and equipment	\$m	0.8	0.7	0.6	0.6
						Exploration and evaluation assets	\$m	2.6	4.5	6.4	10.1
						Right of use asset / Other	\$m	0.3	0.3	0.3	0.3
						Non current assets	\$m	3.7	5.5	7.3	11.0
						Total Assets	\$m	8.9	11.2	13.5	18.0
						Payables	\$m	0.4	0.4	0.4	0.4
						Borrowings	\$m	0.0	0.0	0.0	0.0
						Other	\$m	0.1	0.1	0.1	0.1
						Current liabilities	\$m	0.5	0.5	0.5	0.5
						Borrowings	\$m	0.3	0.3	0.3	0.3
						Other	\$m	0.3	0.0	0.0	0.0
						Non current liabilities	\$m	0.6	0.3	0.3	0.3
						Total Liabilities	\$m	1.1	0.8	0.8	0.9
						Equity	\$m	15.3	20.4	24.4	28.4
						Retained earnings	\$m	(7.5)	(9.8)	(11.4)	(11.7)
						Reserves	\$m	0.1	0.0	0.0	0.0
						Minority Interests	\$m	(0.1)	(0.2)	(0.3)	0.4
						Shareholder's equity	\$m	7.8	10.4	12.6	17.1
						CASH FLOW (A\$m)		FY21	FY22E	FY23E	FY24E
						OCF - pre interest & tax	\$m	(2.2)	(2.2)	(1.6)	1.0
						Net corporate interest	\$m	0.1	(0.0)	0.0	0.1
						Tax Paid	\$m	0.0	0.0	0.0	0.0
						Other	\$m	0.0	0.0	0.0	0.0
						Operating cash flow	\$m	(2.1)	(2.2)	(1.6)	1.0
						PPE	\$m	(0.4)	0.0	0.0	0.0
						Development capex	\$m	0.0	0.0	(2.0)	(4.0)
						Exploration & evaluation	\$m	(1.4)	(2.0)	0.0	0.0
						Other investing cash flow	\$m	(0.0)	0.0	0.0	0.0
						Net investing	\$m	(1.8)	(2.0)	(2.0)	(4.0)
						Net movement in Equity	\$m	8.1	5.0	4.1	3.9
						Cash dividends Paid	\$m	0.0	0.0	0.0	0.0
						Net debt movement	\$m	(0.0)	0.0	0.0	0.0
						Other	\$m	(0.0)	(0.3)	0.0	(0.2)
						Net Financing	\$m	8.1	4.7	4.1	3.8
						Change in cash	\$m	4.2	0.5	0.5	0.8

License Locations



Resources

Tavan Tolgoi Coal Bed Methane Project Prospective Resources				
	Unit	Low	Best	High
Prospective Resource	Bcf	216	1,044	3,062

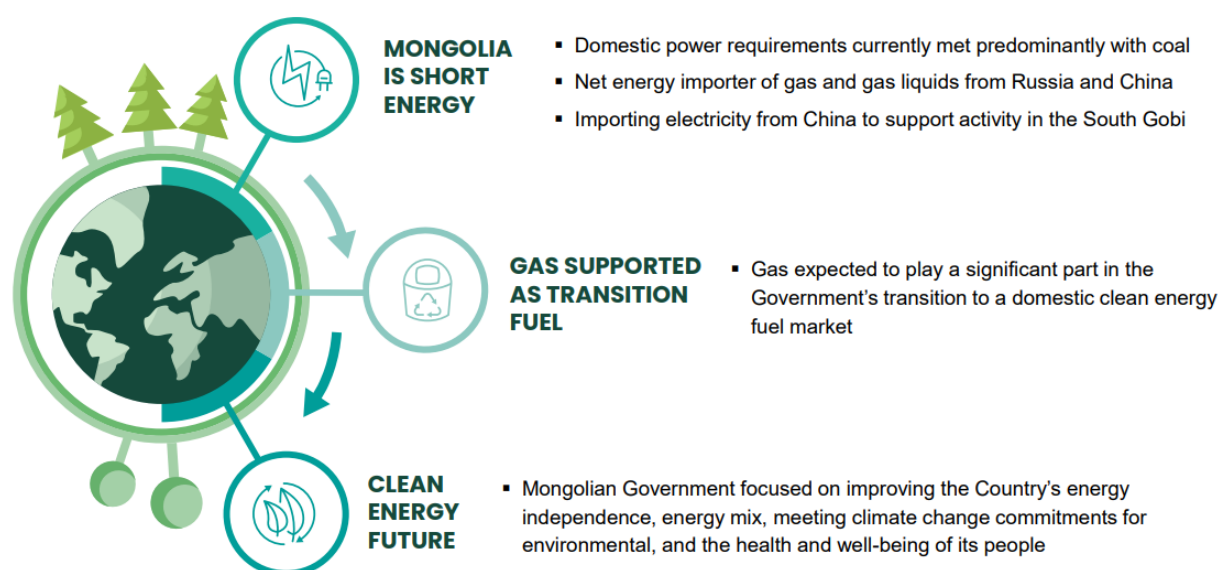
Source: Company, MST

Investment Thesis:

Jade Gas Holdings Limited (JGH) wants to be part of the global momentum shift toward the use of cleaner fuels in the energy supply chain. There is a growing acceptance that a shift towards a cleaner energy supply will require natural gas during the transition period. These market conditions provide a positive backdrop as JGH advances its Tavan Tolgoi Coal Bed Methane (TT CBM) Project in Mongolia.

JGH is a gas exploration company which has entered into two joint ventures for the exploration and exploitation of coal bed methane (CBM) resources in Mongolia. The flagship project is the TT CBM Project which is a 60/40 joint venture with Mongolian State-owned entity Erdenes Methane LLC to explore for and develop the coal seam gas (CSG) resources in the world class Tavan Tolgoi Coal Field area in the South Gobi region of Mongolia.

Figure 1 – Mongolia is Short Energy



Source: Company

JGH will operate and manage the TTCBM Project through its subsidiary Methane Gas Resource LLC (MGR), a joint venture (JV) company partnering with Erdenes Methane LLC (EM), the representative company for the Mongolian Government. The JV was formed with the intention to explore, develop and produce gas from the TTCBM Project located in the South Gobi region of Mongolia.

It is the strategy of JGH to seek to develop all of its projects so that gas produced may, in the long-term, provide a reliable supply option to the oil and gas product market and to the power sector in Mongolia, both to the capital city of Ulaanbaatar and also into regional areas.

Achievement of this strategy would partially displace imported gas and gas liquid products and reduce higher carbon emitting fuel sources such as coal and diesel, the result of which would be the improvement in air quality of Ulaanbaatar city and other towns.

Supporting Mongolia's energy transition is a key priority and success for JGH will result in:

- Improving Mongolia's energy independence
- Supporting Mongolia's significant future energy demand growth
- Decarbonising the economy by improving the energy mix with cleaner fuel sources
- Environmental and health benefits for the people and country of Mongolia.

JGH has recently acquired an additional two new prospective CBM permits, Shivee Gobi and Eastern Gobi. Both permits cover an area of over 18,000km² and are well located within existing coal basins and near coal deposits and mines.

Figure 2 – Jade Gas Holdings Permit Locations



Source: Company

What is the prospective resource at TTCBM?

As part of the process when Jade Gas was acquired a Prospectus was lodged with the ASX on 30 September 2021. As part of that report an independent technical specialist valuation report was prepared by RISC Advisory (RISC).

Based on their assessment, RISC stated that for TTCBM, their “Best” case estimate was:

- a gross prospective resource of 1,044 Bcf
- supporting up to 4,043 wells,
- producing on average 0.45 Bcf of gas (i.e. ultimate recovery per well) over the life of a well.

Assuming a 20 year well life, this equates to ~62 mscfd per well of gas production.

Market Opportunity for Jade

As there is presently insufficient indigenous production of oil or gas within Mongolia, nor suitable refinery capacity, Mongolia meets its oil and gas requirements through importation of gas and other oil and gas products from its neighbours. Furthermore, the switching from coal to natural gas to supply Mongolia’s growing energy requirements needs is expected to align with the Mongolian Government’s push for an alternative source of future energy production to its traditional supply.

It is the intention of JGH that if the TT CBM Project can produce coal seam gas economically, JGH will establish gas sales agreements with customers within the country who are currently meeting their requirements through imports of

gas and other petroleum products. Furthermore, JGH intend to expand the market for natural gas into other areas of the economy not currently using gas, by providing a reliable and long-term supply source.

Such sales opportunities may include, but are not limited to:

- Compressed natural gas (CNG) for delivery via truck to local towns for small scale commercial use;
- CNG or LNG to be delivered via truck into the capital city of Ulaanbaatar to be used in the transport sector as fuel for heavy vehicle and other transport vehicles;
- Sales of coal seam gas to regional mining projects via newly established pipeline(s) to be used as fuel for heavy mining fleet and/or gas fired power generation to meet the needs of the mining operation(s);
- Sales of coal seam gas into the capital city of Ulaanbaatar, via the establishment of a c.540 km pipeline. This gas could be used as fuel supply for heavy vehicle and other transport fleet as well as for fuel for natural gas fired power station(s). This would require the establishment of gas fired power generation in the city or conversion of the existing power generation capacity from coal fuelled to natural gas fuelled; and
- Sales of coal seam gas via a yet to be constructed pipeline into the north of China, linking with the existing and extensive transmission network in the region.

With that in mind JGH has signed a MOU with UB Metan

JGH has signed a non-binding gas offtake memorandum of understanding (MOU) for potential gas sales to Mongolia’s largest liquified natural gas (LNG) importer and gas distributor, UB Metan LLC (UBM).

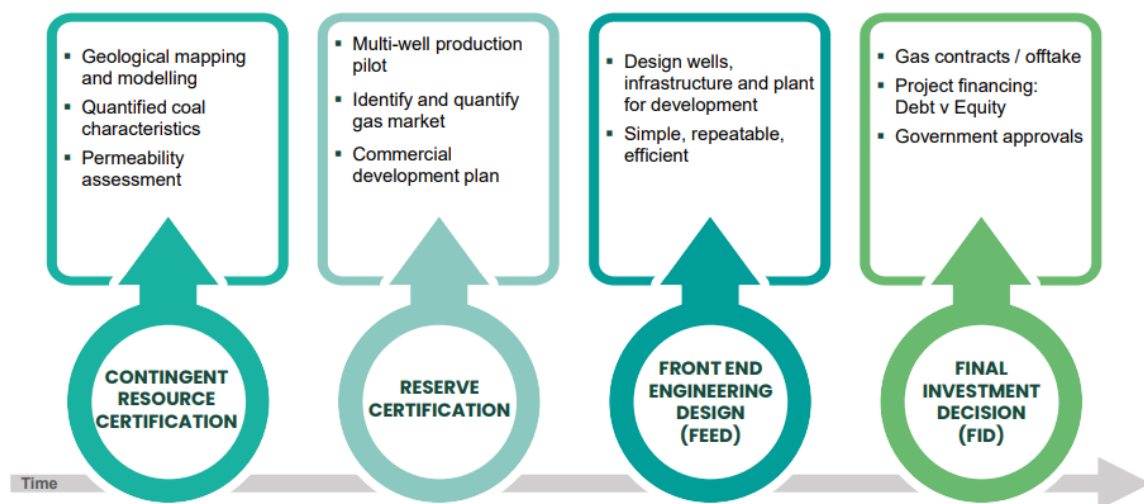
NB: UBM is an ~8% shareholder in JGH.

The MOU plans to work towards establishing a commercial long term gas sales agreement post the proposed 2023 pilot production program. As part of the proposal, JGH may look to UBM to provide the above ground infrastructure for the compression of the gas before UBM sells it through its own distribution network.

Potential near-term catalysts and news flow

- Q2 CY2022 – Completion of wells Red Lake - 5 & 6 with news on gas composition, coal bed permeability, gas content and gas saturation levels of the coal seams in the wells in the TTCBM permit.

Figure 3 – JGH’s path to production

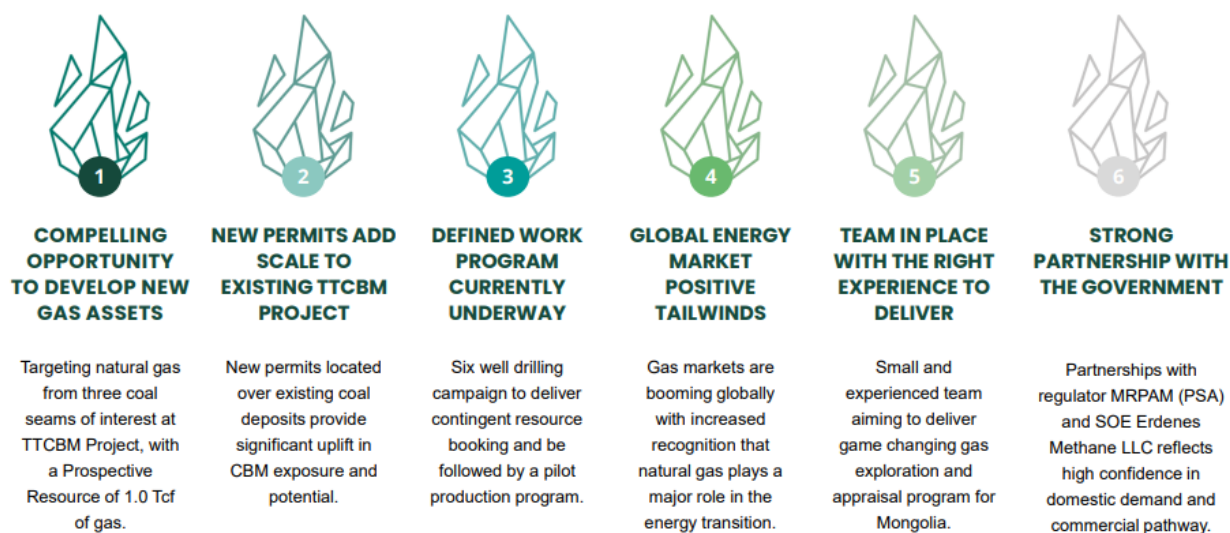


Source: Company

- 2H CY2022 - Conversion of a portion of the TTCBM prospective resource to a contingent resource. NB: Our base case model forecasts accumulated production from TTCBM of 214 bcf which represents ~20% of the 1,024 Bcf of prospective resource estimated by RISC.

- 2H CY2022 - Independent 2U prospective resource for Shivee and Eastern Gobi permits
- CY2023 – JGH to drill two appraisal wells and two to three exploration wells which could be put into production as part of the pilot program.
- CY2024 and CY2025 – Finalise gas field development and start commercial production.

Figure 4 – Why invest in Jade Gas Holdings?



Source: Company

Material upside from current share price to an expanded pilot program valuation

We initiate with a base case valuation of A\$0.20.

Our valuation is based on JGH ramping up production at its 60% owned Tavan Tolgoi Coal Bed Methane (TTCBM) Project) to 400 producing wells by FY33 with the wells having an average daily production rate of ~62 mscfd and 20-year lives.

We note that the RISC prospective resource estimate for the Tavan Tolgo area would ultimately recover 1,828 Bcf from 4,043 wells.

We note if we assume JGH ramps up production wells to 2,000 by FY37, our valuation lifts to \$0.69.

Risks

Risks to our forecasts and valuation include sovereign and political risks associated with operating in Mongolia, exploration success and operating and development risks, permit application and permit renewal, joint venture risk, general regulatory risk, risk associated with drilling, insurance, substitution of gas, third party risk, environmental, commodity price volatility and exchange rate, reliance on key personnel, climate change risk, requirement for capital, changes in tax legislation and economic growth in Mongolia

Please see a more detailed explanation of risks associated with investing in JGH later in the report in our Valuation section.

Jade Gas Holdings Overview

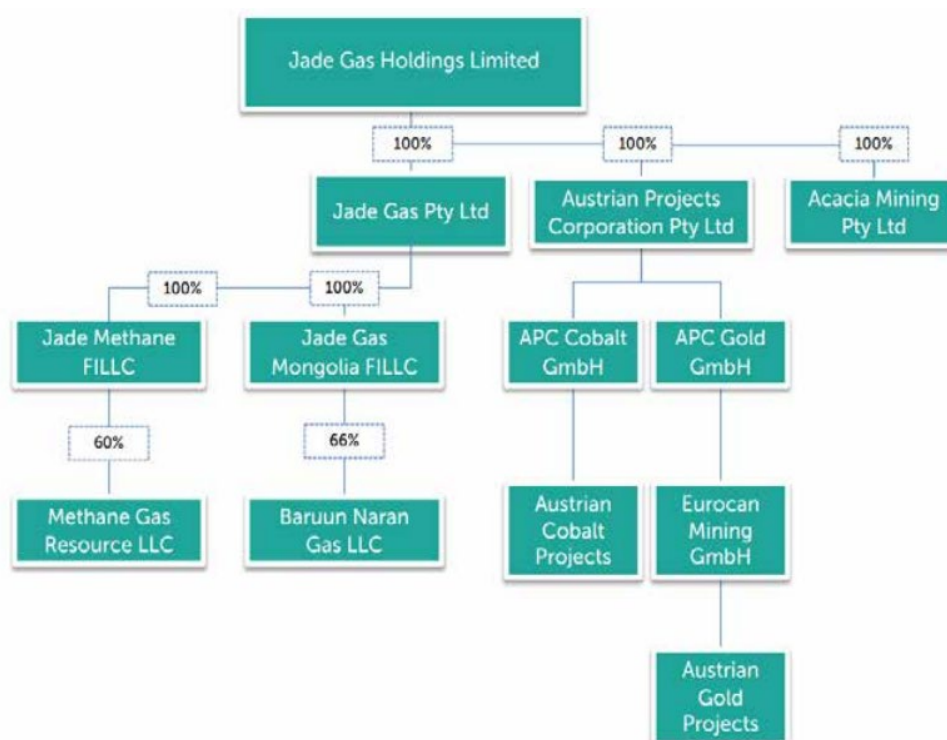
JGH has two wholly owned subsidiaries domiciled in Mongolia, being Jade Gas Mongolia FILLC (JGM) and Jade Methane LLC (JMM).

We note that JGH continues to hold a number of non-core assets that were part of the shell company that JGH acquired when it did a reverse takeover listing.

The assets held in the Austrian Projects structure are currently being sold (forecast to be non-material) leaving just the shelf companies.

The Acacia Mining entity holds a significant quantity of tax losses. Until JGH has determined it can not access these losses we expect the Acacia Mining entity to be retained.

Figure 5 – Jade Gas Holdings Group Structure



Source: Company

JGH holds a 60% interest in the TT CBM Project The flagship project of Jade is the 60/40 joint venture between JMM and Mongolian State-owned entity Erdenes Methane LLC (EM) for the exploration and exploitation of the CSG potential in licences over ~ 665 km² including and surrounding the Tavan Tolgoi coal field (largest coal mine in Mongolia with a 7.5 billion tonne resource) in the South Gobi region of Mongolia, known as the TT CBM Project.

The 60/40 joint venture interests between JMM and EM are held in Methane Gas Resource LLC (MGR), the joint venture operating company formed to explore, develop and produce gas from the TT CBM Project. The TT CBM Project involves the exploration and development of the coal seam gas resources of the Tavan Tolgoi coal field in the South Gobi region of Mongolia. The field is located in the Omnigovi Province in southern Mongolia, approximately 550 km from the capital city of Ulaanbaatar and 85 km to the east of provincial capital, Dalanzadgad.

Jade also holds a 66% interest in Baruun Naran Gas LLC Jade, through its subsidiary JGM, a joint venture operating company formed to explore, develop and produce gas from within the coal mining licence (MV-014493). Khangad Exploration LLC holds the remaining 34% equity in BNG.

JGM is nominated as the joint venture Operator of BNG. The project is referred to herein as the Baruun Naran Project.

Mongolia – Keen to provide its population cleaner energy

Presently the oil and gas sector in Mongolia is small relative to other natural resource-based sectors in the country. Currently, only natural gas associated with crude oil production is produced, and gas requirements are met through importation from neighbouring countries Russia and China.

It has been a focus of the Mongolian Government over recent years to reduce the country’s reliance on importation of energy (electricity) and energy products (oil and gas liquids) from neighbouring countries, and the Mongolian Government established in the State Policy on Energy for 2015-2030 an objective to become a net energy exporter.

With Mongolian Government level commitments to global climate change protocols, the level of interest and support for the exploration and development of cleaner fuel sources within the country has increased. Whilst currently an immature market, Jade foresees an increasing role for the use of natural gas in the energy supply mix of Mongolia. It is the strategy of Jade to seek to develop the TT CBM Project so that gas produced may, in the long term, provide a reliable supply option to the oil and gas product market and to the power sector in Mongolia, both to the capital city of Ulaanbaatar and also into regional areas.

Achievement of this strategy would partially displace the use of imported gas and gas liquid products, reduce the use of higher carbon emission emitting fuel sources such as coal and diesel, and reduce the reliance on imported electricity.

Tavan Tolgoi Coal Bed Methane Project

JGH’s flagship project is the Tavan Tolgoi Coal Bed Methane (TTCBM) Project. JGH’s joint venture (JV) partner, Erdenes Methane LLC (EM), was awarded a Production Sharing Agreement (PSA) over the TTCBM Project area in April 2020, after completion by Methane Gas Resource LLC (MGR) of the requirements of a Prospecting Agreement held by JV partner EM over the area.

Figure 6 – Tavan Tolgoi Coal Bed Methane Project Area and Well locations



Source: Company

In accordance with the joint venture agreements, JGH managed, fully funded and operated the fulfillment of the PSA requirements during that period. Following approval of the Cabinet of Mongolia in October 2020, the PSA rights and obligations were fully transferred to the joint venture company MGR.

JGH is nearing the end of a six well drilling campaign that is focused on the Red Lake area. To date four wells have reached total depth (TD), with extensive gas bearing coals extracted through coring. The extent of the gas bearing coals in the wells has varied from a total of 42 metres to 68 metres. As well as this, gas composition findings from Red Lake-1 have delivered methane of 98% in coal seam III, and 92.5% in coal seam IV. High gas content readings were also identified ranging from 11-15 m³ per tonne.

Tavai Tolgoi Production Sharing Agreement Terms

The initial term is for 10 years ((in phases of 4 years + 3 years + 3 years)

The first phase is for 4 years and carries a minimum work program expenditure of US\$ 5.5m.

- Year 1 – Two-three exploration wells ((300m-900m deep) and market research) - US\$1m
- Year 2 – Core and sample analysis – US\$1.5m
- Year 3 - Three -four appraisal wells – US\$1.5m
- Year 4 - Production plant build and development – US\$1.5m

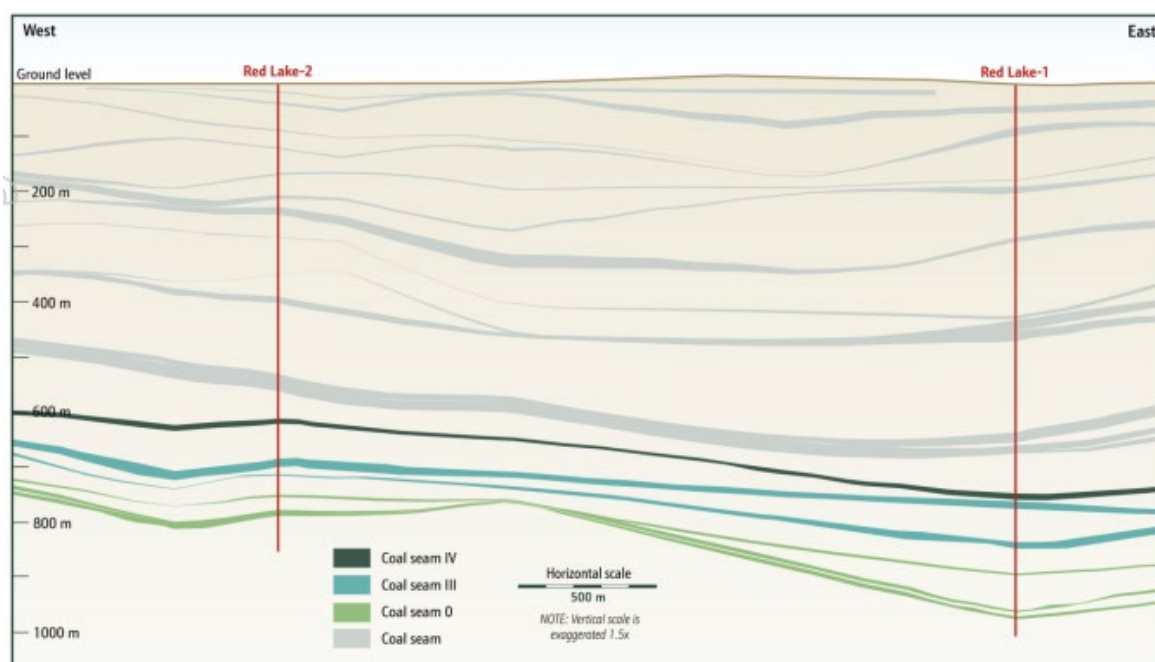
Current Drilling Program

The current six well drilling program is focused on delivering contingent resource certification. Two rigs are drilling to expedite the program. The drilling program is to primarily to determine the gas composition, the level of gas desorption, coal bed permeability and the gas saturation in the coal.

Red Lake-1

- Total depth reached at 1,012 m.
- Coal seams of interest intersected and cored between 730 m and 970 m depth.
- 145 m of coal core recovered of which 58 m was gas bearing.
- Gas composition: 98% methane in seam III, 92.5% methane in seam IV; gas content of 11-15m³/t

Figure 7 – Red Lake-1 and Red lake 2 Coal Seam Targets



Source: Company

Red Lake-2

- Total depth reached at 790 m.
- Coal seams of interest targeted at 600 to 800 metres depth.
- 131 m of coal core recovered of which 47 m was gas bearing.

Red Lake-3

- Total depth reached at 702 m.
- 82 m of coal core recovered of which 30 m was gas bearing.

Red Lake-4

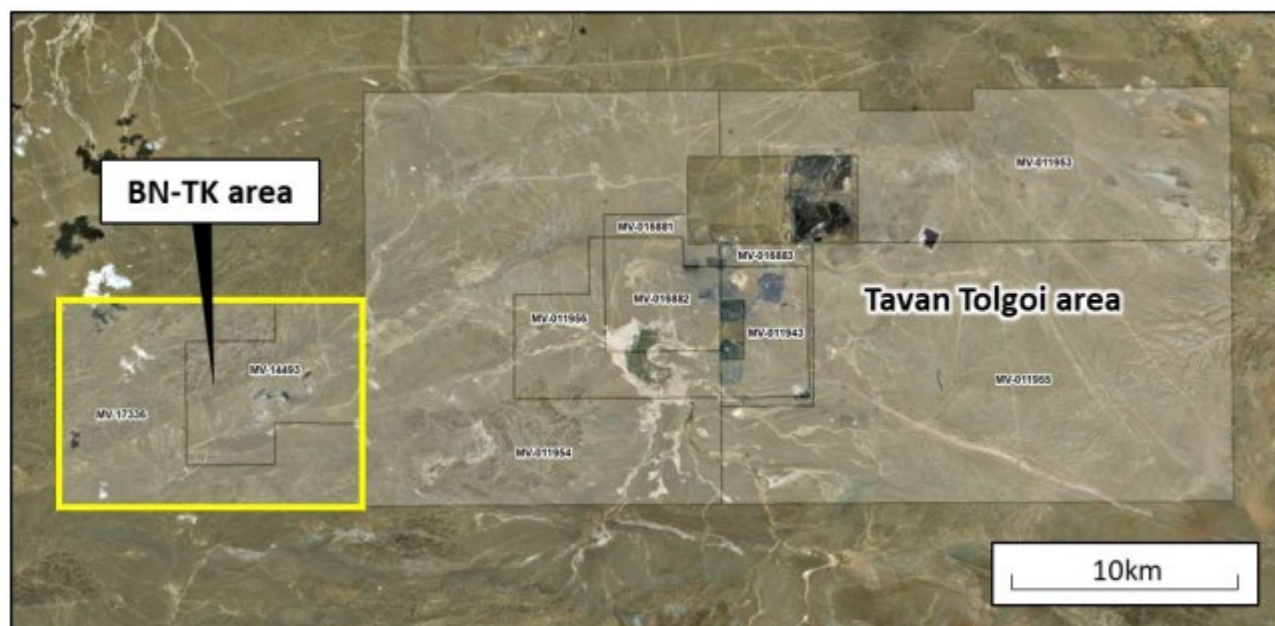
- Total depth reached at 864 m.
- 182 m of coal core recovered of which 65 m was gas bearing.

Baruun Naran

JGH originally entered into an agreement with Khangad Exploration to form a joint venture to explore for coal seam gas under the Baruun Naran (MV-14493) and Tsaikhar Khudag (MV-17336) coal mining license areas, collectively referred to as the BN-TK area, directly to the west of the Tavan Tolgoi area. JGH has a 66% interest in the joint venture entity, Baruun Naran Gas LLC (BN Gas).

The intent was for BN Gas to apply for prospecting agreements over the two coal mining licenses in the BN-TK area. However, in late 2020 Jade was made aware that a 3rd party PSC already exists over the TK license area, held by Elixir Energy. As a result, BN Gas is not able to apply for a Prospecting Agreement over the TK license area (MV-17336). RISC understands that BN Gas still intends to apply for a Prospecting Agreement over the BN area and will carry out the same planned work program once this is agreed. Terms and conditions, and contract obligations of the proposed Prospecting Agreement are not yet available.

Figure 8 – Baruun Naran Location



Source: Company

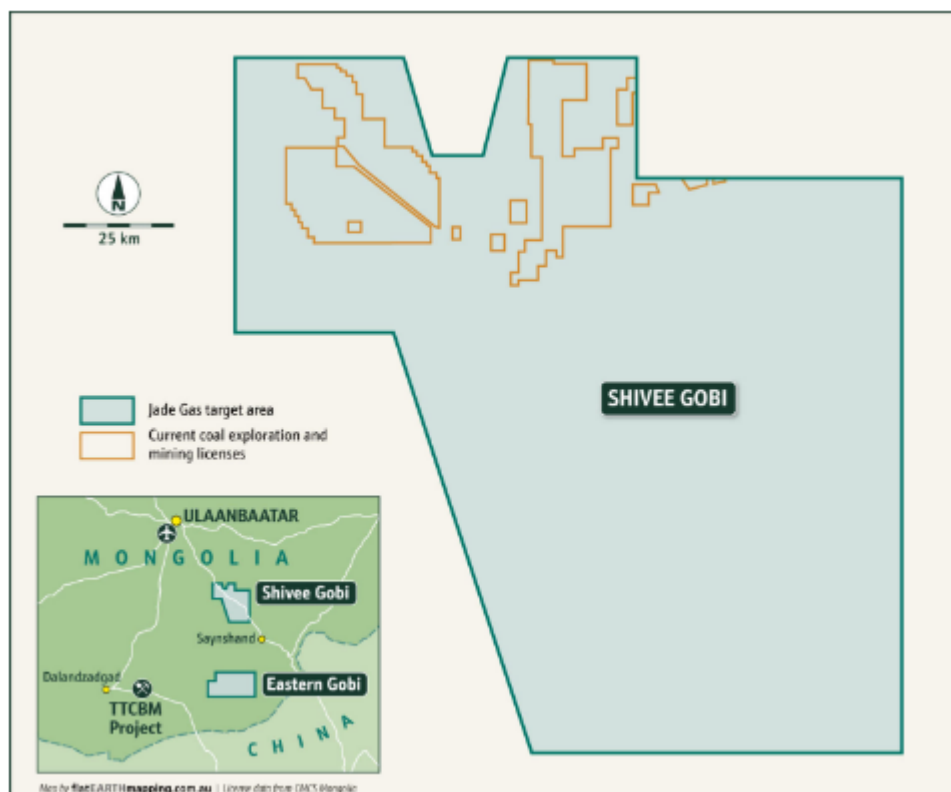
An operating coal mine exists within the proposed Prospecting Agreement area. RISC estimated the “best” prospective resource in BN-TK as 65 Bcf.

Shivee Gobi

JGH has 100% of the Shivee Gobi prospecting agreement permit (PA), which covers an area of 8,317 km² and is located approximately 300 km south of Ulaanbaatar.

Within the permit are several known coal deposits, primarily trending from north-east to south-west. The second largest coal mine in Mongolia is located in the permit.

Figure 9 – Shivee Gobi Project Area



Source: Company

Minimal expenditure commitments on the Shivee Gobi PA over a three-year prospecting period have been negotiated. It is expected that initial desk top study work will be completed around mid-2022 to better assess its potential, ahead of technical studies, drilling, coal sampling and gas testing.

Total expenditure for the three-year period is initially estimated at around US\$110,000.

Initially JGH will be doing a desktop analysis of CBM potential to be followed by technical studies, drilling, coal sampling and gas testing.

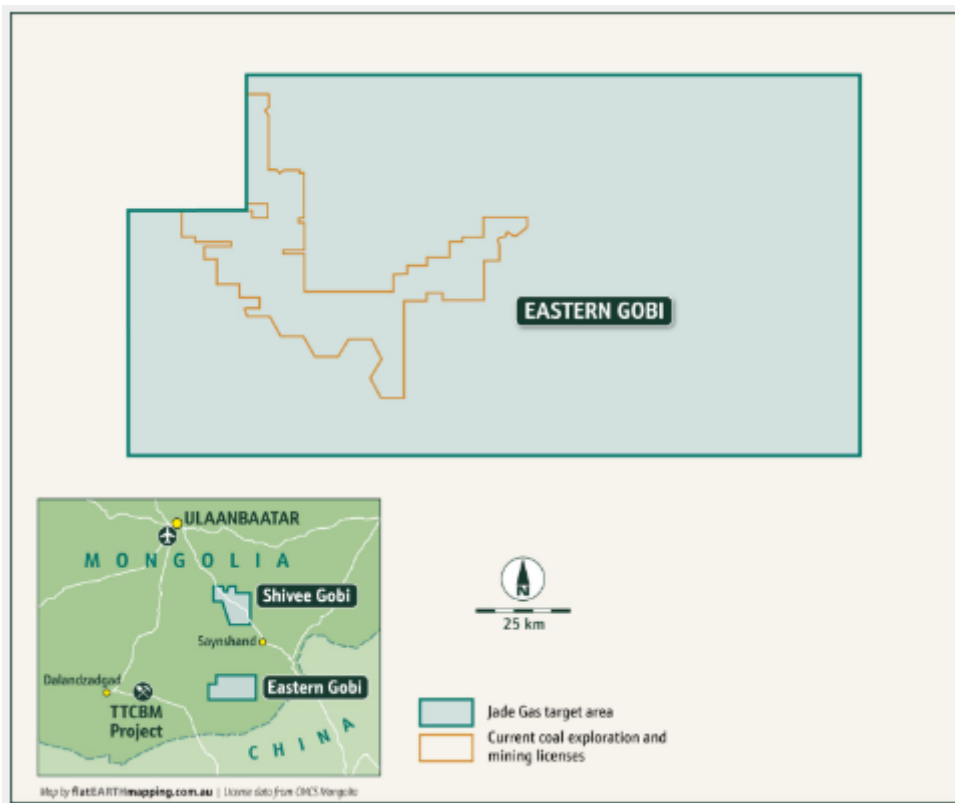
Eastern Gobi

JGH has 100% of the Eastern Gobi PA, which covers an area of 9,691 km² and is located approximately 450 km south of Ulaanbaatar. The Eastern Gobi PA is home to significant coal deposits that are highly prospective for CBM.

Minimal expenditure commitments over a three-year prospecting period for the Eastern Gobi PA have been negotiated. It is expected that initial desk top study work will be completed around mid-2022.,

Total expenditure for the three-year period initially estimated at around US\$160k.

Figure 10 – Eastern Gobi Project Area



Source: Company

What's the potential resource available for gas production?

As part of the process when Jade Gas was acquired a Prospectus was lodged with the ASX on 30 September 2021. As part of that report an independent technical specialist valuation report was prepared by RISC Advisory (RISC).

Based on their assessment, RISC stated that for TTCBM, their "Best" case estimate based on JGH estimates was:

- a gross prospective resource of 1,044 Bcf
- supporting up to 4,043 wells,
- producing on average 0.45 Bcf of gas (i.e. ultimate recovery per well) over the life of a well.

Assuming a 20 year well life, this equates to ~62 mscfd per well of gas production.

As part of the assessment RISC determined that JGH has 664 km² of area included in the PSA. JGH have used a "best" estimate of 222 km² for gas initially in place (GIIP).

Based on data from previous drilling and logs JGH has estimated gas initially in place (GIIP) across the area of 1.7 Tcf to 12.3 Tcf.

Figure 11 – JGH estimated Tavan Tolgoi Coal Bed Methane Project Prospective Gas Initially in Place

Input	Unit	Low	Best	High
Area	km ²	134	222	367
Net coal	m	40	85	200
Coal density	g/cm ³	1.42	1.53	1.69
Gas content	cm ³ /g	3.0	5.0	12.0
Ash content	%	16.0	20.0	44.0
Moisture content		0.00	0.01	0.01
Gas initially in place (GIIP) Bcf		1,710	4,570	12,280

Source: Company

JGH estimated gas recovery at 25% to 60% giving a "best" ultimate recovery per well of 0.45 Bcf, or 0.62 mscfd over 20 years.

Figure 12 – JGH estimated Tavan Tolgoi Coal Bed Methane Project Prospective Ultimate Well Recovery

	Unit	Low	Best	High
Area		134	222	367
GIIP	Bcf	1,710	4,570	12,280
Recovery Factor		25%	40%	60%
Ultimate recovery	Bcf	428	1,828	7,368
Number of wells		2,121	4,043	7,325
Ultimate recovery/well	Bcf	0.20	0.45	1.01
Well density	(wells per km ²)	15.8	18.2	20.0
Well spacing	m	251	234	224

Source: Company

RISC considered the calculated well spacing for JGH's recovery estimate of between 224 m and 251 m very tight. The tightest example of coal seam gas development well spacing RISC found globally was 300 m. Some coal seam gas developments in the Powder River Basin, Wyoming and the Ordos Basin, China are in the order of 300 m - 400 m well spacing. Typically, well spacing in coal seam gas plays is closer to 750 m or 1000 m. Development in the Walloon coal seam gas play in Queensland Australia is typically 750 m. Development in the Bowen Basin coal seam gas play in Queensland, Australia is typically 1000 m.

An alternative approach to calculating resource potential of an area RISC chose to work up from well ultimate recovery expectations and well density. The ‘how many wells can fit in to this area?’ and ‘how much could the wells deliver’ approach.

Given the necessity for large amounts of wells in coal seam gas developments, and the importance of recovery per well over original gas in-place estimates, RISC favoured an approach on calculating prospective resources from recovery per well rather than GIIP multiplied by recovery factor.

RISC calculated the area of potential development in the permit areas to be between 158 km² (low) and 249 km² (high).

RISC considered a range of well spacing between 900 m (1.2 wells/km²) and 300 m (11.1 wells/km²), and a range of ultimate recovery per well of between 0.5 Bcf and 2.0 Bcf, both ranges typical of well spacing and recoveries per well in coal seam gas projects around the world.

These ranges were then multiplied probabilistically to produce a low, best and high estimate of ultimate recovery for the area.

Using this method RISC estimated a total prospective resource range of between 0.2 Tcf (low) and 3.1 Tcf (high) with a best-case estimate of ultimate recovery of 1.0 Tcf.

Figure 13 – RISC estimated Tavan Tolgoi Coal Bed Methane Project Prospective Resources ¹

	Unit	Low	Best	High
Prospective coal seam area	km ²	158	203	249
Well spacing density	m	900	600	300
Wells per	km ²	1.2	2.8	11.1
Estimate of ultimate recovery	Bcf	0.5	1.0	2.0
Prospective Resource	Bcf	216	1,044	3,062

Source: Company

¹ Prospective resources are undiscovered and have both an associated risk of discovery and a risk of development. Further exploration appraisal and evaluation is required to determine the existence of a significant quantity of potentially moveable hydrocarbons. An Independent Technical Specialist Report (ITSR dated 24 June 2021, RISC Advisory) was provided in the Jade Prospectus (14 July 2021) and contains further detail regarding sources of and information in respect of the un-risked Prospective Resource Estimate above, which has been extracted from the ITSR. The additional information includes the basis of the probabilistic estimates, further activities to be undertaken in respect of the TTCBM Project and an assessment of risks associated with the estimates. Jade has a 60% interest in MGR however the Net outcome for MGR is dependent upon the sharing requirements of the PSA which vary according to production rate, capital costs, operating costs and pricing and are therefore currently indeterminate.

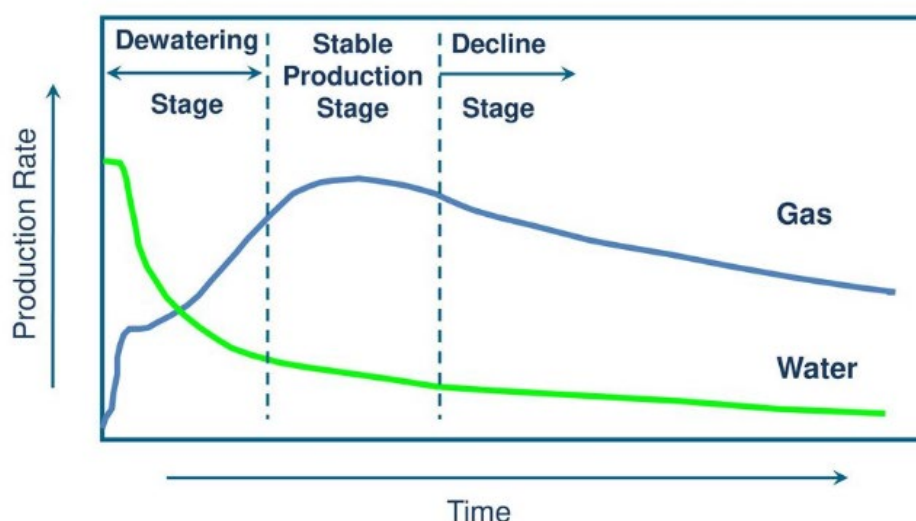
MST financial forecasts

We have modelled up the TTCBM project assuming an extended pilot program.

Key assumptions are:

- As per JGH “Path to Commercial Production” - 5 production wells in FY23 with wells producing for six months, followed by 10 wells in FY24 and 20 wells in FY25.
- We then ramp up our model to 400 wells by FY33, with 50 new wells p.a. Noting 400 wells is only 10% of JGH’s estimated number of wells for the TTCBM permit.
- Assumed average daily production per well of 61.6 mscfd (implies 0.45 Bcf of production per well over 20 years). NB: Coalbed methane wells have different production profiles than conventional oil and gas wells and unconventional shale gas wells. Before gas can be produced, the water in the coal seam has to be pumped out lowering the hydrostatic pressure. It is effectively a long-term drainage process with continuous pressure reduction. This allows the gas adsorbed in the coal to desorb and any free gas trapped in cleats to flow to the surface. Because of the time taken to dewater, the ramp up in gas flow can be up to a year after well completion

Figure 14 – Typical production curves for a coal bed methane well



Source: Internet

- Gas price received at the well head of A\$15/GJ
- Royalties of 7.5% - Royalties vary from 5 percent to 15 percent, depending on the negotiated terms of the PSC and the type of hydrocarbon
- Operating cost per well of \$10,000 per annum.
- Site overheads of \$500,000 per annum.
- Capital cost per well of \$400,000 per well.
- No cash tax paid²
- Straight line amortisation of well costs. Given no forecast cash tax...this is not material.

Gas price received of A\$15/GJ. JGH has stated that UB Metan pay wholesale prices for gas materially higher than gas landed in Australia.

² See <https://old.legalinfo.mn/law/details/16590> Reference: Clause 21.1.4 outlines that the ordinary income assessable income that falls under the 10% & 25% tax rates in section 20.1 is exempt from taxation if it relates to operating in the oil/petroleum industry under a PSA. Under Mongolian classifications this includes gas exploration.

Figure 15 – Base case model assumptions for TTCBM modelling

A\$m	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Production wells drilled	5	10	20	40	50	50	50	50
Cummulative wells	5	15	35	75	125	175	225	275
Producing wells	2	10	25	55	100	150	200	250
Production per well (mmscf)	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6
Production per well (GJ)	65.3	65.3	65.3	65.3	65.3	65.3	65.3	65.3
Annualised Production (mmscf)	45	225	562	1,237	2,248	3,373	4,497	5,621
Annual Production (PJ)	0.0	0.2	0.6	1.3	2.4	3.6	4.8	6.0
Cummulative production (PJ)	0.0	0.3	0.9	2.2	4.6	8.2	12.9	18.9
Gas price received (A\$/GJ)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Sales (A\$m)	0.7	3.6	8.9	19.7	35.8	53.6	71.5	89.4
Royalties	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Royalties (A\$m)	0.1	0.3	0.7	1.5	2.7	4.0	5.4	6.7
Operating cost / well (A\$)	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Operating costs (A\$m)	0.0	0.1	0.3	0.6	1.0	1.5	2.0	2.5
Site Overheads (A\$m p.a.)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Capital costs								
Cost per well (A\$m)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Capital expenditure (A\$m)	2.0	4.0	8.0	16.0	20.0	20.0	20.0	20.0

Source: Company

We then generate a forecast profit and loss for the TTCBM project.

Figure 16 – Base case model profit and loss

Profit & Loss (Ungeared)	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Sales	0.7	3.6	8.9	19.7	35.8	53.6	71.5	89.4
Less: Royalties	(0.1)	(0.3)	(0.7)	(1.5)	(2.7)	(4.0)	(5.4)	(6.7)
Net sales	0.7	3.3	8.3	18.2	33.1	49.6	66.2	82.7
Operating costs	(0.5)	(0.6)	(0.8)	(1.1)	(1.5)	(2.0)	(2.5)	(3.0)
EBITDA	0.1	2.7	7.5	17.1	31.6	47.6	63.7	79.7
Well amortisation	(0.1)	(0.3)	(0.7)	(1.5)	(2.5)	(3.5)	(4.5)	(5.5)
PBT	0.0	2.4	6.8	15.6	29.1	44.1	59.2	74.2
Mongolia corporate tax	25%	25%	25%	25%	25%	25%	25%	25%
Tax (Note 1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Project NPAT	0.0	2.4	6.8	15.6	29.1	44.1	59.2	74.2

Source: Company

From that we can generate a forecast free cash flow for the TTCBM project.

Figure 17 – TTCBM base case model forecast free cash flows

Tavan Tolgoi JV cash flows	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
EBITDA	0.1	2.7	7.5	17.1	31.6	47.6	63.7	79.7
Tax	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capex	(2.0)	(4.0)	(8.0)	(16.0)	(20.0)	(20.0)	(20.0)	(20.0)
Free cash flow	(1.9)	(1.3)	(0.5)	1.1	11.6	27.6	43.7	59.7

Source: Company

However, given JGH is entitled to recover cash expenditure up to the DFS, we then derive a forecast cash flow to JGH. We have assumed ~A\$11m of costs expensed prior to the definitive feasibility study are recovered over FY26 to FY29.

Figure 18 – Forecast cash flow to JGH from TTCBM

Tavan Tolgoi JV cash flows to JGH	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Equity contribution	(1.9)	(1.3)	(0.5)	0.0	0.0	0.0	0.0	0.0
Theoretical share of FCF	60%	60%	60%	60%	60%	60%	60%	60%
Theoretical share of FCF	0.0	0.0	0.0	0.7	7.0	16.6	26.2	35.8
Assumed share of FCF to recover pre DFS costs	85%	85%	85%	85%	80%	75%	70%	60%
Cost recovery	0.0	0.0	0.0	0.3	2.3	4.1	4.4	0.0
JGH cash return from JV	(1.9)	(1.3)	(0.5)	1.0	9.3	20.7	30.6	35.8
FCF Timing Factor	1.7	2.7	3.7	4.7	5.7	6.7	7.7	8.7
Discount Factor	1.2	1.3	1.4	1.6	1.7	1.9	2.1	2.3
Discounted FCF	(1.6)	(1.0)	(0.3)	0.6	5.4	10.9	14.7	15.6
Sum (NPV₁₀)	314.5							

Source: Company

We value the JGH investment in the TTCBM project at ~\$315m, using a discount rate of 10%.

Comparative companies to JGH

There are three other Australian listed companies looking at developing coal bed methane in Mongolia. Talon Energy and TMK Energy are co-investors in the same project. See Appendix 6 for more detail on the companies.

Figure 19 – Australian listed coal seam methane companies with assets in Mongolia

Company	Ticker	Share price (LC)	Market Cap. (A\$m)	Total Debt (A\$m)	Cash (A\$m)	Net debt / (Cash) (A\$m)	Enterprise Value (A\$m)
Elixir Energy Limited	EXR-AU	0.180	161	0	28	(28)	132
Talon Energy Ltd	TPD-AU	0.009	63	0	7	(7)	56
TMK Energy Limited	TMK-AU	0.014	40	0	2	(2)	38
Jade Gas Holdings Limited	JGH-AU	0.060	32	0	4	(4)	28

Source: FactSet

Jade Gas Holdings Bae Case Valuation of A\$0.20 per share

Capital structure

We have assumed for our valuation that all the options vest (aside from the June 2022) and all the performance shares issue vest.

Figure 20 – Shares outstanding

Current Shares on issue (m)						
1,209.4						
Ticker (m)	Securities to issue	Total	Exercise Price	Cash raised (A\$m)	Exercise Date	Comment
Options	0.0	7.0	\$0.150	0.0	30-Jun-22	
Options JGHAC & JGHAD	90.0	90.0	\$0.045	4.1	30-Jun-23	
Options JGHAE	12.0	12.0	\$0.045	0.5	22-Sep-24	
Options JGHAT	4.0	4.0	\$0.100	0.4	31-Oct-24	
Options	4.0	4.0	\$0.120	0.5	1-Feb-25	
Performance rights JGHAT	25.0	25.0				Tranche 1 at \$0.105 and Tranche 2 at \$0.14
Other equity	135.0	142.0				

Source: Company, FactSet, MST

Valuation

We have valued JGH using the value we attribute to the extended pilot program for TTCBM less the present value of all the corporate overheads divided by the forecast diluted shares on issue. NB: We forecast additional new equity (A\$8m) is required, over and above option exercise (A\$5.5m), over the next three years.

Figure 21 – Jade Gas Valuation

A\$m	FY23
Tavan Tolgoi JV	315.0
Corporate overhead	27.5
Valuation	342.5
Forecast diluted shares on issue	1,464.4
FY23 per share (A\$)	\$0.23
Spot Valuation (A\$)	\$0.20

Source: MST

Sensitivity analysis

We believe the key driver of JGH's valuation going forward is to the gas price achieved and the production per well.

Figure 22 – Jade Gas Sensitivity

Production per well (mscfd)	Gas Sale Price (A\$/GJ)				
	10.0	12.5	15.0	17.5	20.0
42	0.07	0.10	0.12	0.15	0.18
52	0.10	0.13	0.16	0.19	0.22
62	0.12	0.16	0.20	0.24	0.27
72	0.15	0.19	0.23	0.28	0.32
82	0.17	0.22	0.27	0.32	0.37

Source: MST

Risks to our forecasts and valuation

The key risks to our financial forecasts and valuation include:

Sovereign and Political Risks Associated with Operating in Mongolia

Mongolia is a young democratic country which is transitioning to a market economy and is therefore subject to risks and uncertainty. There is also a risk that laws in place in Mongolia may change in future or be applied by the judiciary and regulators in Mongolia in a way that is detrimental to the Company and its proposed operations. JGH may also be adversely affected by the actions of government authorities or others and there can be no guarantee that the rights to be held by JGH following completion of the Transaction will not also be adversely impacted.

Exploration Success and Operating and Development Risks

Exploration activities for gas such as those proposed to be undertaken by JGH are inherently risky, with a high chance of failure. The proposed exploration activities of JGH are subject to various risks (such as geological conditions and environmental difficulties) that are outside of the control of JGH. There can be no guarantee that JGH will identify any resource capable of producing hydrocarbons at commercial rates, if at all and even if such a resource was identified that JGH will be in a position to commence production.

Permit application and permit renewal

JGH cannot guarantee that itself or its joint venture partner or partners will be able to maintain all required rights to permits or licences needed for JGH to undertake its planned exploration activities. Such permits and licences will be subject to various initial and ongoing conditions that may become too onerous for JGH to meet. No guarantee can be given that any right or rights will be renewed on particular terms, or at all. Hydrocarbon reserve estimates are expressions of judgment based on knowledge, experience, interpretation and industry practice. Estimates that were valid when made may change significantly when new information becomes available. In addition, reserve estimates are necessarily imprecise and depend to some extent on interpretations, which may prove inaccurate, which may result in the plans of JGH needing to be adjusted and could adversely affect the operations of JGH.

Joint Venture risk

The primary activities of JGH will be undertaken pursuant to joint venture arrangements with third party entities, including those entities formed to represent the interests of the Mongolian Government such as EM. These activities will be subject to risks generally associated with joint venture arrangements, including the risk that the other party(s) may fail to perform their obligations under any joint venture arrangement(s), or may seek to terminate or withdraw from the joint venture arrangement(s). Such risks would also apply to any joint venture JGH enters in future (although there is not current proposal to do so).

Funding risk

We have assumed UB Metan provide the topsides infrastructure to get “gas to market”. If JGH needed to construct this and own this equipment, more capital would be required, necessitating new and additional equity and debt raisings. Between now and DFS we have assumed JGH will need to raise additional equity to fund working capital and exploration and evaluation work.

Risk associated with Drilling

Gas drilling activities are subject to numerous risks, many of which are beyond JGH’s control. JGH’s drilling operations may be curtailed, delayed or cancelled due to a number of factors including weather conditions, mechanical difficulties, unforeseen sub-surface hazards (such as unexpected pressures), shortage or delays in the availability or delivery of rigs and/or other equipment, availability of suitable drilling rigs, and compliance with governmental requirements. While drilling may yield some hydrocarbons there can be no guarantee that a gas discovery or accumulation will be sufficiently productive to justify commercial development.

Insurance

Exploration, development and production operations on oil and gas properties involve a number of risks and hazards which are beyond the control of JGH. Although JGH will have insurance in place at levels considered appropriate for its

operations and in accordance with industry practice, in certain circumstances JGH's insurance may not cover, or be adequate to cover, the consequence of such events which could reduce or eliminate any future profitability, result in increasing costs and have a negative impact on the value of JGH.

Substitution of Gas

There are a number of alternative energy sources from oil and gas products, including other non-renewable sources such as coal and oil, and those referred to as renewable energy sources such as wind, solar or hydroelectric, geothermal and biomass, amongst others. If the costs and commercial prices of such alternative energy sources fall or there is a significant shift in consumer sentiment towards such sources, this may have a significant effect upon JGH's overall performance.

Third Party Risk

JGH has entered, and will likely in future enter, contractual arrangements with various third parties, including in respect of the joint venture interests forming the Projects. There is a risk that these counterparties may fail to perform their obligations which could lead to delays, increased costs, disputes and even litigation. All these factors could negatively impact the proposed operations of JGH and there can be no assurance that JGH would be successful in seeking remedies or enforcement of its rights through legal actions.

Environmental

The rights acquired by JGH are subject to certain Mongolian laws and regulations concerning the environment. It is JGH's intention to conduct its activities to a high standard of environmental obligation, however there is a risk that Mongolian laws and regulations will impose onerous obligations that JGH will not be able to effectively meet, whether due to excessive costs of regulatory compliance or otherwise. In addition, the occurrence of any safety or environmental incident on one or more of the Projects could materially delay or increase the costs of operations or result in a substantial liability being accrued against JGH.

Commodity price volatility and exchange rate

It is expected that any future revenues achieved by JGH, other than sales of assets, will be derived from the sale of CSG. The demand for, and price of, CSG is dependent on a variety of factors beyond the control of JGH, including supply levels of the product, the level of consumer product demand, weather conditions, the price and availability of alternative fuels, actions taken by governments and international cartels, and global economic and political developments. Furthermore, the sales prices and contracts of various commodities including CSG are likely to be denominated in United States dollars. This will have the effect of exposing JGH through its source of revenue generation to fluctuations and volatility of the rate of exchange between the United States dollar and the Australian dollar.

Reliance on Key Personnel

The success of JGH may depend on its ability to attract and retain key personnel. There is a risk that JGH may not be able to hire or retain such key personnel for different reasons, including matters of compensation. The success of JGH may also be dependent on the contributions from its management team and key technical personnel, the loss of whose services may be difficult to replace.

Climate change risk

JGH may be subject to risks arising from climate change. If the government of Mongolia makes additional commitments to future carbon reduction targets, it may impede the ability of JGH to commercialise coal bed methane (although such a change would also impact upon other non-renewable energy sector such as coal). In addition to this, it is currently uncertain how general climate change will alter the global environment and as such there is a risk around this uncertainty as it relates to operating in any jurisdiction globally.

Appendix 1 – Board & Senior Management

Mr Dennis Morton - Non-Executive Chairman

Mr Dennis Morton is a geologist with over 40 years' experience in the oil and gas industry, including substantial experience in coal seam gas projects. He is currently the Managing Director of ASX listed company Gas2Grid Limited, and previously held positions as founder, CEO and Managing Director of ASX listed Eastern Star Gas Limited, as well as with Eastern Energy Australia Pty Ltd, Hartogen Group of Companies and Esso / Exxon. Mr Morton holds a Bachelor of Arts-Geology with first class honours from the Macquarie University, Sydney.

Mr Joseph Burke - Executive Director

Mr Burke is an experienced mining executive. He has spent over 30 years working and living in Asia and has been involved in Mongolian mining projects since 2009. In previous roles Mr Burke was a Director and founding partner of the mining venture capital group Starboard Global and the CEO of ASX listed Voyager Resources Limited (ASX: VOR) which had projects based in Mongolia. He has also undertaken advisory roles with an Asian focus and with other ASX listed entities including American Pacific Borates Ltd (ASX: ABR), and Black Rock Mining Limited (ASX: BKT). Mr Burke holds an MBA from the Australian Graduate School of Management (AGSM).

Mr Daniel Eddington - Non-Executive Director

Mr Eddington has over 20 years' experience in the financial markets with experience across multiple sectors including the resource, energy and industrial sectors. He specialises in equity capital markets and has been responsible for IPO's, placements, reverse takeovers, underwritings, corporate negotiations and corporate advisory for companies predominantly in the resource sector. Mr Eddington has a Bachelor of Commerce Degree from The University of South Australia and a Graduate Diploma in Applied Finance & Investment from the Securities Institute of Australia. Mr Eddington is a Director of Sparc Technologies Limited.

Mr Peter Lansom - Non-Executive Director

Mr Lansom has over 30 years' experience in conventional and unconventional exploration, appraisal and development in the oil and gas industry, including subsurface engineering, asset valuation, field development planning and commercial/corporate finance. Mr Lansom is currently a Non-Executive Director for Metgasco Ltd and Bengal Energy Ltd. In his most recent executive role, Mr Lansom was Managing Director of Galilee, an Australian coal seam gas explorer and appraiser, where he oversaw the appraisal of the Glenaras coal seam gas field in the Galilee Basin. Prior to Galilee, Mr Lansom was at Eastern Star, where he had overall engineering responsibility for the exploration and pilot development of the company's coal seam gas assets in NSW, growing the 2P Reserves to approximately 1520 PJ of gas which underpinned the company's eventual market capitalisation of \$1 billion. Mr Lansom holds a Bachelor of Petroleum Engineering (Honours) degree from the University of NSW.

Mr Chris Jamieson – Chief Executive Officer

Chris has broad experience in the oil and gas sector having spent over seven years at ASX listed Beach Energy Limited. Chris held various roles at the company including Group Executive - External Relations, a role which had oversight of all external and internal communications, with a prime focus on the institutional and retail investor communities. Prior to working at Beach, Chris worked in corporate finance at Ernst & Young for nine years in Adelaide, London, and San Francisco, as well as seven years in the mergers and acquisitions group at Normandy Mining Limited, Australia's largest gold miner at the time. More recently, Chris co-founded Jamieson Piper, a capital markets and investor relations firm that serviced clients across a range of industries including oil and gas, mining and manufacturing. Chris holds a Bachelor of Commerce from the University of Adelaide, as well as a number of post graduate qualifications including a CPA, graduate diploma of Applied Finance and Investment (FINSIA) and diploma of Investor Relations (AIRA).

Mr Mark Pitkin – General Manager (Technical)

Mark is a reservoir engineer, with almost 30 years of experience in the oil and gas industry, who most recently worked as the General Manager of Development for Beach Energy Ltd’s South Australian and Western Australian assets. Mark has extensive CBM experience and was Origin’s subsurface development engineer for the Spring Gully CBM Field. This project went from a five-well pilot to gas production of 10 PJ per annum, which formed a key part of the full field development plan for the more than 1 Tcf field. Mark also stewarded Beach Energy Ltd’s Tipton West CBM technical position during the successful sale process to Arrow Energy.

Mr Justin Green - Company Secretary

Mr Green is a member of Chartered Accountants Australia and New Zealand. He has previous experience working across a number of industries managing the financial compliance and reporting requirements in both ASX listed and large private companies.

Appendix 2 – Substantial and Board Shareholdings

Figure 23 – Substantial and Board Shareholdings

Shareholder	Shares (m)	Percentage of Ordinary Shares
Mr Joseph Burke	414.6	34.3%
UB Metan LLC	95.0	7.9%
Mr Daniel Eddington (Director)	68.9	5.7%
Directors		
Mr Dennis Morton	1.2	0.1%
Mr Chris Jamieson (CEO)	1.1	0.1%
Sub total	580.7	48.0%
Other	628.7	52.0%
Total Shares Issued	1,209.4	100.0%

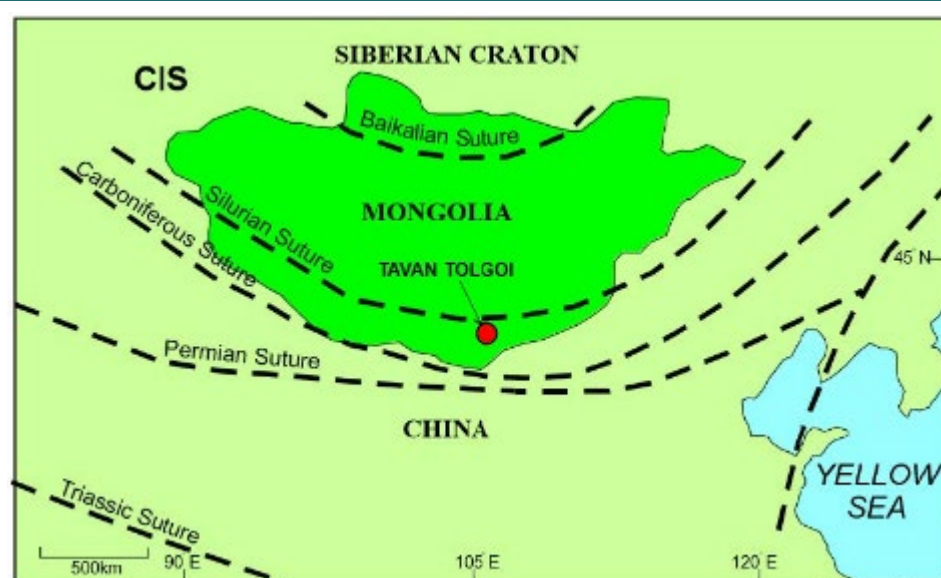
Source: FactSet, Company

Appendix 3 – Mongolian Geology

Mongolia and Northern China were formed by a series of accretionary terrains that range in age from Proterozoic to Late Palaeozoic as shown in Figure .

Each successive accretionary belt was added from the south and wrapped around the Siberian Craton to the north, forming a series of concave north-wrapping arcs separated by ophiolitic suture zones. Two suture zones are present in Mongolia, the Baikalian Lineament in the north, which represents late Proterozoic accretion and the Main Mongolian Lineament in the south, which represents Silurian accretion. In southern Mongolia, the oldest rocks are of late Precambrian to middle Palaeozoic age and were deposited as shallow marine carbonate and clastic facies, on passive continental margins. Mid-Palaeozoic orogenesis is associated with the collision of the Altai microplate in western Mongolia and the accretion of the central Mongolian microplate onto the Siberian Craton. Renewed sedimentation in the Altai foreland and also perhaps in marginal rift or back arc basins is represented by Devonian and Carboniferous continental and marine clastic and volcanic formations.

Figure 24 – Mongolian Regional Tectonic Setting



Source: Company

A Late Carboniferous to Early Permian orogenic phase marks accretion of the Gobi microplate onto the enlarged Mongolian-Siberian Craton, giving rise to a third suture which more or less coincides with the location of the present day Mongolian-Chinese border.

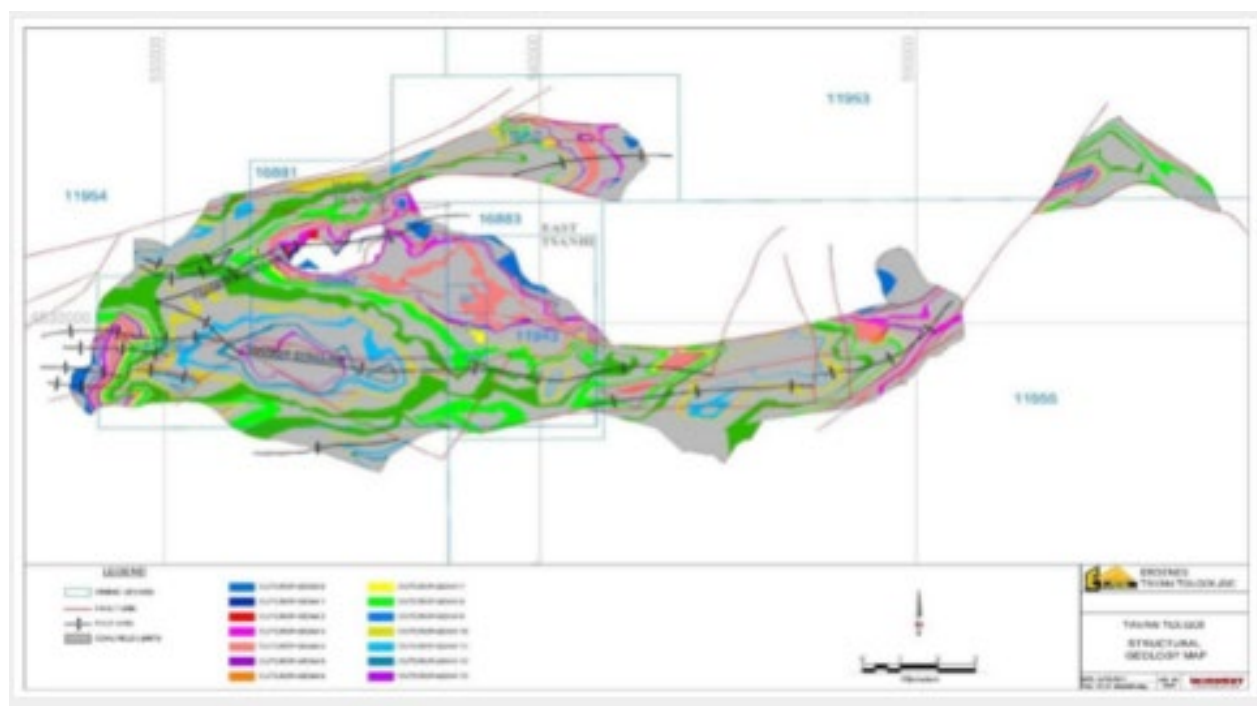
Late Permian to Early Jurassic sediments in southern Mongolia comprise a very thick sequence of coarse continental clastic formations overlain by locally occurring finer clastic, coal, and lacustrine sequences possibly deposited in foreland basins. These sediments were subsequently deformed during the Triassic to Middle Jurassic, when the Qiantang block (in China), collided with the growing Mongolian-Siberian Craton.

Later periods of continental rifting occurred resulted in thick sequences of fluvial conglomerate and sandstone, floodplain coal, and lacustrine shale to be deposited in the rift basins through the Late Jurassic and Early Cretaceous. The southern Mongolia area was affected by significant tectonism and volcanic activity throughout the Late Cretaceous and Tertiary periods.

Appendix 4 - Local Structural Geology

The coal seams of the Tavan Tolgoi district accumulated in the Ulaan Nuur Trough, an intra-cratonic basin. The basin, generally regarded as a broad synclinorium, is the result of crustal subsidence of the basement rock adjacent to a large scale east to northeast trending fault system (mega-shear) that bounds the district to the north. Upper Permian coals accumulated in the subsiding basin and were subsequently faulted and folded from a moderate to intense degree by post-depositional tectonic events.

Figure 25 – Tavan Tolgoi Structural Geology Map



Source: Company

The Tavan Tolgoi coalfield is comprised of a series of east-west trending synclines and anticlines which are overprinted by a north-south trending anticline. While much of the Tavan Tolgoi is gently to moderately inclined, dips in the flanks of these structures can exceed 40°. Numerous east-west trending normal faults bisect the coalfield. Significant east-west trending thrust faults form the coalfield boundaries throughout much of Tavan Tolgoi, bringing underlying, older volcanics and non-coalbearing formations to the surface and truncating the coal resource areas.

The figure above shows the structural features of the Tavan Tolgoi coalfield. The areas of the coal-bearing formations are shaded. Two major fold structures are evident in the western half of the deposit, the Tsankhi Syncline and Tsankhi Anticline. The syncline hosts the structural basin containing the thickest coal-bearing sequence, while the anticline brings the lowest coal horizons to the surface.

Appendix 5 – Mongolia

Mongolia is a landlocked country in Asia, bordered by Russia to the north and China to the south, east, and west. The country is divided into 21 provinces, with the capital city of Ulaanbaatar hosting approximately 45% of the population. The official language is Mongolian (Khalkh Mongol) which is spoken by 90% of the population, with Russian widely spoken and the use of English growing strongly. The currency is the Mongolian Tugrik (MNT). With a population of 3.2 million and a land surface area of over 1.5 million km², it is the seventh largest country in Asia, the 18th largest country in the world, and the world’s least densely populated country.

Figure 26 – Mongolia



Source: Company

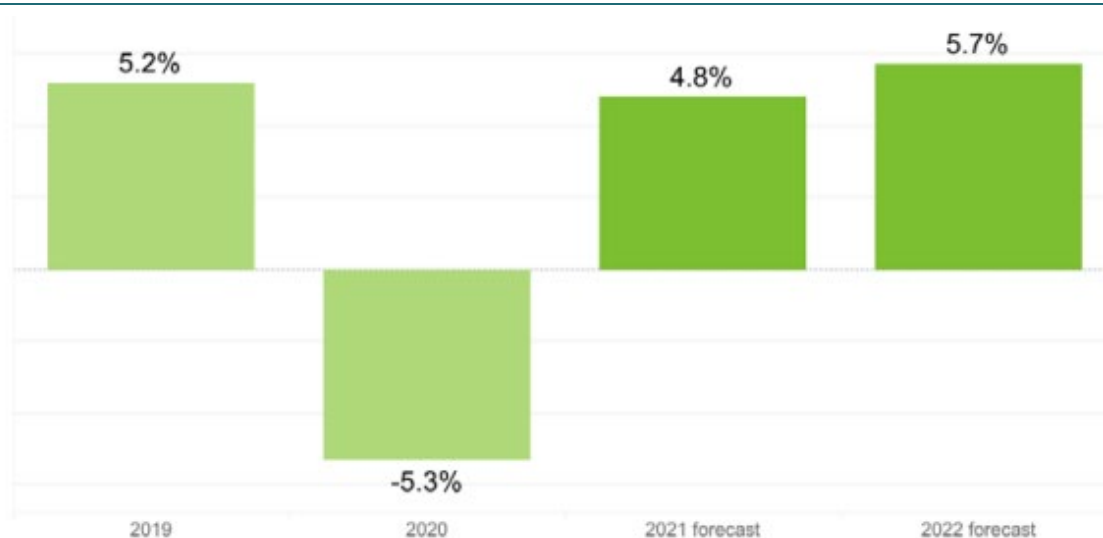
Having achieved independence from the Chinese Qing Dynasty in 1921, the Mongolian People’s Republic was declared in 1924, at which time the Mongolian political system was heavily influenced by that of Russia. The country operated under a Soviet dominated communist regime for almost 70 years until 1990. Following the collapse of the communist regimes in Eastern Europe, and the perestroika and glasnost in the Soviet Union, a peaceful democratic revolution in 1990 led to a multi-party system, a new constitution in 1992, and a transition to a market economy. Mongolia remains one of just a few democracies in Asia. On 24 June 2020, the country held its eighth democratic parliamentary election since 1992, and the country voted to confirm a government for the first time, voting in by an overwhelming majority the governing Mongolian People’s Party (MPP).

The Mongolian Economy

Mongolia has been experiencing a period of strong economic development. According to the World Bank Mongolia has tripled its gross domestic product (GDP) per capita since 1991. Economic activity has traditionally been based on agriculture. The country's extensive mineral deposits have continuously attracted foreign investors, particularly in the years following a commodities boom around 2010. The country holds significant resources of copper, gold, coal, molybdenum, fluorspar, uranium, tin, and tungsten deposits. Following a decline in commodity prices due to the global financial crisis, the Mongolian economy slowed between 2014 and 2017. With GDP growth in 2016 of 1.2%, the economic situation improved through 2017 and 2018 with GDP growth rates of 5.4% and 7.2%. In 2019 growth weakened to 5.2% predominantly due to weaker performance of the mining sector following falls in commodity prices. Due largely to the impact of the COVID-19 pandemic, in 2020 the Mongolian economy contracted by 5.3%, with a sharp decline in global demand for key commodities and closure of the border with China attributed to slowing the mining led economy.

There is potential for the economy to recover in 2021 with increasing efforts to control the COVID-19 pandemic and stimulus measures to strengthen domestic demand being enacted. Being landlocked, the country relies heavily on imports from its neighbours. Mongolia purchases approximately 95% of its petroleum products and a substantial amount of electric power from Russia, its neighbour to the north, east and west. Trade with China represents more than half of Mongolia's total external trade, and China receives about two-thirds of Mongolia's exports. Mongolia joined the World Trade Organization (WTO) in 1997. Mongolia ranks 81 out of 190 countries in the World Bank's 2020 Ease of Doing Business report.

Figure 27 – Mongolian Forecast GDP Growth



Source: Company, Asian Development Bank - Asian Development Outlook (ADO) (April 2021)

Whilst the growth outlook is positive driven by a rebound in private consumption and mining sector investment, the risks to the outlook include prolonged impacts of COVID-19 on the economy, political uncertainty, commodity price uncertainty, potential for inefficiencies in cross-border trade relationships, implementation delay of infrastructure projects, and slower implementation of banking sector reforms.

Australia-Mongolia Diplomatic Relations

Australia established diplomatic relations with Mongolia on 15 September 1972. Bilateral engagement accelerated following the democratic and free-market reforms in Mongolia in the early 1990s. Mongolia opened an Embassy in Canberra in 2008. The Australian Trade Commission (Austrade) opened a trade office in Ulaanbaatar to serve the needs of Australian business in 2011. The Australian Embassy in Ulaanbaatar was opened in December 2015.

According to the Department of Foreign Affairs and Trade, business is continuing to develop between Australia and Mongolia. There are more than 50 Australian companies currently operating in Mongolia, most of which are engaged in the mining sector, with the most prominent being Rio Tinto (a leading investor and development partner in the Oyu Tolgoi copper-gold project).

The Australian Chamber of Commerce Mongolia, a non-government organization, was established in 2013 and promotes the interests of Australian and Mongolian business in the region, which it pursues through business-to-government relations with the support of the Australian Embassy, Austrade, leading institutions, professionals and thought leaders.

Oil and Gas Industry in Mongolia

Presently the oil and gas sector in Mongolia is small relative to other natural resource-based sectors in the country. No natural gas was recorded to be produced in the country in 2020, and gas requirements are met through importation from neighbouring countries Russia and China. It has been a stated focus of the Mongolian Government over recent years to reduce the country's reliance on importation of energy (electricity) and energy products (oil and gas liquids) from neighbouring countries, and the Mongolian Government established in the State Policy on Energy for 2015-2030 an objective to become a net energy exporter. With the introduction of Mongolian Government level commitments to global climate change protocols, the level of interest and support for the exploration and development of cleaner fuel sources within the country has increased. Whilst currently an immature market, Jade foresees the potential for an increasing role for the use of natural gas in the energy supply mix of Mongolia. It is the strategy of Jade to seek to develop the TT CBM Project so that gas produced may, in the long term, provide a reliable supply option to the oil and gas product market and to the power sector in Mongolia, both to the capital city of Ulaanbaatar and also into regional areas. Achievement of this strategy would partially displace the use of imported gas and gas liquid products, reduce the use of higher carbon emission emitting fuel sources such as coal and diesel, and reduce the reliance on imported electricity.

Mongolia joined the United Nations Framework Convention on Climate Change (UNFCCC) in 1993, the Kyoto Protocol in 1999, and the Paris Agreement on Climate Change in 2016. In March 2017, the Mongolian Government approved a National Program on Reduction of Air and Environmental Pollution. This national program aims to decrease air pollutants by 80%, prohibit the use of unprocessed coal anywhere except for thermal power plants in Ulaanbaatar, and reduce air and environmental pollution by at least 50% by 2025. Alongside many other signatories, in November 2019, Mongolia revised its commitment under the Paris Agreement to carbon emission reductions of 22.7% by 2030 under a new Nationally Determined Contribution, increased from its original commitment of a 14% reduction defined in 2015.

Energy Sector in Mongolia

Petroleum Laws and Regulations

The Petroleum Law of Mongolia was adopted on 18 January 1991. The law was revised in 2014 creating a clear and transparent legal environment and more favourable conditions for investors. The law regulates the operations of Mongolian and foreign entities or individuals on exploration, production, transportation, storage and marketing of petroleum in Mongolia. The Mineral Resources and Petroleum Authority of Mongolia (MRPAM) is the government agency overseeing the implementation of the Petroleum Law of Mongolia and relevant regulations.

Exploration and Production

The upstream exploration segment of the Mongolian energy sector is immature, and with no natural gas production, little oil production and no substantial oil refining capacity currently, the country relies almost entirely on imports of oil and gas products from its neighbours.

According to MRPAM, 33 prospective petroleum blocks have been identified for petroleum exploration, and currently PSAs have been signed over 27 of these blocks.

There are a number of international oil and gas exploration companies active in the sector, including Petro China (China's largest oil company), AIM listed Petro Matad plc (focussed on oil exploration), and ASX listed Elixir Energy Limited focussed on exploration for coal seam gas. In 2019, Petro Matad announced two oil discoveries at Heron-1

and Gazelle-1 wells in Block XX in eastern Mongolia proximate to Petro China producing fields. In 2020, Elixir Energy Limited announced the first coal seam gas discovery at Nomgon-1 in the South Gobi region.

Crude Oil is commercially produced from three blocks with two operated by Petro China, and one operated by Dongsheng Petroleum (Mongol) LLC. According to the Ministry of Mining and Heavy Industry, 6.88 million barrels of oil (approximately 19,000 barrels per day) were produced in 2019, an increase of approximately 500,000 barrels over 2018. Petro China produces up to 95% of the oil production in the country. The volume of proved reserves plus cumulative production for the three producing Production Sharing Contract blocks was estimated at approximately 320 million barrels in 2011/12.

Demand for refined oil products in the country was reported in 2019 as approximately 25,000 barrels of oil per day, and until refining capacity is available in the country oil produced is transported to China for processing. In October 2019, work commenced on a joint Mongolia-India oil refinery project in the Dornogovi Province. The refinery is to have a processing capacity of 1.5 million tonnes per year and is expected to be completed by 2022.

Coal Seam Gas Exploration

With a well-known abundance of coal in the country, exploration for coal seam gas in Mongolia has been underway since the early 2000's, with a number of studies and limited field activities undertaken to understand the resource potential. See JGH lodged with the ASX on 30 September 2021 for more detail.

Appendix 6 - Australian listed companies in Mongolia

Elixir Energy Limited (ASX: EXR) is an ASX listed gas exploration and development company. It is focused on exploring in Mongolia for natural gas in the form of coal-bed methane (CBM – known as coal seam gas -CSG -in Australia). EXR holds 100% of a CBM production sharing contract (PSC), located just to the North of the Mongolian/Chinese border. The PSC was signed in September 2018 with the Mineral Resources and Petroleum Authority of Mongolia (MRPAM). The Nomgon Project licence area covers ~30,000 km² (~7 million acres). This very large area has been independently certified to contain a giant CBM risked recoverable prospective resource of 7.6 Tcf (best case).

TMK Energy Limited (ASX: TMK) is listed on the Australian Stock Exchange and holds a 100% interest in the Gurvantes XXXV Coal Seam Gas Project located in the South Gobi Basin of Mongolia. Talon Energy is farming in (33%) to the PSA associated with the project. TMK is led by an Australian and Mongolian team bringing together the expertise and experience to develop of the Gurvantes XXXV Project. TMK's key focus is the development of the Gurvantes XXXV South Gobi Natural Gas Project located in the South Gobi basin of Mongolia. TMK also holds a 20% interest in the Talisman Depp Project containing the Napoleon Structure located in the Barrow-Dampier Sub-basin.

Talon Energy Ltd (ASX.TPD) is an Australia-based junior oil and gas exploration company. The Company's balanced portfolio of diversified assets in Australia and Mongolia. The Company holds a 45% non-operated participating interest in EP447 and the Walyering Prospect. EP447, located in the Perth Basin of Western Australia contains the Walyering conventional gas discovery. The Company has 100% interest in the area covering the Condor Structure located on EP 494 and SPA-0081 (Condor Prospect) in the onshore Perth Basin. TPD is farming in (33%) to the Gurvantes XXXV Coal Seam Gas Project is located in Southern Mongolia. Gurvantes XXXV is located approximately 20km from the Chinese-Mongolian border and close to the extensive Northern China gas transmission and distribution network.

Appendix 7 - Recent history of Jade Gas Holdings

- 2017 - Jade Gas incorporated.
- 2019 - As a private entity Jade Gas drills eight wells in the Tavan Tolgoi permit.
- July 2021 – High Grade Metals (HGM) issues Prospectus to raise \$7.5m at \$0.03 to fund Jade Gas acquisition.
- September 2021 – Completes acquisition of Jade Gas.
- September 2021 – High Grade Metals changes name to Jade Gas Holdings. (Ticker changed from HGM-ASX to JGH-ASX). As part of the acquisition of Jade Gas HGM consolidated its share count on a 1 for 5 basis.
- October 2021 – Jade Gas Holdings commences trading on ASX.
- October 2021 - Detailed Environmental Impact Assessment and Management Plan granted by Ministry of Environment and Tourism for JGH's TT CBM Gas Project that enabled JGH to commence its appraisal stage six well drilling program.
- November 2021 - Six Well Drilling Program commenced at TT CBM Gas Project in Mongolia following on from the eight well program completed in CY2019.
- December 2021 – Mr Chris Jamieson starts as CEO and Dennis Morton appointed Non-Executive Chairman.
- January 2022 – Red Lake-1 exploration well reaches total depth (TD) of 1,0121 metres (m) with all three target coals seams (III, IV and 0) intersected and cored between 730 m and 900 m.
- January 2022 – JGH announced two rigs had spudded wells at the second (Red Lake-3) and third (Red Lake-4) targets.
- February 2022 – Peter Lansom appointed as Non-Executive director.
- February 2022 - JGH granted two coal bed methane Prospecting Agreement Permits (Shivee Gobi and Eastern Gobi), covering a total area of 18,000 km².
- March 2022 – Positive results indicating gas composition at coal seams III and IV from the Red Lake-1 drilling with methane (CH₄) of 98% and 92.5% respectively.
- April 2022 – JGH advised it signed a non-binding gas offtake memorandum of understanding (MOU) for potential gas sales to Mongolia's largest liquefied natural gas (LNG) importer and gas distributor, UB Metan LLC (UBM), a 7.9% shareholder in JGH.

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