

## ASIACHEM: New Coal Chemical – the “Fifth” Oil & Gas Supplying Passage for China?

2010-10-20

***ASIACHEM estimates that China will have capacities of 12Mt/a CTL, over 5Mt/a CTO, and more than 20bnNm<sup>3</sup>/a SNG by 2015. Through the clean and efficient conversion of coal resources, new coal chemicals will become the “fifth” oil & gas supplying passage to contribute to China’s energy demand and economic growth.***

Along with the sustained economic growth, China’s energy demand and dependency on foreign oil supply are increasing continuously. China has become net oil importer since 1993 when the oil import exceeded export first time. In 2009, China imported over 200Mt of crude oil, reflecting a foreign dependency of more than 50%.

As predicted by the National Energy Administration, China’s oil demand may approach 600Mt by 2020 and, if domestic oil output is maintained around 200Mt, China need to import 400Mt of crude oil to fill the gap or showing a foreign dependency around 67%. To secure a stable supply of energy is the most important precondition to realize sustainable and steady growth of economy.

### **China’s Four Strategic Oil & Gas Supplying Passages**

China’s energy import has been gradually developed from the original single passage through Malacca Strait to the coexistence of both ocean shipment and inland pipelines, and begun to form a diversified pattern composed of four major oil & gas supplying passages.

#### **The first one: Malacca Strait – Oversea Oil & Gas Passage**

The ocean shipping line through Malacca Strait towards coastal ports is the most important passage for China. Before 2008, over 90% of Chinese oil import was transported through ocean shipment and the more than 80% of the import, i.e. from Middle East and Africa, need to pass the Strait, arrived Chinese ports, and finally reached oil refineries and/or petrochemical complexes to feed the oil/chemical production.

Before the Mid-Asia gas pipeline was brought on-stream in 2009, China’s gas import was also conducted by the ocean shipment of liquefied natural gas (LNG). In future, with the large capacity LNG terminals completed and put into use at Chinese coastal ports, LNG import through this passage will probably further increase.

#### **The second one: Sino-Kazakh Oil & Gas Passage**

Sino-Kazakh oil pipeline is the first inland energy transport artery in China. The pipeline is 962.2km in total length, starting from Atasu, Kazakhstan at the west start, and reaching Ala Pass, Xinjiang, China at the east end. Construction of the pipeline was based on

USD700bn of capital jointly invested by China and Kazakhstan, started in September 2004 and completed in November 2005. In May 2006, crude oil from Kazakhstan arrived at the measuring station of Ala Pass at the Chinese side as the official launch of oil export to China.

Sino-Mid Asia gas pipeline consists of phase I and phase II constructions. Phase I is designed to receive natural gas from Turkmenistan while the phase II is for reception of gas from Kazakhstan. The lines from two directions converge in Kazakhstan and go northwest, finally arriving Horgos, Xinjiang China and connecting to the China 2<sup>nd</sup> West-to-East Pipeline, which passes Xinjiang, Hubei, Zhejiang and other Chinese provinces, reaching Shanghai and Guangzhou as its east and south ends respectively, and is extended to Hong Kong, to deliver clean and efficient energy for China's economic development.

### **The third one: Sino-Russia Oil & Gas Passage**

In September 2010, Construction of Sino-Russia oil pipeline of 997.25 total length was completed, as the second inland energy transporting artery for China. According to the original planning, Russia shall export 15Mt/a crude oil to China in next 20 years. In prior to that, Russia has delivered China with crude export by railway transportation, in the quantity of several million tons per year, mainly passing the railway port at Manchuria, Inner Mongolia and destining to Daqing, Heilongjiang.

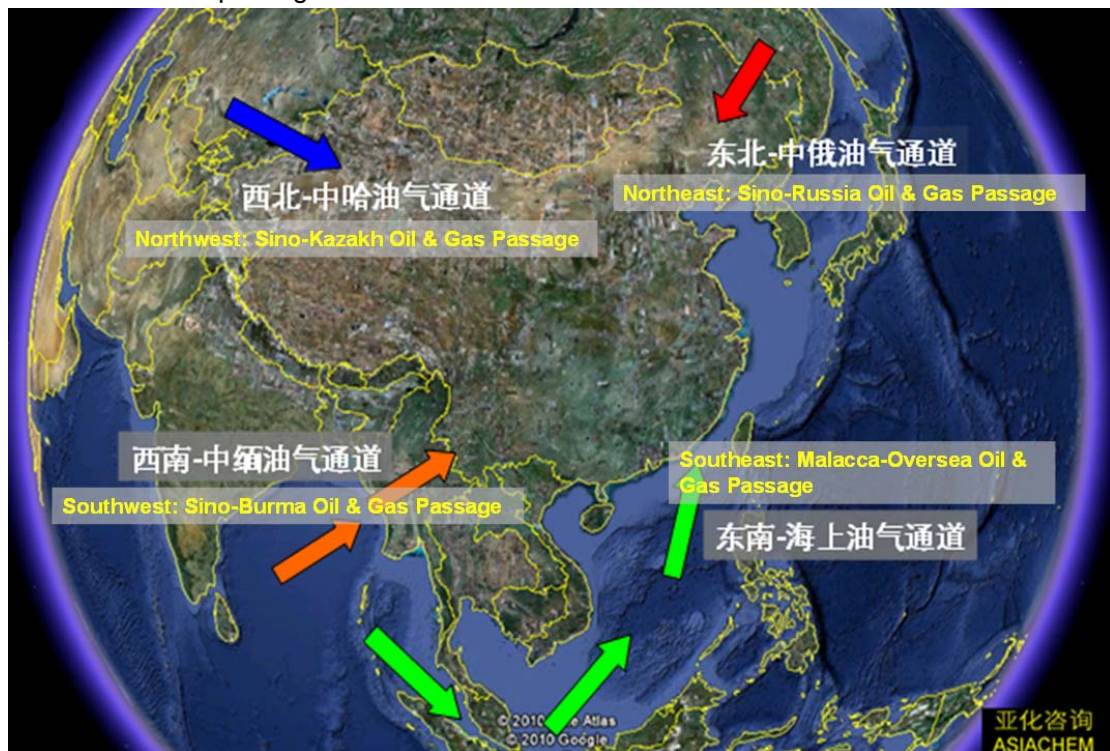
In the past years, China and Russia held a discussion on the construction of a joining gas pipeline over variable plans. The most recent scheme is that Gazprom (Russian Gas Industry Company) will build a new gas line towards China through Altay Region, South Siberia. Total investment for the project will be finalized in 2011. Both China and Russia also expect to reach agreement upon the price of gas supply by that time.

### **The fourth one: Sino-Burma Oil & Gas Passage**

In June 2010, Sino-Burma oil & gas pipeline project started the construction of Burmese section, followed by the construction of Chinese section in Yunnan Province started in September. As the third inland Chinese energy supplying artery, the line is also a strategic passage planned in southwest China to dissolve, in part, the "Malacca Dilemma". In comparison with the conventional Malacca passage, import distance through Sino-Burma passage may reduce at least 1200km.

Sino-Burma pipeline is designed in two parallel lines for gas and oil respectively. Both lines start from Sittwe Port on west Myanmar coast, passing across the border to arrive Ruili, Yunnan Province and further extending to Kunming, capital of Yunnan. Based on around 1100km of total length, the capital investment on the project is estimated about USD2bn. The pipeline is preliminarily designed of a capacity to transfer 22Mt of crude oil and 12bnNm<sup>3</sup> of gas annually. Most of oil supply will come from Middle East and Africa, but the main gas resource will be that from a Myanmar offshore oil/gas field.

After exercise of a “Go out” national energy strategy in recent years, China has formed the said four major passages for energy import, to name once again the overseas passage at southeast, the Sino-Kazakh passage at northwest, the Sino-Russia passage at northeast, and Sino-Burma passage at southwest.



### New Coal Chemical: the “fifth” Oil & Gas Passage for China?

The new coal chemical is the clean coal-based energy/chemical system with advanced gasification as the leading process step. Different from the said oil & gas import passages, the new coal chemical shall be applied, based on the Chinese resource conditions of oil/gas shortage and coal rich and with the backup of technology innovation, to realize the supplement and partial substitution of oil & gas supplies.

In 2009, Chinese Government published a petroleum & chemical industry stimulus package, where 5 new coal chemicals, namely CTL (coal-to-liquid), DME (coal-to-di methyl ether), CTO (coal-to-olefins), SNG (synthetic natural gas) and CTMEG (coal-to-mono ethylene glycol) were explicitly defined as the developing orientation for demonstration. In the period of 2009-2010, part of these processes was demonstrated with success on industrial scales. Amongst them CTL, CTO and SNG are of most brilliant foreground.

### CTL

CTL can be further sorted into three directions, i.e. direct CTL, indirect CTL and coal-based methanol-to-gasoline (MTG). All of them have realized steady operation on demonstration units.

In June 2010, Shenhua Group announced that its direct CTL project in Ordos, Inner

Mongolia had reached continuous and steady operation, in addition Shenhua 180kt/a CTL project of indirect process was also started up successfully. Inner Mongolia Yitai Group 160kt/a indirect CTL project has passed three times of trial production since March last year. By June 30<sup>th</sup>, the line had kept steady operation for 5640h and now reached full load of the whole process line, producing 483t/d of oil products, including 265t of light diesel, 148t of naphtha, and 19t of LPG. Lu'an CTL demonstration project has also restored production since mid-June 2010. The project consists of two lines based on Co- and Fe-catalyst respectively, with 210kt/a of combined CTL capacity. Jincheng Coal Industry Group (Jinmei) constructed a 100kt/a methanol-to-gasoline (MTG) plant based on the technology licensed from ExxonMobil. A 300kt/a crude methanol unit integrated in the project. This MTG demonstration plant was started up and produced the first barrel of on-spec gasoline in June 2009. The project has maintained stable operation since March 2010.

### **CTO**

In 2010, there are three CTO projects are scheduled to start up in China, all of them with polyolefin resins as final product. They will become the first time of large quantity production of plastics from coal as starting material. Shenhua Baotou CTO project reached mechanical completion on May 31<sup>st</sup> 2010, and was brought on-stream in August, and on-spec PE and PP products were sold on market a soon later. By early October 2010, Shenhua Ningmei's MTP unit was started with success and outputted on-spec propylene product. The whole process - 520kt/a coal to PP - is expected to get through in Q4 2010. Besides, Datang coal to PP project in Duolun, Inner Mongolia is also scheduled to start up the complete process before the end of 2010.

ASIACHEM predicted that by the end of 2010 when all the above mentioned three projects will be completed and on-stream, China may has 1.58Mt/a of coal-based polyolefin capacity, including 300kt/a of polyethylene and 1.28Mt/a of polypropylene. This is around 7% of the total Chinese polyolefin capacity at the time. As an indirect oil-substitute route, CTO will become a supplement of great significance to China's olefin supplying market.

### **SNG**

Coal-based SNG is a process to produce clean synthetic natural gas by using coal as feed material and through the steps of coal gasification, syngas cleaning, and methanation etc. According to the data from ASIACHEM, up to August 2010, for SNG projects had obtained official approval from NDRC with capacity totalized up to 15.1bnNm<sup>3</sup>/a. Namely they are Datang 4bnNm<sup>3</sup>/a SNG project in Chifeng, Inner Mongolia, another Datang 4bnNm<sup>3</sup>/a project in Fuxin, Liaoning Province, Huineng 1.6bnNm<sup>3</sup>/a project in Ordos, Inner Mongolia, and Qinghua 5.5bnNm<sup>3</sup>/a project in Yili, Xinjiang.

Datang Chifeng project was approved by NDRC in August 2009, the first line of the project, with 1.3bnNm<sup>3</sup>/a capacity, is due to be complete by the end of 2010 and to supply Beijing area through self-furnished pipeline. The whole project of three lines and 4bnNm<sup>3</sup>/a total

capacity shall be completed by the year 2013 when the produced SNG can supply the needs of Shenyang, Fuxin, Tieling and other near cities. Huineng Inner Mongolia project is designed of 2bnNm<sup>3</sup>/a coal-based SNG capacity and 1bnNm<sup>3</sup>/a LNG capacity. This project, of CNY13.55bn capital budget, achieved approval from NDRC in December 2009 and started construction on April 21<sup>st</sup> 2010.

Following the steady progression of demonstration of the NDRC defined 5 novel processes and the successful start-up of several demonstrative units, new coal chemical will achieve great development in next 5-10 years. ASIACHEM estimates that China will have capacities of 12Mt/a CTL, over 5Mt/a CTO, and more than 20bnNm<sup>3</sup>/a SNG by 2015. Through the clean and efficient conversion of coal resources, new coal chemicals will be made as a supplement and partial substitution to oil & gas resources, and become the "fifth" oil & gas supplying passage to contribute to China's energy demand and economic growth.

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The 2<sup>nd</sup> **Coal to Olefins Conference** will be held in Nov.22-23, 2010 in Beijing, China.

Under the cooperation of Total Petrochemicals, the upcoming conference will be organized by ASIACHEM. It will focus on the update of three world scale Coal based Olefins project (Shenhua Baotou, Shenhua Ningmei & Datang Duolun) and the Technology & Economics of methanol to olefins comparing the naphtha crackers.

For more information, please contact: (8621) 51386466 or [Lex@chemweekly.com](mailto:Lex@chemweekly.com)