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14. January 2013

Online at <https://mpa.ub.uni-muenchen.de/43753/>

MPRA Paper No. 43753, posted 13. January 2013 16:17 UTC

# China's Coal Chemical Industry: In the View of Governance Challenges

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## ABSTRACT

This paper examines the China's coal chemical strategy. As a part of national energy strategy, China's coal chemical industry induces conflicts on technical level, economic level and policy level. The analysis of this paper is under the policy framework and discusses the causes and effects of these conflicts and also proposes some possible solutions.

**Keywords:** Coal chemical industry; low carbon; renewable energy

## 1. Introduction

Coal chemical technology refers to the process that uses coal as raw material to produce gases, liquids and solids, which are then used to synthesize a series of chemicals (Li & Xie, 2010). Coal chemical industry can be divided into traditional coal chemical and new coal chemical industries. The former mainly includes production of synthetic ammonia, coke, calcium carbide and other sub-sectors, while the new coal chemical industry aims at producing petrochemicals, including ethylene glycol, gas, oil, olefins, and etc. (Liu, 2012).

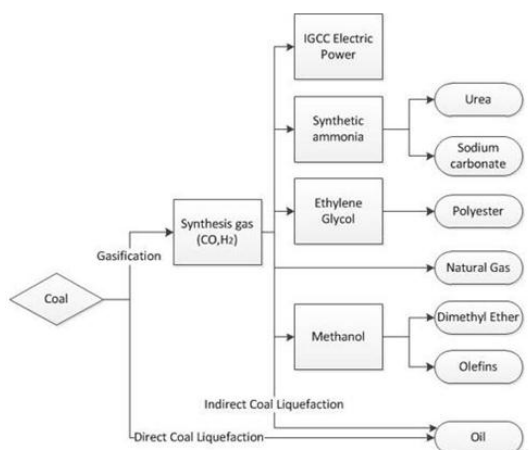


Figure 1, New coal chemicals (Liu, 2012).

China is the largest consumer of coal and has the third largest coal reserve in the world (EIA, 2012). At the same time, China's production of other primary energy

such as oil and gas are far lower than its domestic demand, for the nation's rapid growth requires greater and greater amount of energy. In 2010, China had to import 239 million tons of crude oil to meet the needs of the country's energy consumption, bringing its dependence on foreign oil reached as high a level as 55% (NEA, 2012). However, oil, gas and other petrochemicals are all crucial raw materials to China's economy. From this prospective, the utilization of coal chemical in China is considerably important to the nation's energy security.

Though it could be an ideal option to China's current energy predicament, there are still many practical problems in adopting coal chemical technologies. With a large number of new projects being constructed, this industry has become more or less over-invested. More importantly, coal chemical technologies are still immature and would lead to severe investment risks. Again, the competing interests between coal chemical companies and the nation's monopolistic petrol companies are worth noticing. There are also critics from green organization saying that these projects are dangerous to local ecosystem since they would use huge amount of water. Besides, policy makers receive pressures from 'carbon issue' as well, for the industry would involve substantial quantities of GHGs emissions.

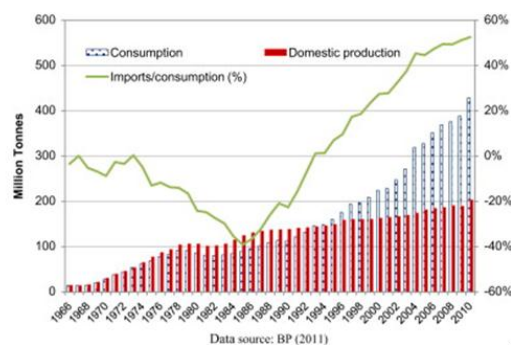


Figure 2, China's Dependence on Foreign Oil (BP, 2011)

As the most authoritative development policy, the final version of the National Development Strategy for Coal Reprocessing Industry (NDSCRI), which is being drafted by the National Energy Administration (NEA) and the National Development and Reform Commission (NDRC), will be enacted in the near future (Xinhua News Agency, 2012). It is foreseeable that most of these governance challenges would be considered and could affect the final result, and the topic is worth discussing for its perfect timeliness.

## 2. Key actors

### 2.1 The Central Government

The central government plays the most influential and authoritative role in this case, for China adopts a single-party socialist republic political system, where the central government has the absolute decision-making power. However, the central government has to balance the interests of each province so as to maintain the overall optimal outcome.

The central government mainly regulates the coal chemical industry from the macroscopic view. Specifically, it focuses on maintaining power security, avoiding over-heated investments, coordinating competing interests across provinces/industries, proposing overall development strategy, and etc..

The National Energy Administration (NEA) and the National Development and Reform Commission (NDRC) in the central government are divisions who are responsible for regulating and organizing the coal chemical industry in China. The National Development Strategy for Coal Reprocessing Industry, which is the central document of this case report, is being drafted by these two divisions. Besides, the Yellow River Conservancy Commission (YRCC) under the Ministry of Water Resources and the Ministry of Environmental Protection (MEP) are the departments in charge of the Yellow River and the nation's environmental protection respectively.

## 2.2 Local Governments

Compared with the central government who values overall planning and sustainable development as the most important issue, local governments concern more about their local developments. However, as the lower level authorities, local governments should always follow the policy made by the central government.

Major coal-rich provinces in China are Shaanxi, Shanxi, Inner Mongolia and Xinjiang: all of them locate in the north of China (figure 3). Their economy largely rely on the coal industry (Shanxi, for example, 98% of the province's value-added tax were collected from coal industry (Shanxi Provincial NTB, 2012)), therefore these local governments are more sensitive to the profits of their local coal companies, and naturally more willing to support development plans of new coal chemistry plants, which would broaden their tax bases.

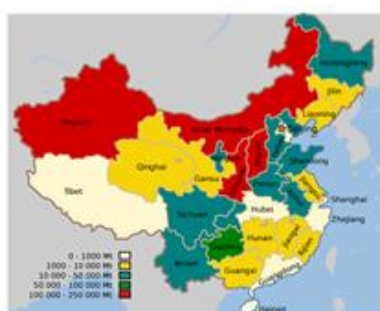


Figure 3, Map of China Coal Resources by Provinces (Coalworld, 2005).



Figure 4, Map of China's two major rivers (Enviro-map, 2009).

Besides, the dispute on 'water right' is another controversial issue across provinces. There are 9 provinces locate along the Yellow River: Qinghai, Sichuang, Gansu, Ningxia, Inner Mongolia, Shaanxi, Shanxi, Henan and Shandong, counting from upstream to downstream, while the YRCC is currently managing the water resource from the Yellow River.

### **2.3 Companies**

Coal Chemical Companies are the direct developers of coal chemicals plants, though it is the governments (on different level) who compile the development plans and decide whether a project is approved or not. In 2009, the right of approving projects was shifted from local governments to the NDRC (The State Council, 2009).

Both private companies and state-owned companies are welcome to enter the industry, though it requires fairly high initial capital (Sina Finance, 2012). There is no current subsidy policy towards coal chemical industry in China (CICC, 2012).

### **2.4 Green Powers**

Many Green Organizations are worriedly watching the enthusiastic investments in this industry. Although their major concerns, which are mainly on the overuse of water and the large amount of incremental GHGs emissions (Greenpeace, 2012), definitely make sense, their voices are weak for they do not have corresponding political rights or political influences.

Compared with Green NGOs in China, the binding/semi-binding targets the state leaders have pledged, such as the nation's 10 years target on carbon emissions reduction announced right before the Copenhagen Conference in 2009 (NDRC, 2009), are more influential. MEP and NDRC in the central government are responsible for related administrations.

## **3. Governance Challenges**

### **3.1 Values**

The concern on the values of national energy security is a major impetus for the nation to pursue the development of coal chemical industry. China has been experiencing rapid growth since last decades, and its economic growth largely depends on the use of crude oil and its chemicals. However, China is not sufficient in such resource. In 2010, China had to import 239 million tons of crude oil to meet the needs of the country's energy consumption, bringing its dependence on foreign oil reached as high a level as 55% (NEA, 2012). Luckily, the country is rich in coal: China is the largest consumer of coal and has the third largest coal reserve in the world (EIA, 2012). Therefore, as long as the technology is reliable, policy makers do have enough interests to support the development of the industry.

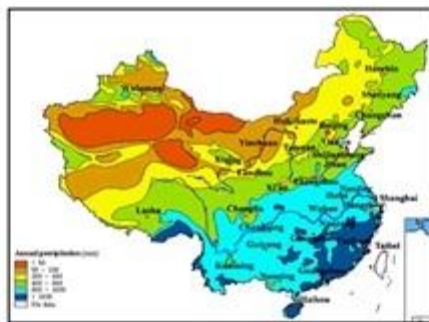


Figure 5, Annual precipitation in China (Factanddetails, 2011)

However, the significant negative impact on the environment is a major constraint to the development of the industry. Coal chemical is a highly water-consuming industry, normally 7 to 12 cube meter of water are needed to produce 1 ton of oil from coal (Greenpeace, 2012). However, the Northern China, the home to most coal chemical plants for its rich endowment of coal (figure 3), is suffering from the serious shortage of water (figure 5). Therefore, due to the contradiction between rich endowment of coal and serious shortage of water, the feasibility of developing coal chemical industry in this region is doubted by many people. They believe that the projects could ruin their hometown and strongly oppose those projects.

### 3.2 Competing Interests

In addition, the problem of lacking of water could also cause ‘the war of water’ across provinces. Currently, all of the projects in this region are counting on the water from the Yellow River (Sina Finance, 2012), one of the two major rivers in China (figure 4), though the river cannot provide enough water. There are 9 provinces locate along the Yellow River, and the huge demand of water from the Yellow River (not only for coal chemical industry) has already incurred the rivalry across these provinces over the ‘water right’. Even though there is a ‘Water Right Replacement Scheme’ managed by the YRCC that allows provinces to receive disposable ‘water right’ by reducing water uses in other industries (YRCC, 2010), it cannot change the fact that water is a type of scarce resource in this region.

Besides, enough attention should be paid onto unfair competitions across companies. One the one hand, even though no evidence shows private capitals have received unequal treatments from the government, public capitals do have natural advantages on entering the industry, for these state-owned companies have closer relationship with the policy maker, who is responsible for approving projects. One the other hand, some (state-owned) energy monopolists have already used their monopoly position to obstruct their competitors: China National Petroleum Corporation (CNPC), one of the (only) three major (state-owned) petroleum companies in China, for example, was reported rejected the request from China Shenhua Energy Company Limited (Shenhua), the biggest (state-owned) coal company, to use its gas pipeline, which led to the stagnation of a Shenhua’s coal-to-gas project in Inner Mongolia (Sina Finance, 2011). Market supervision and surveillance is a basic responsibility of the government,

yet it is not an easy task in practical, especially when it comes to state-owned companies.

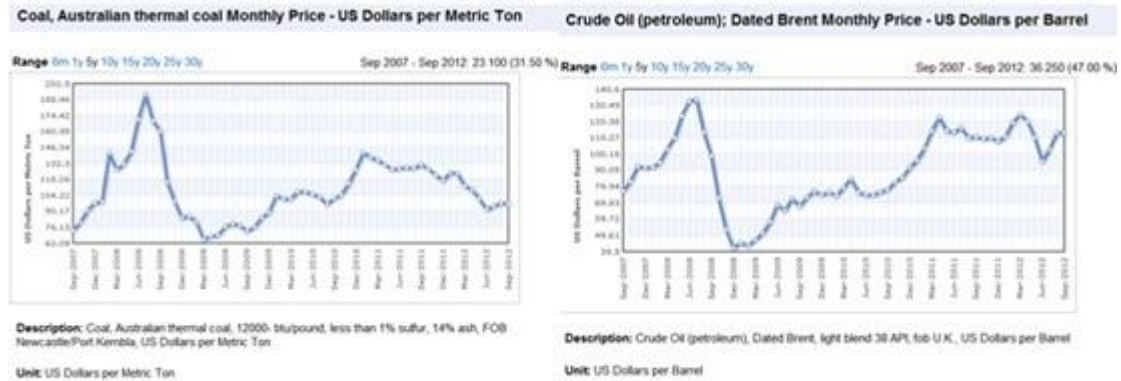
### **3.3 Contested Knowledge**

The immature technology of coal chemicals is another major constraint to the development of the industry. Much different from other listed industries in the Decree, the main reasons why the industry was evaluated risky are its immature technology and severe impact on the environment (Leave the second point aside, which will be covered later), but not the deterioration of supply and demand relationship (The State Council, 2009). There are two negative consequences of this problem: on the one hand, there is no effective way to radically solving the environmental puzzle without the advance in technology (Wen & Lee, 1979); on the other hand, the industry would continuously be kidnapped by the volatilities of commodity prices, if there is not an appropriate technology to help lower the production cost to a secured level (Odusami et al., 2011). Therefore, as long as the government wants to fully use the advantages of coal chemical industry without bearing high risks, the government has no choice but supporting the scientific research. Although some interim achievements have been made (NEA, 2012b), it is undoubtedly that no one can guarantee the technology advance in the near future.

Another issue regarding contested knowledge is that how should we treat the large amount of incremental GHGs emissions caused by the industry. According to the CICC report (2012), 1 ton of oil converted from coal will incur around 5 ton CO<sub>2</sub> emissions, which is approximately 2 times of the emissions from burning oil. China has pledged to reduce the emissions intensity of its economy by 40% to 45% from 2005 to 2020 (NDRC, 2009), and the development of the industry may form new challenges to this target. There is no effective way to capturing the GHGs discharged from the production of coal chemicals to date, yet 'joint production' could more or less lower per unit emissions (Miller, 2010).

### **3.4 Institutional barriers**

The industry has been diagnosed with over-investing, which was caused by the disordered investments in the industry. According to the Decree of the State Council no. 38[2009] released nearly 3 years ago (The State Council, 2009), coal chemical industry was listed as one of the six most risky industries regarding overcapacity and redundant construction. As stated in the Decree, the rate of capacity utilization of China's coal chemical industry was as low as around 40% in the first half of the 2009, which was contributed by the volatility of global cruel oil price (figure 6). Therefore, it was reasonable for the central government to curb the disordered investments in the industry, since companies mainly focus on their own interests but not the overall economic situation.



**Figure 6, Australian thermal coal index & Brent crude oil index (IndexMundi, 2012)**

Moreover, there are strong incentives for local government to push the development of the industry, yet the fundamental risk remains. Local governments care more about local GDP and tax revenues than the overall economic arrangement, while the coal chemical industry could be an important incremental source of tax revenue, especially for those coal-rich provinces. And the recent global crude oil price, which has climbed up to around 110 US dollars (figure 6), provides local governments with enough confidence to do so. Even though new coal-to-oil project approval has been suspended since 2008 (NDRC, 2008), new project applications submitted by local governments and companies have reached as many as 104 pieces with the total proposed investments of more than 2 trillion Chinese yuan as of July, 2012, said Li, the director of department of energy conservation and equipment, National Energy Administration (Sina Finance, 2012). However, these business invitation incentives could be a nightmare if the commodity prices collapse again, given that no significant technology advance is made.

#### 4. The Most Significant Governance Challenge

As far as I am concerned, among all these governance challenges, the most significant governance challenge lies on the institutional barrier of local governments. The reason why I picked this problem as the most significant challenge is that the governments have the real power in China (compared with companies and NGOs) in accordance with the nation's political situation (Bo, 2009), thus they are able to truly influence the governance result.

Compared with the central government who values overall planning and sustainable development as the most important issue, local governments concern more about their local developments, and this is the source of the institutional barrier. Therefore, it is not difficult to conclude that the fundamental contradiction between the central government and local governments, which was caused by the institutional barrier of local governments, is the contradiction of disordered development and overall planning.



The case of applications submitted by local governments and companies regarding new coal chemical projects is a vivid example, showing the dangerous outcome if there is no overall planning by the central government: the total proposed investments of more than 2 trillion Chinese yuan could easily kidnap the nation's economy, and the fate of the country will largely rely on this risky industry with immature technology.

## 5. The Recommended Governance Option

The development of coal chemical industry in China is fairly controversial, for there are many governance challenges in terms of values, competing interests, contested knowledge and institutional barriers. However, since the industry has special strategic significance to the country, China should not give up the chance to make use of it.

Therefore, it could be an excellent option for China to set up several pilot projects at the moment rather than carry out the full-scale development plan. By setting up pilot projects, China could gain practical experience as well as nurture related technologies, while the overall risk is controllable. The pilot scheme should be directly led by the central government so as to avoid any possible institutional barriers. When the pilot program has been crowned with success (e.g. significant technology advance was made) or conditions permit, the country could use their experience gained from the pilot program to guide the full-scale development of the industry.

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