# Sino Gas & Energy

## Gas & Energy highly promoted by central government

***to summarize…***

- **Sino Gas and Energy, is an ASX listed company, operating Coalbed Methane (CBM) projects in Shanxi China. CBM is a new form of clean energy highly supported by the central government.**
- **Series of favourable policies are announced to support and accelerate development of CBM segment. For example, VAT rebate, subsidies and construction of large scale pipelines.**
- **Distinct geological advantage: combination of shallow and deep CBM reservoirs. High gas rates from deep CBM project, with potential to speed up gas production via shallow CBM projects.**
- **Moving toward production stage. Number of wells will be more than triple as compared to FY2011.**

**Company Overview.** Sino Gas and Energy (SEH.AU), is an ASX listed company, engaged in the Coal Bed Methane business in the Ordos Basin Shanxi, China. The Company acquired its interest in two Production Sharing Contracts (PSCs) via a "farm-in" agreement from Chevron in 2006. These PSCs gave SEH rights to conduct CBM exploitation in Sanjiaobei and Linxing in Shanxi. The total area of the PSCs covers roughly 3,000km$^2$ with gas reserves and total estimated resources of 22Bcf and 3.7Tcf respectively. Sino Gas and Energy listed on ASX through an IPO in 2009 raising AU$7.9m. The major shareholder is Imdex Limited (26%); SHL (10%), the rest of shareholders represent (64%). In January 2012, Colin Heseltine was appointed to the board, after previously acting as China strategic advisor to the company. Colin has 40 years of foreign policy experience with the Australian government, including postings in Beijing, Taiwan and Korea.

**New form of clean energy, highly promoted by central government.** Coal Bed Methane (CBM) is a form of natural gas, comprising 95% methane (conventional natural gas: 80%-90%), making it a cleaner natural gas. With coal being the dominant energy source in China, development of CBM is highly promoted by the central government. A series of supportive polices have been released to promote investment in the CBM industry, such as tax waivers, subsidies and construction of backbone transmission infrastructure (gas pipelines). The government targets development and utilization of CBM gas to double in the 12$^{th}$ Five-Year plan (2011-2015) compared to the 11$^{th}$ Five-Year plan (2006-2010). Sino Gas's PCSs have been specifically listed in the latest 5 year plan as a part of the initiative for accelerated development.

**New pricing mechanism on Natural Gas, 2x in gas prices.** On 27 Dec 2011, National Energy Administrative of NDRC (NEA) reformed the natural gas pricing mechanism, and selected Guangdong and Guangxi as the pilot provinces to introduce the new mechanism, which then will be extended to other provinces. New formula:

$$P_{Gas} = 0.9 \times \left(60\% \times P_{Fuel\ Oil} \times \frac{H_{Gas}}{H_{Fuel\ Oil}} + 40\% \times P_{LPG} \times \frac{H_{Gas}}{H_{Fuel\ Oil}}\right)(1+R)$$

The new mechanism benchmarks import fuel oil and city gate LPG price rather than previously relied on coal price. In our view, the new formula is more transparent, and more closely reflects the market equilibrium. The current benchmark natural gas price is around RMB1.5/m3 in Shanxi (where SEH operates), while the calculated potential natural gas price in the region is approximately RMB2.6/m3, i.e. represents roughly 73% potential upside in terms of current gas price.

| | |
|---|---|
| **Ticker** | **SEH.AU** |
| **Rating** | **Not Rated** |
| Price (AU$) | 0.065 |
| Target Price (AU$) | n.a |
| 12m Price Range (AU$) | 0.035-0.08 |
| Market cap. (US$m) | 66.0 |
| Daily t/o (US$m) | 0.05 |
| Free float (%) | 62.9 |

***Financial summary***

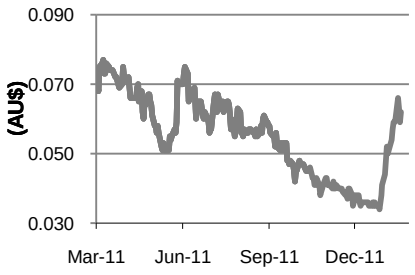
| Year to Dec | 08A | 09A | 10A |
|---|---|---|---|
| Turnover (AU$m) | 0.3 | 0.0 | 2.0 |
| Net Profit (AU$m) | (4.4) | (7.9) | 1.1 |
| EPS (AU$) | - | - | 0.0019 |
| P/E (x) | - | - | 34.7 |
| P/B (x) pre-CB | - | - | - |
| EV/EBITDA (x) | - | - | - |
| Yield (%) | - | - | - |
| ROE (%) | - | - | - |
| ROCE (%) | - | - | - |
| N. Gear. (%) | 97% | 79% | Net Cash |

*Source: SBI E2-Capital*

| | 11F | 12F | 13F |
|---|---|---|---|
| Consensus EPS (HK$) | - | - | - |
| Previous earnings (HK$m) | - | - | - |
| Previous EPS (HK$) | - | - | - |

***Price performance***

| Year to Dec | 1m | 3m | 12m |
|---|---|---|---|
| Relative to HSI (%) | (6.9) | (26.2) | (39.9) |
| Actual Price Changes (%) | (10.3) | (25.5) | (47.8) |




*Source: Bloomberg*

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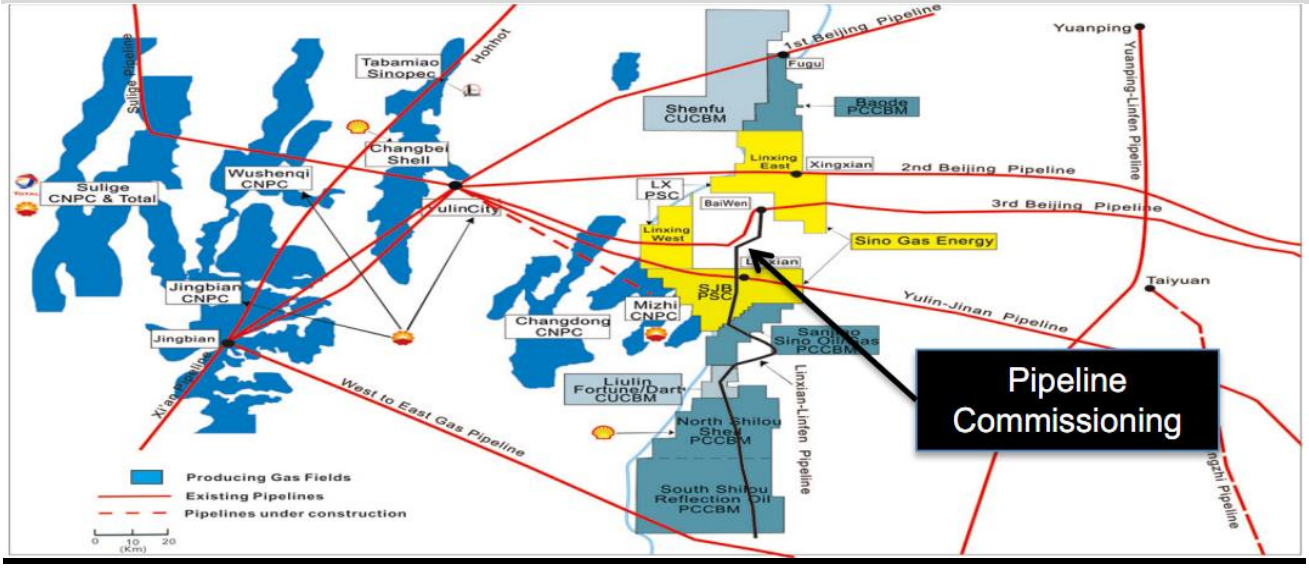
**Highly transparent in operational and financial activities.** Resources companies, especially those at early stage of development, bear high exploration risk. In this respect, SEH has a high degree of transparency with frequent updates on both its development status and reserves. The company releases quarterly operational performance reviews. SEH has also appointed RISC, an Australian independent advisor to the oil and gas industry to issue independent review reports semi-annually. Regular Joint Management Committee (JMC) meetings are held between Sino and its respective PSC partners in order to achieve alignment on all activities.

**Company Key Assets:**

**Assets Overview**




*Source: SEH*

**Key Assets overview.** PSCs are required to conduct CBM development and production in China. Four special State Owned Enterprises (SOE) are involved in Chinese PSCs, namely **PetroChina (857 HK)**, **Sinopec (386 HK)**, China United Coal Bed Methane (50% owned subsidiary of **CNOOC, (883 HK)**) and China Pingmei Shenma Energy & Chemical Group. They are authorized to contract and administer the PSCs within their agreed terms and conditions. Under the PSCs, the foreign contractors receive a preferential return of invested capital as they bear the total costs and risk of exploration. SEH has two PSCs with CUCBM and CNPC for Linxing and Sanjiaobei CBM exploitation respectively. Linxing and Sanjiaobei are located in the Ordos basin, the second largest basin in China. The total acreage is 3,000km$^2$ with well established infrastructure and major roads in place. It is located around two and half hours by car away from Taiyuan, the capital city of Shanxi province. Ordos basin contains prospective reserves of conventional gas and coal bed methane gas assets. Thousand of wells have been drilled in the basin by international firms, such as CNPC, Total and Shell. In Dec 2011, a new pipeline had begun pre-commission checks on dedicated CBM pipeline as shown on the graph above. The new pipeline connects directly between Sino Gas's Linxing and Sanjiaobei projects and the western edge of Shanxi Province. According to the management, SEH's CBM gas production will be largely consumed by local usage in Shanxi Province via the new pipeline. We believe the new pipeline will provide SEH with a cheap option for early gas production, while it has the capacity to satisfy a large portion of the future full commercial gas production as industrial development continues in the province.

**Linxing & Sanjiaobei PSC.**

**Production Sharing Contract (PSC) summary**

| Regions | Contracted SOE | Acreage($km^2$) | Net interests (%) | Minimum spend/annual(AU$) | 2P reserves | Total resources |
|---|---|---|---|---|---|---|
| Linxing | CUCBM[1] | 1874 | 64.75 | 2,893,888 | 12bcf | 2,189bcf |
| Sanjiaobei | CNPC[2] | 1126 | 49 | 1,738,804 | 10bcf | 1,493bcf |

*Source: Sino Gas and Energy presentation [1]CNOOC (China United Coal Bed Methane, 50% owned by CNOOC), [2]CNPC (PetroChina)*

**Linxing PSC contract.** Linxing covers total acreage of 1,874$km^2$, divided into two blocks namely Linxing West and Linxing East, as shown above. The Linxing project's contract partner is CUCBM and authorizes SEH to explore and commercialise CBM gas in Linxing for 30 years, sharing 64.75% net equity interest from the project. Under the terms of the Linxing PSC, SEH has a minimum spend obligation of roughly US$2.9m annually. Profit sharing is in two stages. In the first stage, the company is entitled to 80% of the profits plus a share of net their equity interest (ie. 64.75%) on the remaining 20%. This profit sharing is maintained until SEH fully recovers the upfront exploration costs and both parties share of their development costs. In the second stage of profit sharing, the entire net profit is split according to the net equity interest. Linxing consists of deep and shallow gas reservoirs. Linxing West, which has been SEH's prime focus, covers 573$km^2$ with gas deposits at depths between 1,000m to 2,000m. The 2P reserves, mid case contingent and mid case prospective resources discovered in the region are 12Bcf, -1282Bcf and 571Bcf respectively. The gas resources in Linxing East are generally shallower. It covers an area of 1,301$km^2$ with gas resources found at depths less than 1,000m, the mid case contingent and prospective resources is 324Bcf. Exploration in Linxing East is still at a relatively early stage, and more comprehensive seismic tests are expected to be conducted in coming years. We expect a high possibility to significantly increase the CBM resource at Linxing East project as the exploration plan is executed.

**Sanjiaobei PSC contract.** Sanjiaobei project covers total acreage of 1,126$km^2$ with the PSC contracted with CNPC. SEH's has a 49% net equity interest. The terms of the Sanjiaobei PSC is similar to that of the Linxing PSC except for the minimum expenditure requirement and interest share. The minimum spend obligation is approximately US$1.8m annually. The 2P reserves, mid case contingent and mid case prospective were 10Bcf, 471Bcf and 1,012Bcf respectively. Only half of the region has been examined by detailed seismic tests. Hence, we also expect the possibility of a significant upgrade of CBM resources further down the track. Furthermore, the Sanjiaobei project shares roughly the same geology and reservoir properties as the Linxing West region, which means deeper gas reservoirs and potentially the same high gas flow rates.

**Competitive advantage in SEH's gas reservoirs**. Around 88% of SEH's CBM deposits are found at depths between 1,000m and 2,000m. This is an advantage. Despite a higher construction cost due to the deeper drilling, there are numerous upsides in deep gas deposits. These include: 1) less chance of interacting with groundwater resources, resulting in low/no dewatering cost; 2) the increased overburden stress, formation pressure and thermal maturity of coal at larger depths, leads to higher gas content. In fact, Methane (CH4) extracted from Linxing west and Sanijiaobei wells were around 92-96% purity, and 3) higher flow rate of gas due to higher formation pressure. With such high purity, these unprocessed gases are already suitable for pipeline delivery. SEH also has the option of first developing its shallower gas deposits. The lesser cost of drilling (exclude dewatering) and shorter drilling time would potentially allow SEH to accelerate its gas outflow in a shorter time period. However, the negative is that shallow gas reservoirs have a greater potential to intersect with groundwater tables. Where coal cleats are water saturated, it is necessary to dewater the coal bed to allow desorption and gas production, which is costly and time consuming. Furthermore, the high moisture content in gas would tend to be too high for direct consumption. Hence, an extra processing step is needed to take out this unwanted moisture. Other issues associated with shallow deposit may include lower overpressure; low permeability to gas in the coal cleats, resulting low rate of gas outflow. Nonetheless the shallower CBM reservoirs do represent a potential significant resource for SEH.

**Operating review.**

SEH has discovered CBM gas in 14 out of 15 drilled wells, which is impressive. According to the management, the typical industry success rate of finding a "gas discovery" drill well is only around 40%. In order to improve the success rate, exploration via seismic testing is critical. Surface seismic testing provides useful information regarding the physical properties of the sub-surface, which can help to select optimal engineering applications to maximize well performance. It is also crucial to determine the influence of these geologic parameters on the success of specific drilling, completion, or stimulation practices. All deep CBM drilling on Linxing West and Sanjiaobei is to a standardized depth of approximately 2,100m at around US$0.8~1.0m/well. Wells are drilled to this depth to ensure that all potential gas bearing zones are analysed.

To date, SEH has drilled 15 exploration wells (8 Linxing West, 1 Linxing East and 6 Sanjiaobei). During the drilling process, detailed data and analysis is captured to perform a comprehensive study of formation structures, gas resources, and permeability. The analysis typically takes one month or so to finalize. Once the detailed analysis of the formation properties is completed, well testing is planned and executed.

**Current Operation Progress Update.**

SEH has completed multiple operations over 3Q and 4Q, 2011. Approximately 400km$^2$ of the seismic program has been completed. This resulted in an increase in overall CBM reserves, with Sanjiaobei mid case reserves plus contingent plus prospective resources increased 1.5x to 1.15Tc,f while 2P proved plus probable reserves was up by 33% to 8 Bcf. A further update on the resources and valuation of both Linxing and Sanjiaobei project completed by independent assessor RISC during January 2012, 2P proved reserves increased by 5% to 22Bcf, while the total reserves and resources rose 27% YoY to 3,682 Bcf. SEH's share of project NPV has increased 96% to US$2.3b from US$1.2b.

SEH also continued its flow testing program during 3Q and 4Q. Significant commercial gas flow rates were delivered from testing activity from wells during the period, namely TB08 at 882,500 scf/day and TB-06 at 1,000,000 scf/day in Linxing and 150,000 scf/day at SJB1 in Sanjiaobei. Sino Gas also drilled the SJB2 well and drilled the TB10 well during 4Q, 2011, with both wells revealing multiple hydrocarbon zones. The photos below illustrate the drilling process for SJB2 and the testing of TB04 taken during our site visit. The data and information collected from flow testing and drilling will be processed and prepared for the Chinese reserve report and the overall development plan (ODP) approval reports.

**Company Site visit - SJB2 (Left), TB04(Right)**

*Source: SBI E2 Capital Site Visit*

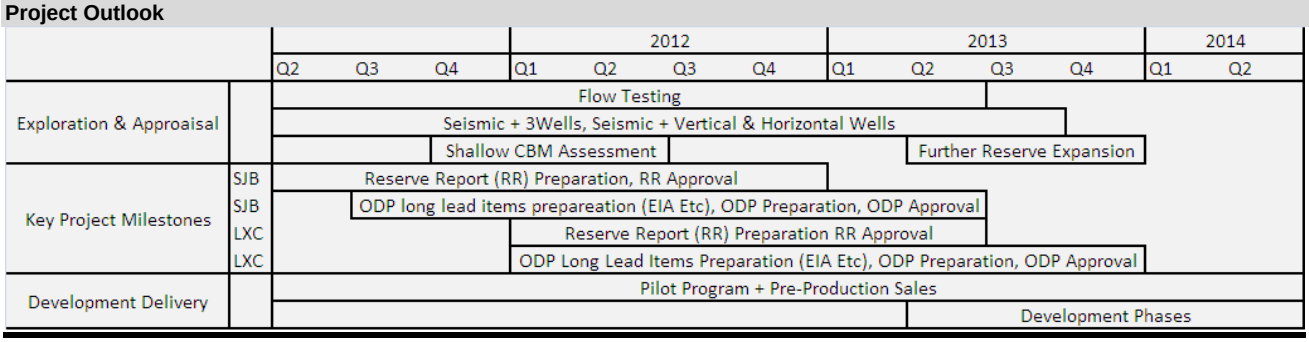
**Moving into development stage.** More seismic tests will be undertaken in 2012 with up to 470km of new seismic data being acquired. Well drilling progress will accelerate and SEH is expecting to drill 17 additional wells, which would effectively double the total number of wells to date. Management mentioned that horizontal wells might be drilled in suitable zones, to potentially increase gas outflow from a single well although this is still being reviewed. Pre-production activities and gas sales are targeted for mid 2012.

**2012 operation outlook**

| Project | Seismic(km) | No. of New wells | Cost (US$ 'm) |
|---|---|---|---|
| Sanjiaobei | 110 | 6 | 11 |
| Linxing West | 200 | 5 | 9 |
| Linxing East (Deep) | 100 | 1 | 2 |
| Linxing East (Shallow) | 60 | 5 | 3 |
| Total | 470 | 17 | 25 |

*Source: Company's London Investor Update presentation 2011*

**Project Outlook**




*Source: SEH*

**Financial position.** SEH is not yet in production and therefore there is no/insignificant cash inflows currently being generated. According to the PSC contracts, there are minimum spend requirements to fulfill annually of US$4.7m. The company had A$1.6m on its balance sheet at end 3Q, 11. The company has also recently completed an A$6m capital raise by placing out 150m shares at A$0.04/share. In January 2012, SEH engaged Argonaut capital (based in Perth and Hong Kong) to pursue non-dilutive forms of fundraising in order to support exploration activities into the development phase. SEH cites Argonaut capital's technical expertise in the natural resources sector and location in the region contributing to the appointment, which is aimed at realising the potential value of its projects whilst maintaining existing shareholder value. The company's calculated project value (mid case) at a 10% discount rate was reported by RISC in Jan 2012 at US$2.3b.

**Key financial overview**

| P&L | YE FY06/08A | YE FY06/09A | YE FY12/10A |
|---|---|---|---|
| Total Revenue | 0 | 0 | 2 |
| Profit/ (loss) for the period | (4) | (8) | 1 |
| Diluted earnings per share (cents) | (4) | (7) | 0.19 |
| B/S | | | |
| Assets | | | |
| Cash and cash equivalents | 4 | 2 | 8 |
| Plant and equipment | 0.1 | 0.1 | 0 |
| Total assets | 24 | 24 | 37 |
| Liabilities | | | |
| Trade and other payables | 1 | 2 | 6 |
| Financial liabilities and borrowings | 13 | 14 | 0 |
| Total liabilities | 15 | 16 | 6 |
| Equity | | | |
| Issued capital | 21 | 25 | 53 |
| Reserves | (2) | 1 | (3) |
| Accumulated losses | (9) | (17) | (18) |
| Total equity | 10 | 8 | 31 |
| Cash Flow statement | | | |
| Net cash used in Operating Activities | (1) | (1) | (1) |
| Net cash used in investing activities | (11) | (4) | (5) |
| Net cash provided by Financing Activities | 6 | 2 | 10 |
| Cash at the end of the Financial Period | 4 | 2 | 8 |

*Source: Sino Gas and Energy annual reports*

**Comparison with HK listcos focusing on CBMs.** There are two listcos on the Hong Kong bourse focusing on the development of CBM. These include: **Sino Oil & Gas (0702 HK)** and **Enviro Energy (1102 HK)**. All are at their exploration or appraisal stage, although Sino Oil & Gas expects to receive their ODP during 1H2012. SEH has also announced development plans and we believe is therefore more closely aligned to Sino Oil & Gas than other comparables. SEH has plans to generate initial revenues in 2012 through sale of gas through tapping offtake from some of its existing exploration wells.

**CBM companies comparison table**

| Company | Ticker | Price | Mkt Cap (US'm) | Free float (%) | Current P/E | PB | BVPS | Drilling Tech |
|---|---|---|---|---|---|---|---|---|
| Sino Oil and Gas | 702 HK | HK$0.275 | 423.9 | 78.5 | 111.8 | 1.0 | 0.2 | MLU |
| Enviro Energy | 1102 HK | HK$0.224 | 87.3 | 56.8 | - | 0.9 | 0.2 | MLU |
| China Leason | 8270 HK | HK$0.35 | 176.9 | 64.7 | - | - | - | Vertical |
| Sino Gas and Energy | SEH.AU | A$0.065 | 66.0 | 62.9 | - | 2.1 | 0.0 | Vertical |

*Source: Bloomberg*

**CBM related companies on HKEx**

**Sino Oil & Gas (0702 HK)** currently has oil and gas projects in Shaanxi Province and a CBM project in Sanjiao in Shanxi Province. The CBM project has net 2P reserves of 237.5bcf. It has drilled 35 wells and expects to drill 50 wells each year. Commercialization is expected to start in 2H2011. The Company has an experienced management team and well established technologies. Mr. Louis Yang, Vice President, has over 15 years extensive experience in CBM reserve assessment, drilling technology applications and commercial development in China. Mr. Ding Gui Ming, Chairman of the Experts Committee, was the former general manager of Daqing oil field, Chief Director of Exploration Bureau, and assistant general manager of CNPC. Together with the MLU drilling techniques, we believe the Company is the one most likely to succeed in starting commercial production. Also, the Company has a well established sales plan. The CBM extracted can be sold to SOE pipelines, LNG plants and through its CNG station.

**Enviro Energy (1102 HK)** currently has oil and gas fields and CBM fields in China. It has a CBM project in Xinjiang through the PSC with PetroChina. The reserve there is estimated by US reporting standard (NI 51-101 Compliant). Measured CBM reserve there was 26.7bcf/sq mi in 2010. It has multiple Tcf potential. 3 pilot wells have been drilled and 900 wells are to be drilled over 6 phases. Commercialization is expected to start in the next 6 to 12 months. It also has an ECBM (Enhanced CBM) project in Qinshui in Shanxi Province. It uses CO2 injection to recover CBM resources. A multi-well pilot phase started in 2010. The focus of this company is the CBM potential in the project in Xinjiang in the Junggar Basin. The infrastructure there is less developed and there is no long coal extraction history. The company believes that it can create a higher asset value of the CBM field. The MLU techniques adopted would be able to extract the thick coal seams which produce higher gas content.

# Industry overview

**SEH Flow Test on TB07 well**

*Source: SEH*

**Coal Bed Methane**

Coal Bed Methane (CBM) is a new type of clean energy with high calorific value similar to conventional natural gas, which generally comprises 95% methane and 5% Co2. CBM can be found almost anywhere there is coal and is usually trapped in the coalbed by ground pressure and water. Methane is a prime cause of fatal accidents in the coal mining industry, however has potential as a rich clean energy source to help replace other diminishing hydrocarbon reserves. China has the 3rd largest CBM reserves of 36.8tcm, behind Russia's 112tcm and Canada's 75tcm, located mainly in central and eastern regions.

Coal is the dominant energy in China. The exploitation of coal however leads to the emission of methane (CH4), leading not only to disasters in China's coal mines, but also significant amounts of greenhouse gas (21x the greenhouse effect than that of Co2). The concentration of coal mine methane extracted underground is generally 30%~60% that is suitable for residential use in the mining areas, which implies a clean gas fuel. The benefits from CBM production can be summarized as follow:

- Keeps coal mining safe from fatal accidents
- Decreases emissions of greenhouse gases from mines
- Decreases air pollution due to its nature as a clean-burning fuel
- Decreases reliance on conventional fossil fuels
- Utilizes the coal resources

New energy and clean energy, especially coal bed methane gas, is highly advocated by solid central government support and a series of favorable policies in China. In the 12th Five-Year plan, the Chinese government is targeting to double CBM production over that of the 11th Five-Year plan. Supportive policies, such as favorable tax policies and construction of pipelines to increase accessibility, were released to attract investment and speed up development progress.

In fact, development of unconventional gas projects, i.e. CBM, began in China in the early 1990s. Progress has been hampered mainly because of the lack of long distance pipelines. At present, several major pipelines have been built, such as West-East Pipeline and Ordos – Beijing pipelines. The total length of natural gas pipelines in the country is targeted to reach 100,000km by the end of 2015, as compared with 36,000km in 2010. Prior to PetroChina (0857 HK) being authorized to conduct CBM business in 2007, China United Coalbed Methane Corporation (CUCBM) held the monopoly in China's CBM business. Later, other state oil companies, PetroChina(0857 HK), China Gas Sinopec (0386 HK), CNOOC (0883 HK) and Henan Coal Seam Gas, have also been given a right to attract foreign investment in CBM business. These special operation executives (SOE) are developed to provide both financial resources and expertise in dealing with foreign companies to help accelerate the development of CBM projects.

**Government Supportive policies**

The 12th Five-Year plan has recently been released to address the issues related to increasing demand for gas and pressure to reduce carbon emissions. China has set a target to accelerate gas production; however, challenges faced by the CBM development industry are economic viability, infrastructural availability and technological development. During the 11th Five-Year plan period (06-10), China's CBM output reached 8.8bcm and CBM consumption amounted to 3.6bcm, lagging far behind the targeted output of 10bcm and target consumption of 8bcm. More supportive policies are being implemented to better co-ordinate achieving the targets in the 12th Five-Year plan.

**Five-Year plan Target for Coal Bed Methane**

| | 12th Five-Year plan | 11th Five-Year plan | Change (%) |
|---|---|---|---|
| Targeted coal-bed methane output (bcm) | 21 | 10 | 110 |
| Subsidization/scm of CBM produced (RMB) | 0.4 | 0.2 | 100 |
| Subsidization/kilowatt-hour of electricity produced (RMB) | 0.35 | 0.25 | 40 |

Source: SBI E2 Capital

According to the 12th Five-Year plan, newly-discovered CBM reserves will reach 850bcm from 300bcm in the previous five year period. The plan also proposes that coal mine gas accidents will reduced by over 40% in 2015 compared to 2010. China will speed up construction of industrial bases in the Qinshui Basin and eastern edge of Erdos basin in the period between 2011 and 2015 to enlarge reserves and expand production capacity. The 12th Five-Year plan also proposes that 33 coal mine companies in several provinces and cities including Shanxi, Liaoning, Anhui and Henan and 8 key coal production regions will begin building large-sized mining areas of coal mine gas extraction and utilization.

China will also eliminate tariffs and value added taxes on imports of machines, instruments and components that are used in CBM exploration operation from 2011 to 2015. Other benefit includes:

- 13% VAT rebate, i.e. income tax reduction.
- Subsidy RMB0.05/scm from the local government.
- Royalty wavier if the annual CBM production less than 1bcm, 1%~3% paid if the annual CBM production more than 1bcm.
- Fees of CBM exploration right and mining right in China's western region free for the first year, 50% exempted from the second to the third year, 25% exempted from the fourth to seventh year.
- Flexible price policy, CBM price determined by negotiation.
  (Gas prices recently rose to RMB1.5/m3 from 1.1/m3)

Pipelines also play an important role in CBM development. Lack of long distance pipelines was one of the causes of its slow development in earlier decades. The total length of natural gas pipelines in the county is targeted to increase by 1.8x in the period between 2011-2015 to 100,000km. Major additional pipeline projects are also planned to commence construction between 2010 and 2015. In March 2011, CNPC reached an agreement with Shanxi International Electricity Group to construct a CBM pipeline network in Shanxi province. Sections of this pipeline are now being commissioned.

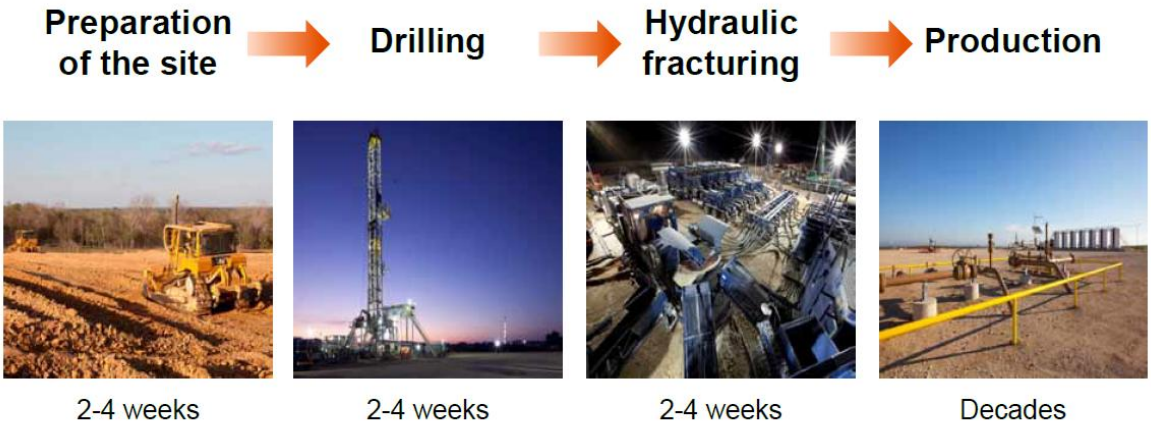
**Risks involved in CBM business in China.**

1) changes in the current favorable government policies, 2) political and social consideration, 3) devaluation, appreciation in the value of RMB, 4) restrictions on convertibility of RMB, 5) lower-than estimated resource and reserves being developed, 6) future further funding and capital expenditure requirements, 7) accessibility of pipeline 8) changes in the CBM gas price.

# Appendix

The drilling and testing process undertaken by SEH is similar to that illustrated below.

**CBM extraction process**



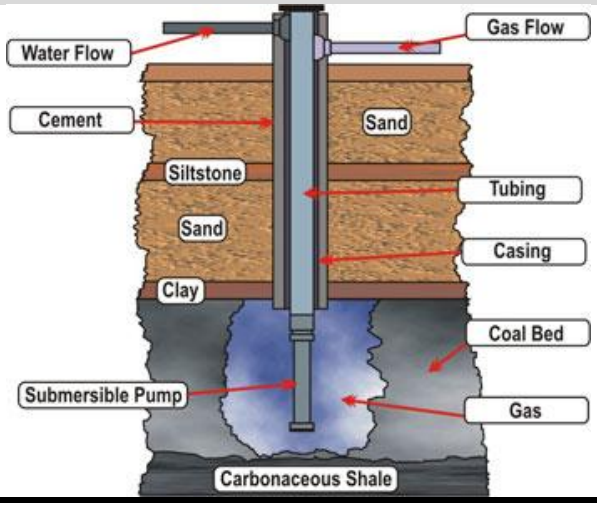

*Source: bhpbilliton company presentation*

**Preparation of the site**

As mentioned above, SEH has undertaken extensive seismic to provides it with information regarding the physical properties of the coal and other rock formations which are associated with coal. The seismic provides a rough idea of the amount and location of the possible gas reserves. Based on the analysis of the seismic a suitable drilling location is identified. Once selected, the site is prepared which often requires construction of roads for the transport of heavy equipment and leveling of the site etc. Cost might also include compensation to local residents due to the use of their existing land.

**Drilling operation**

**Vertical Drilling Technique**




*Source:* Ground Water Practitioners web site

The drilling costs are normally most intensive in this stage although this is a critical exploitation phase. In general, 60% of drilled wells are found inefficient/no gas emission, although this has not been the case for SEH. Drilling techniques for CBM in foreign counties may not be appropriate for China due to geological differences. The methods used for CBM production in China may also need to vary from one basin to another, depending on the local geology and reservoir properties. For example, shallow gas reservoirs have greater potential for interaction with groundwater resources, leading to a significant amount of water production when the coal seam is depressurized to release the gas and hence increases costs. Deep gas reservoirs however requires higher drilling costs although can lead to significantly enhanced production rates.

**Hydraulic fracturing**

**Production Site (Left), Modified Sand for Fraccing (Right)**

*Source: bhpbilliton company presentation, SBI E2 Capital Site Visit*

Hydraulic fracturing (fraccing) is a technique commonly used in both vertical and horizontal wells to stimulate production. Fraccing is conducted by pumping highly-pressurized fluid into the formation to increase the permeability and provide a conductive path connecting a larger area of the reservoir to the well. To keep this fracture open after the injection stops, processed sand (proppant) is often added to the high-pressurized fluid. Normally, the fraccing fluids consist of 90% water, 9.5% processed sand and 0.5% chemicals. Some chemicals, such as diesel, can be used in hydraulic fracturing which naturally can be toxic and lead to concerns about the environment, health and safety. Hence, the practice of hydraulic fracturing is closely regulated internationally or banned in some countries. SEH conducts fraccing in China in accordance with the Chinese regulations and international best practice.

**Production stage**

At the production stage, depending on the geological formation, some wells might require additional dewatering process when the moisture content is too high. When a well is on production surrounding land is restored its original condition, as shown on the photo above. Then, it requires very minimum maintenance costs and operation costs. Productive life in China often can last over 10 years, sometimes considerably longer than this.