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Pollution Solutions

China woos the energy sector's Cinderella

While shale gas steals the limelight at the global energy ball, China zeroes in on its less glamorous yet abundant step-sister: coal

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1/2/2014



Confronted by an external oil dependency rate that exceeds 55% alongside intensifying popular demands to reduce its high carbon emissions, China is investing heavily in alternative forms of energy. With high extraction costs limiting the ability of shale gas to play a meaningful role in the nation's power supply equation any time soon, the country has turned its attention towards finding ways of more efficiently and cleanly extracting energy from the fuel source it is famous for: coal. Coal conversion, a process that transforms coal into liquid or gaseous fuel, presents a means by which China can reduce both its emissions as well as its reliance on imported energy. However, while the country will increasingly consume energy produced from domestic coal conversion projects, these projects will certainly require foreign technology and expertise, Liu Yanwei, deputy chief engineer of the **China National Petroleum and Chemical Planning Institute**, told this news service in an interview.

"The output from coal conversion will enable China to decrease its imports of energy by 10 to 15% in the next several years," he said, adding that while the upcoming initiatives to establish coal conversion plants will pose a threat to foreign suppliers of raw energy, multinationals are expected to play a strong role as technology providers.

"For high-capacity projects we will continue to use technology from foreign partners," Liu said.

20 coal conversion projects, including those in which coal is converted to diesel, synthetic natural gas, methanol, or olefin, will be approved by the **National Development and Reform Commission (NDRC)** this year, with four or five expected to break ground before 2014, according to Liu, who noted that international giants such as France's **Air Liquide** and Germany's **Siemens** are expected to win major contracts.

The **Lu'An Group**, a state-owned Chinese coal producer, will continue to collaborate with foreign technology providers on upcoming coal conversion projects, Feng Yongfa, president of the group's subsidiary, the **Shanxi Lu'An Coal-to-Liquid Co.**, told this news service.

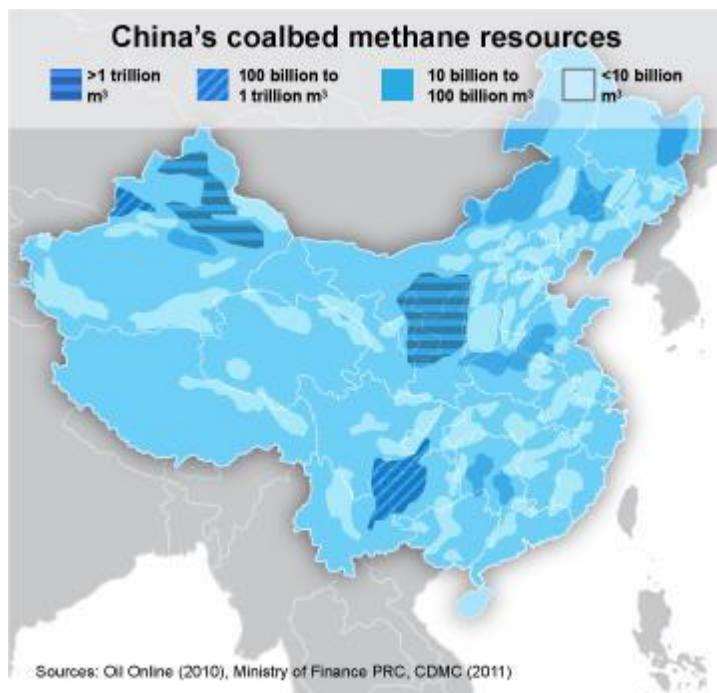
"For general products, we are now able to use the Chinese suppliers. But for the high-capacity aspects, foreign products are more reliable," he said.

Air Products and Chemicals Inc., the Pennsylvania-based industrial gas giant, has won the contract to build, own and operate four air separation units (ASUs) at Lu'An's coal-to-liquid (CTL) facility in Changzhi, Shanxi province, which will combine to supply over 10,000 tons of oxygen, 6,000 tons of nitrogen, and 700 tons of instrument air per day, according to a company release.

The Changzhi facility, which has received a total investment of USD 647m (CNY 4bn), will also use coal gasifiers provided by **Royal Dutch Shell**, said a source with knowledge of the matter.

Going forward, Lu'An plans to set up two or three new coal conversion projects in the next two years, pending approval from the NDRC, according to Feng. These projects will likely be for converting coal into methanol and olefin, he added.

For these projects, Lu'An expects to invest 30% of its own capital into the equipment costs, with the rest being provided by both Chinese and foreign investors. The company is open to foreign companies owning and operating equipment themselves, such is in the contract with Air Products, Feng said.



The New Deals

Foreign players are now jockeying for position as they wait for state-owned enterprises (SOEs) such as the **China Petroleum and Chemical Corporation (Sinopec)**, the **China National Offshore Oil Corporation (CNOOC)**, and the **China National Petroleum Corporation (CNPC)**, to attain NDRC approval for coal conversion initiatives, each of which will require total investment ranging from USD 500m to 3bn (CNY 3.1 to 18.5bn), depending on the capacity.

Air Liquide is preparing to bid for at least three upcoming coal gasification projects, said Alexander Schrieffl, technology director of the company's China engineering and construction division.

"We're already working on early development," he said, noting that Air Liquide is currently putting together proposals for both Sinopec and CNOOC.

Earlier this month, Air Liquide won a contract to build, own and operate four ASUs, each of which will deliver 3,900 tons of oxygen per day, along with nitrogen and other gases, in a CTL and coal gasification facility in Xinjiang province managed by the Shanghai-listed **Inner Mongolia Yitai Group Co.**, said Benjamin Michel, development group manager of the company's China E&C division. The

contract is the largest of its kind, and will provide revenue to Air Liquide for at least 30 years, he added.

Siemens plans to bid for six to eight Chinese coal conversion projects within the next two years, including CTL, coal-to-synthetic natural gas, and coal-to-chemical, said Dr. Jan Kollmus, head of proposal management for the company's Beijing-based fossil power generation division. Siemens will soon deliver a total of 24 coal gasifiers to the **Shenhua Ningxia Coal Industry Group Co.**, a subsidiary of the **Shenhua Group**, the world's largest coal producer, according to Kollmus. These will add to the five 500-megawatt gasifiers that the German technologies giant has already provided for a coal-to-polypropylene plant that Shenhua operates in Ningxia province.

Air Liquide and Siemens will also be competing against Air Products, **General Electric**, Shell, and the **Linde Group**, as well as the domestic player, Hong Kong-listed **Yingde Gases Group Co.**, to supply equipment such as ASUs and coal gasifiers for the upcoming projects, according to Schrieffl. Contracts to provide equipment, as well as engineering and design services, will run up to USD 200m (CNY 1.24bn), he added.

Kollmus noted that supplying coal gasifiers alone can result in contracts worth upwards of USD 50m (CNY 310m).

The Supply Chain

There is space in China's coal conversion supply chain for less well-known foreign brands as well. **KSB**, the German producer of pumps, valves, and related equipment, is now targeting sales of its black water pumps to Chinese coal conversion projects, said Erhard Bingel, senior consultant to the KSB board of management. Bingel is now approaching the Shenhua CTL project in Ningxia, as well as a coal gasification plant operated by the **China Power Investment Corporation** in Xinjiang, each of which presents opportunities worth at least USD 30m (CNY 185m).

Ensival Moret, a French manufacturer that supplies centrifugal pumps to Air Liquide and Shell, is poised to get a boost from upcoming coal conversion projects, said a company official. **Fives Cyrogenie**, a fellow French producer of heat exchangers used for gas separation that is also a supplier of Air Liquide, has its eyes on CTL opportunities and has been in talks with several potential SOE end users, as previously reported by this news service.

There might be room for newcomers too. **Western Hydrogen**, a Canadian start-up that offers patented molten salt catalyzed gasification technology used for the production of hydrogen, a key element in coal conversion, is also looking to get in on the action, said Lyman Frost, CTO, a serial entrepreneur who previously built up a fuel cell company that he sold to **Rolls-Royce**.

Frost has given presentations to several Chinese officials involved with the clean coal sector, detailing the success of Western Hydrogen's demonstration project in Alberta.

"The SOE guys are interested, and some of them said that they want to come over to check it out," he said.

With a goal of reducing carbons emissions per unit of GDP by 17 percent by 2015, according to China's 12th Five-Year Plan, the world's largest consumer of coal is now increasingly shifting its focus to liquefaction and gasification, which can result in significantly cutting emissions compared to conventional coal burning.

While the energy produced from coal conversion plants will likely eat into profits made by overseas suppliers of oil and gas in China, foreign companies able to supply technology for high-capacity applications stand to benefit.