
Master's Thesis
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I hereby declare that this thesis I submit for assessment is entirely my own work and has not been taken from the work of others save to the extent that such work has been cited and acknowledged within the text of my work.

Date:  
Signature
Acknowledgements

Here I want to sincerely thank my family first for their love. When deciding if I should come to Brno to continue my study, they gave me the biggest support. Then I really appreciate all the teachers and colleagues in Masaryk University who gave me great help during my study. I cannot imagine if I could study without your unselfish support. I really enjoy the time in Brno. It's one of the best memories in my life. In short, just THANK YOU!

Xiao Xiao
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Abstract

The aim of the master thesis is to map and deeply comprehend the Chinese energy policy in LNG producing countries and analyze its consequences for the European Union energy security. The master thesis will follow this structure: a) it will describe the situation of China from energy security point of view concentrating on growing role of natural gas and future predictions, as well as major goals of Chinese energy policy abroad; b) it will present the situation of the European Union from energy security point of view concentrating on the role of natural gas and growing pursuit of the EU to find alternatives gas supplies; c) finally, it will map Chinese activities in major LNG producing countries from the Middle East and North Africa, and analyze its consequences for the European energy security. The master thesis tries to answer following research question: “Does the Chinese energy policy in LNG producing countries lead to significant decline in the European Union energy security or not?” At last, the thesis will provide recommendations towards European energy security based on its results.

Key words: China, EU, natural gas, LNG, energy policy, energy security, import, export
1. Introduction

1.1. Research Area: Energy Security and Natural Gas

The consumption of world energy grows quite fast, especially after entering the 21st century, accompanying with the fast development of high technology and economy. In order to sustain this high speed, the basis of advancement—energy—became the center of this international issue. In new dimension of energy security, environmental sustainability is added, together with availability, reliability and affordability (Elkind 2010). These dimensions generally represent the demand for energy that is crucial for economic growth: the sustainable supply and reserve capacity; the price of energy; environmental protection (climate change) and promotion of use of technologies. In essence, energy security of a consumer country is about the "security of supply" and the "stability of price" if reliance on external sources becomes inevitable (Lee 2005: 266).

For the big actors of consumption, such as United States, European Union, China and Japan, the energy security is an important strategic issue concerning economic growth, social stability and national security. Thus, in this thesis, author will work from the main four dimensions to Chinese energy policy in major producer countries and its possible consequences to the European Union, especially focusing on the availability dimension of energy security in the global LNG market.

Why liquefied natural gas (LNG)\(^1\)? As compared with traditional energy (such as coal), it is a clean alternative, more and more countries consider natural gas as potential fuel. Particularly the 1973 Oil-shock strengthened the role of natural gas in the energy supply. Spurred by the shift toward price deregulation and privatization of natural gas business around the world, LNG began evolving into a more flexible,

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\(^1\) LNG is generally defined as, the natural gas which is cooled to approximately -256 degrees Farenheit so that it can be transported from countries to countries as liquid. The volume of natural gas as liquid is 1/600th of its volume as gas.
competitive and entrepreneurial business (Barnes, Hayes, Jaffe and Victor 2006). LNG now accounts for 30.5% of global gas trade (BP 2011: 4). This is probably first because of the development of a competitive market for gas in the United States, second because LNG has been subject to concentrated technological and commercial innovation that has sharply lowered the cost of moving gas from distant fields to its final users.

Traditionally, governments provide financing and stated-owned companies are responsible for the operating pipeline or LNG infrastructures, but now, the role of the private sector has grown a lot. This shift has favored governments that have been able to signal credibly that they offer an attractive and stable context for private investment (Barnes, Hayes, Jaffe and Victor 2006). To date, the price of gas is still high, thus, in order to lower the price, massive investment in infrastructure is needed, as well as standardized pricing mechanism.

Accompanying with the LNG trade, there are four geopolitical and economic factors response in gas trade- investor risk, geopolitical supply shocks, demand and technology shocks (Barnes, Hayes, Jaffe and Victor 2006). The growing role for cross-border gas trade will force new political attention on the security of gas supplies, and emerging relationships between major gas suppliers and key end-use consuming countries will create new geopolitical thinking in the highest levels of economic and security policy.

1.2. Research Objective and Research Questions

In this thesis, author intends to supply the inadequacy in the study of EU-China energy relations through a more comprehensive understanding of energy security, especially the growing critical role of LNG in global energy scenario. The main goal is to map and deeply understand the Chinese energy policy in LNG producing countries and analyse possible consequences for the European Union energy security
The main research question is: does the Chinese energy policy in LNG producing countries lead to significant decline in the European Union energy security or not? The specific questions are: What are the energy policies of China in LNG producing country? Are there any business activities of China in LNG producing country supported by diplomacy? Does China take the share of EU’s in LNG producing countries and possible reasons? What about the future for both actors under the intensive competition of energy market?

1.3. Methodology

In order to analyse the situation, case study is mainly used in this paper. For social scientists, this kind of qualitative research method is widely used as it's a simple way to examine a complex issue in detailed contextual analysis.

Generally, the analysis has two horizontal and one vertical level. First horizontal follows the analysis of China, while the second one follows the European orientation. The intersection of this two levels is the vertical analysis about the situation of LNG import of China and EU, aiming at finding out the possible and feasible future for both EU and China in global energy market. According to these three levels of analysis, the researcher would try to find out the answer to the research questions mentioned above.

The whole research is designed into two phases. In first stage, researcher will mainly collect the data of the relevant case, then in the second phase, analyzing qualitative date and further explanation are the main jobs, and researcher remains open to new opportunities and insights. In this paper, author selects three cases from LNG producing countries, which are relevant for the EU, thus the Chinese energy policy might have impact on its future energy security. The three countries are Qatar, Iran, Algeria who are the leading LNG producing countries. Even Iran is not an LNG exporter now, it may play significant role in the future, thus, in this paper, the author
will analyse Iran as well.

The author will mainly focus on Chinese energy policy in LNG producing countries and particular framework is:

1) Detailed analysis of natural gas sector development in LNG producer country

2) Character of Chinese energy policy in these countries
   - History of mutual relations between China and certain LNG producer
   - Character of current relations
   - Diplomatic activities on highest political level (President, Vice-President, Minister of Foreign Affairs, Head of Standing Committee of the National People's Congress, etc)
   - Special agreements with the LNG producing country, which aim to ease cooperation in energy security
   - Activities of Chinese National Oil Companies (NOCs) in LNG producing countries.
   - Agreements between Chinese NOCs and companies of LNG producer
   - Character of these agreements (do they correspond to "neo-mercantilism")?

3) Possible consequences to the EU energy security and final recommendations

The author will use primary (e.g. archives of Chinese Ministry of Foreign Affairs) as well as secondary sources (typically analysis or publications of reputable experts on energy security). Especially in the date collection on the Internet, reputable and official websites have priority, such as BP, International Energy Agency, in order to ensure the authenticity and reliability of this research.

Based on the dialectical perspective, no matter which kind of result is found, researcher fully realizes that any possible result should be expected and cannot be ignored or reconciled. And because of the single dimension in collecting date and the representative of these three cases, it may simplify the reality as author could not analyze all the cases. In this research, the field survey and interview are not utilized
which leaves pity for comprehensive conclusion. Besides, as energy security is somewhat top secret issue, the data of the same objection may be different for unknown reason, such as the statistics of BP and China official bureau about the China's natural gas reserves and production in 2006 (Fridley 2008: 11) and the collection of data couldn't be one hundred percent comprehensive for sure. What's more, some professional researches conducted by famous and reliable organizations will require to purchase online, if the author wants to access to it. Above all, the access to the data has difficulty in some degree.

2. World Natural Gas Scenario

From the statistics of International Energy Agency (IEA), the share of OECD in natural gas production decreased between 1973 to 2010, from 71.3% to 36%, probably because of the increased proportion of Non-OECD Europe and Eurasia, Asia and Africa in this period. Contrast with the decrease of OECD, the share of Middle East raised from 2.1% to 14.4% (see Figure 1).

![1973 and 2010 regional shares of natural gas production](image)

Figure 1: 1973 and 2010 regional shares of natural gas production
Overall, the production of natural gas increased more than thrice from 1971 to 2020 (see Figure 2).

![Figure 2: Natural gas production from 1971 to 2010 by region (billion cubic metres)](image)

In producing term, Middle Eastern and North African (MENA) is particularly outstanding. In 2009, MENA countries produced about 55 billion cubic feet per day (bcf/d) of dry natural gas, which is about one-fifth of the estimated total worldwide daily supply and just under the average daily U.S. dry natural gas production of about 56 bcf/d for the corresponding year (EIA\(^2\) 2011a).

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\(^2\) EIA\(^=\) U.S. Energy Information Administration
Figure 3: The producing amount of states of Middle East and North Africa.


http://www.eia.gov/todayinenergy/detail.cfm?id=710

In BP statistical review about world energy in 2011, it detailedly described the proved reserves in different regions. The top reserves were in Middle East, Europe&Eurasia, while Asia Pacific, Africa and the whole America had the similar shares of reserves in the world (Table 1).

<table>
<thead>
<tr>
<th>Trillion cubic metres</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2010 share of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>7.5</td>
<td>7.7</td>
<td>7.4</td>
<td>7.4</td>
<td>7.5</td>
<td>7.8</td>
<td>8.0</td>
<td>8.9</td>
<td>9.2</td>
<td>9.9</td>
<td>9.9</td>
<td>5.3%</td>
</tr>
<tr>
<td>S. &amp; Cent. America</td>
<td>6.9</td>
<td>7.0</td>
<td>7.0</td>
<td>6.8</td>
<td>7.0</td>
<td>6.8</td>
<td>7.2</td>
<td>7.4</td>
<td>7.4</td>
<td>7.5</td>
<td>7.4</td>
<td>4.0%</td>
</tr>
<tr>
<td>Europe &amp; Eurasia</td>
<td>55.9</td>
<td>56.8</td>
<td>56.7</td>
<td>57.8</td>
<td>57.4</td>
<td>57.3</td>
<td>57.1</td>
<td>57.0</td>
<td>62.2</td>
<td>63.0</td>
<td>63.1</td>
<td>33.7%</td>
</tr>
<tr>
<td>Middle East</td>
<td>59.1</td>
<td>70.9</td>
<td>71.8</td>
<td>72.4</td>
<td>72.4</td>
<td>72.8</td>
<td>72.8</td>
<td>74.2</td>
<td>75.2</td>
<td>75.7</td>
<td>75.8</td>
<td>40.5%</td>
</tr>
<tr>
<td>Africa</td>
<td>12.5</td>
<td>13.1</td>
<td>13.8</td>
<td>13.9</td>
<td>14.2</td>
<td>14.1</td>
<td>14.4</td>
<td>14.6</td>
<td>14.6</td>
<td>14.7</td>
<td>14.7</td>
<td>7.9%</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>12.3</td>
<td>13.1</td>
<td>13.0</td>
<td>13.1</td>
<td>13.4</td>
<td>13.5</td>
<td>13.8</td>
<td>14.7</td>
<td>15.8</td>
<td>15.8</td>
<td>16.2</td>
<td>8.7%</td>
</tr>
</tbody>
</table>
Table 1: Selective Data of Natural gas proved reserves by regions.


However in term of consumption, the table changes. Europe&Eurasia took the first place, within which European Union accounted for about half share. North America consumed most in 2010 accounting for 26.9% of world consumption, while Africa ranked in the bottle, together with South and Central America (Table 2).

<table>
<thead>
<tr>
<th>Billion cubic metres</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2010 share of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>794.4</td>
<td>759.6</td>
<td>787.0</td>
<td>776.8</td>
<td>782.5</td>
<td>774.9</td>
<td>771.9</td>
<td>812.1</td>
<td>820.8</td>
<td>807.7</td>
<td>846.1</td>
<td>26.9%</td>
</tr>
<tr>
<td>S. &amp; Cent. America</td>
<td>96.0</td>
<td>100.7</td>
<td>102.1</td>
<td>107.9</td>
<td>117.5</td>
<td>122.9</td>
<td>135.5</td>
<td>134.6</td>
<td>141.3</td>
<td>135.1</td>
<td>147.7</td>
<td>4.7%</td>
</tr>
<tr>
<td>Europe &amp; Eurasia</td>
<td>985.3</td>
<td>1016.1</td>
<td>1023.2</td>
<td>1067.1</td>
<td>1100.1</td>
<td>1122.8</td>
<td>1129.5</td>
<td>1143.5</td>
<td>1148.2</td>
<td>1060.5</td>
<td>1137.2</td>
<td>35.8%</td>
</tr>
<tr>
<td>Middle East</td>
<td>186.7</td>
<td>206.8</td>
<td>217.6</td>
<td>229.0</td>
<td>247.1</td>
<td>279.2</td>
<td>291.5</td>
<td>303.1</td>
<td>331.9</td>
<td>344.1</td>
<td>365.5</td>
<td>11.5%</td>
</tr>
<tr>
<td>Africa</td>
<td>58.4</td>
<td>63.8</td>
<td>65.8</td>
<td>72.6</td>
<td>79.7</td>
<td>83.0</td>
<td>88.1</td>
<td>94.4</td>
<td>100.1</td>
<td>98.9</td>
<td>105.0</td>
<td>3.3%</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>290.8</td>
<td>308.0</td>
<td>324.6</td>
<td>350.8</td>
<td>367.7</td>
<td>398.9</td>
<td>426.0</td>
<td>459.6</td>
<td>484.0</td>
<td>503.9</td>
<td>567.6</td>
<td>17.9%</td>
</tr>
<tr>
<td>European Union³</td>
<td>440.4</td>
<td>451.8</td>
<td>451.2</td>
<td>473.2</td>
<td>486.0</td>
<td>494.2</td>
<td>486.9</td>
<td>481.2</td>
<td>489.7</td>
<td>458.5</td>
<td>492.5</td>
<td>15.5%</td>
</tr>
<tr>
<td>Total World</td>
<td>2411.7</td>
<td>2455.0</td>
<td>2520.3</td>
<td>2606.1</td>
<td>2694.5</td>
<td>2781.8</td>
<td>2842.4</td>
<td>2947.4</td>
<td>3026.4</td>
<td>3050.2</td>
<td>3169.0</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 2: Selective Data of Natural gas consumption by regions.


From the BP's review about the major world trade of Natural gas, it's obvious that the geographic factor influences the world trade most. The source of American import is generally from the domestic market. So does Asia Pacific region. In Eurasia, Russia is the biggest gas exporter for Europe through pipeline, while Africa and Middle East take small share of the gas import of Europe through LNG. As the most potential exporter, Middle East exports its major gas to Europe, India, Korea and Japan.

³ The data of European Union is included in Europe&Eurasia.
Here, MENA should be highlighted again. The MENA countries take larger share of global liquefied natural gas exports. In 2009, MENA accounted over 40% of worldwide LNG exports, within which Qatar's LNG exports alone reached nearly 1,800 billion cubic feet (bcf), about 20% of the global total, while Iran was the leading dry natural gas producer (12.7 bcf/d) in MENA in 2009, a level about 20% of total 2009 U.S. natural gas consumption (EIA 2011a).

3. The Review of China

In 1950s, the Chinese industrial policy did not favor the fuel, and the natural gas were the second choice, following coal (Fridley 2008). Two main reasons are: firstly, the natural gas business requires large investments for infrastructure; and secondly, natural gas is a far more expensive fuel than coal. However, the world had witnessed
the high-speed development of China after the government adopted the "open policy" in 1978. From BP statistical review of world energy 2011, China awarded the fourth place in terms of natural gas consumption in 2010, accounting for 3.5% of world consumption in natural gas (BP 2011: 23). In the whole period of "11th Five-year Plan", the total natural gas consumption was 405.6 billion cubic meters (bcm) and according to the forecast of PetroChina planning and engineering institution, the demand of natural gas in China would be 200-240 bcm in 2015 and at that time, the domestic gas and imported gas supply would be 222-240 bcm which can generally satisfy the natural gas market in China (Long 2012). If setting the possible domestic crisis aside, Andrew-Speed and Dannreuther predicted that China’s demand for energy will keep growing, albeit at a rate that gradually declines and the net import requirement for oil, natural gas and possible coal will also arise (Andrew-Speed and Dannreuther 2011).

Until the start of LNG imports in 2006, China was self-sufficient in terms of natural gas. Since 1997, noticing the natural gas was a cleaner fuel to replace coal which can diversify the energy supply mix, China concentrated on attempt by government and state companies to extend the use of natural gas to 8-12 percent of the national energy mix in 2020 (Sun and Zhang 2011). In the 11th Five-Year Plan, China gave the key points on natural gas and oil, hoping the share of production of natural gas in total gas and oil production would increase from 12.4% in 2000 to 34.6% in 2009 (Sun and Zhang 2011). In 12th Five Year Plan, the expected domestic production and import would be 170 bcm and 90 bcm and in the next five years, the natural gas consumption would increase 25% annually (Long 2012). As IEA forecasts, China seems to become increasingly import dependent and in medium term, the additional sources of import will be LNG and pipeline gas from Turkmenistan (OECD/IEA 2010:180). Other types of unconventional gas would be important for Chinese market as well and in term of technology, China is seeking positive talks with foreign companies, such as BP and Shell.

In domestic market, the gas fields generally locate in the west China - particularly
Sichuan, Xinjiang province - and central China. According to the key world energy statistic 2011 conducted by IEA, from 1973 to 2010, the Chinese share of natural gas production in world increased from 0.5% to 2.9%. The consultancy Wood Mackenzie forecasted that in the coming decade, China would ask for more LNG in import, while after 2020, because of the increase of domestic gas production, the import will decrease (Reuters 2010). However, Andrews-speed and Dannreuther (2011) argued that as domestic production would not be able to keep pace with demand, China still needed contracts for LNG supplies.


For a long time, China doesn't believe "energy security is best served by reliance on the international market" (Fridley 2008: 40). China's inexperience with international trading mechanisms was often cited as a source of vulnerability (Meidan 2008: 39). In Adrew-Speed and Dannreuther’s book, they found that China’s energy policy could be characterized by on one hand, continuity and path-dependency, on the other hand, by incremental, short-term adjustment (Adrew-Speed and Dannreuther 2011). Meidan summarized China's view of energy security as "strategic approach", which favours strong intervention on the domestic markets and political ties with producer countries in order to link the producer more directly to the consumer and to foster a political atmosphere conducive to the national energy companies' activities within that country (Meidan 2008: 34).

Concerning about availability and reliability are crucial for a growing economy and maintain social stability, China's chief energy security traditionally relies on domestic produced coal in spite of its obvious environmental impacts (Elkind 2010: 130). Many researchers agree that, in order to ensure the developing speed, especially experienced the energy shortage in 2003 and 2004, China put more attention on adequacy of supply, transport security, reasonable price and energy diversity. Thus energy security of China constitutes an important supply challenge, which means the Chinese energy
security is supply-side security. Andrew-Speed and Dannreuther further explained the threats of security of supply are under two headings: an interruption to or a reduction in the physical flow of energy, and a rise in the price of this energy (Andrew-Speed and Dannreuther 2011: 65). Xu Qinhua supplied two more points of China's supply-side security, which are greatly expanding the channels for supply of imported energy and increasing the security of energy transportation, even if China does not have clear and complete Chinese international energy policy (Xu 2007: 3). However there is difference between scholars about the central focus of China's energy security. The research conducted by three Chinese universities showed that the central government had placed security of supply, along with affordability, as its most vital energy priorities (GTRDC, JU and TU 2005:2), but in Jonathan Elkind's opinion, affordability has simply been a lower priority for Beijing than availability and reliability (Elkind 2010: 131). In Chen S.F.'s standpoint, availability, reliability and affordability are all key in Chinese dimension of energy supply security (Chen S.F. 2008: 85).

In recent years, as China gradually finds itself has shared interests with other major energy importing states, the new energy security concept of China is gradually involving the dimension of "winning the recognition from more and more countries" (Ziegler 2006: 6). So far, as Ziegler stated, China has pursued a cooperative path in the energy field and Chinese leaders appear willing to work together to keep energy producing regions quiet and stable (Ziegler 2006: 19), just as liberal experts predict. However, because of a lack of technical, safety, health standards and law, the future of a large role of gas and clean energy in China may require new thinking about the energy security and "bring it closer to European thinking on the need to reinforce market mechanisms and encourage more transparency and a better flow of information" (Meidan 2008: 43).

In the G8 Summit in St.Petersburg in 2006, President Hu pointed out the basic context of Chinese energy strategy:
(a) saving energy first; (b) keeping standpoint in domestic market; (c) diversification of the development; (d) protection of environment; (e) reinforcement of international cooperation, and after all, constructing stable, economic and clean energy supply system (MFAPRC\(^4\) 2006).

Generally, the broad China's energy strategy is:

*to develop domestic resources to the maximum possible, to promote greater energy conservation and efficiency, to create strategic reserves, to seek foreign technology and investment, to establish reliable and secure oil trading channels, to make strategic investments in upstream production facilities abroad, and to formulate naval and maritime military strategies in order to protect the sea-lanes from the Gulf and through the South China Sea to China* (Öztürk and Ma 2007: 106).

Even though facing the increasing energy dependency, Chinese energy policy focused on increasing supply rather than curtailing demand through conservation, mass transportation, and alternative technologies (Ziegler 2006: 20), following the Chinese dimension of energy security. Since the Chinese energy diplomacy follows the guideline - "coexistence between energy development and eco-safety; coexistence between energy supply and technology progress" (Xu 2007: 6), Chinese foreign policy is stimulated to become more constructive and cooperative (Ziegler 2006). Therefore China puts the foundation and goal of its foreign energy policy in: creating a stable political environment for global energy security; resolving disputes and conflicts via dialogue and consultation according to UN charter and international law; developing mutually beneficial and win-win international energy cooperation (Xu 2007: 6), which echo with Zigeler’s new Chinese dimension of energy security.

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\(^4\) MFAPRC= Ministry of Foreign Affairs of the People's Republic of China
3.2. The Chinese Energy Policy (Strategy) Abroad

3.2.1. Going-Out Policy

In 1996, President Jiang Zemin first brought up the concept of "going out" (Chen Y.Y. 2008). As one aspect of the Opening-Door Policy that is one of the basic state policies, "going out" policy has its given meaning. On one hand, state-owned companies, especially Chinese National Oil Companies (NOCs) should strengthen themselves so as to seek overseas market and resource positively, especially "going out" with each other; on the other hand, NOCs should cooperate with international companies in fields where Chinese companies have shortcoming, so as to decrease the political, economic and technological risk (EID\(^5\) 2009).

In the National Energy Conference in 2011, the Head of National Energy Bureau Zhang Baoguo pointed out that, during 12\(^{th}\) Five-Year Plan, in order to ensure the "going-out" policy, China needs to:

\((a)\) ensure the security of the Sino-Russia, Sino-Central Asia pipeline and develop the construction of the Sino-Burma pipeline; \((b)\) encourage enterprises to cooperate with other states in energy resource, especially in overseas exploration of oil, gas, coal and electricity; \((c)\) stimulate the export of equipments of oil and gas, thermal power, hydropower, electricity grid, nuclear power and wind power through overseas energy contracts, technical services, labor cooperation, etc; \((d)\) use the bilateral mechanism, strengthen the dialogue and communication with producing and consuming countries, so as to promote Chinese energy policy and eliminate the distrust, then further deepen the cooperation; \((e)\) establish and complete the coordination role of government in "going-out" policy, encourage the internationalization of big energy enterprises and develop the social responsibility practice as well (Wang, Du and Li 2011).

\(^5\) EID= The Economic Information Daily
In Zhang's explanation, the "going-out" policy paints the diplomatic color in NOCs' activities abroad. Even though China has strong advantage in energy exploration (e.g.: oil) after many years' experience in international energy competition, due to the lack of capital, elites and knowledge in international market, the overseas activities of Chinese NOCs are mainly coordinated by government, through bilateral mechanism with producing countries, aiming at both upstream and downstream.

3.2.2. China’s International Oil and Gas Strategy (Policy)

In western academic field, many experts, for instance Andrew-Speed, Dannreuther and Kref, also came up with their ideas about Chinese international energy strategy. The main content of China’s energy strategy was summarized in Chen S.F.'s paper, that the central goal of China's oil diplomacy is apparently to gain more secure national control of overseas oil and gas supplies and diversify its import sources through a strategy of "developing two resources (both domestic and international resources) and making full use of two markets (both domestic and international markets)" in the energy sector (Chen S.F. 2008: 81;84).

The first character in Chinese international energy strategy is its target market of supply. The targets of its oil diplomacy lie with special preference on those states that shunned by western international oil companies, the states with less competition from other oil companies, or states have high quality, light, sweet crude oil (Andrew-Speed and Dannreuther 2011). From the perspective of International Relations, learned from the work of Phar and Li (2005), for the realists analysts, China's acceptance of rogue regimes such as Sudan and Iran, in exchange for obtaining almost exclusive rights for "overseas infrastructural investment" has clearly been regarded as alarming in pursuing destabilizing policies which may damage international energy market, while for the liberal analysts, as global energy market is highly integrated, China will
participate international market under "equity oil" arrangement, which reduces the market price and expand world energy supply without exposing itself in competitions.

Second, NOCs' direct control of overseas oil and gas, which was described as neo-mercantilist approach by Kreft (2006), is the most important character in China's international energy policy. It's reasonable that China will gain equity oil or gas, long-term contracts through overseas exploration because of the indigenously insufficient oil and gas supplies, distrust of international energy market and high cost of imported energy from international market. Only in this way, can China feel that it has capacity to sustain price hike and ensure supply security (Zhou and Zhu 2002). But sometimes China will also use its market as a carrot to exchange for the entrance in producing countries, as it dodges away transport risks, particularly the risks through the Malacca Straits, which represents the Chinese government's innovation of market strategy (Chen S.F. 2008: 94).

The third characteristic of Chinese energy policy abroad is its political consideration. As China's supply security was a "strategic approach", it's obvious that China's deployment of its energy strategy abroad has strong political color. The supplies from major oil and gas producing states are underpinned by both long-term supply agreement and by wider economic and diplomatic engagement (Andrew-Speed and Dannreuther 2011:69). On one hand, its diplomatic actions would support NOCs overseas activities in energy fields to secure its energy supply, on the other hand, the energy strategy would help China to improve its image and to settle down the distrust and mutual suspicious through peaceful integration into global economic and political structures via cooperation. This point fits the new dimension of Chinese energy security.

At last, the strategy of Chinese oil companies has been to invest in wide range as possible, notably upstream and downstream of Middle East production (especially in Iran, Iraq and Kuwait) to reduce possible disruption of supplies (Ziegler 2006:9).
Most analysts think that China is trying its best to involve in energy fields of producing states. Adrew-Speed and Dannreuther even argued the scope of China’s oil service and engineering companies is wider than that of exploration and production companies (Andrew-Speed and Dannreuther 2011:76).

3.3. The Main Actors of Chinese Energy Policy

3.3.1. Government

Energy security is not only economically vital, but also has political, diplomatic and military implications. The legitimacy of the Chinese Communist Party is largely based on rapid and sustained economic growth (Umbach 2007). Traditionally, the Chinese central planning bureaucracies has orchestrated major shifts in the energy industry. However China’s energy sector has long been characterized by a lack of a strong and well-resourced agency at central government level which was highlighted by the energy crisis that the new government faced in 2003 (Andrew-Speed and Dannreuther 2011: 49). Especially during the reconstruction of government since mid-1990s, China seemed to lost central control which led to the decline in the quality of governance.

The desire to build closer political and economic relations with key oil and gas producers has been high on the government’s diplomatic agenda since the early 1990s (Andrew-Speed and Dannreuther 2011: 83). China not only builds bilateral relations with oil and gas producing states, but also engages in regional or global community and enhances dialogues with other importing countries through international organizations, among which Shanghai Cooperation Organization is quite noticeable. Generally, the policy making bodies of China are nine-member Politburo Standing Committee of the Communist Party of China (CPC) Central Committee, within which, President and Premier are central in making foreign policy decision. Because the senior CPC leadership assumes responsibility for crucial decisions affecting China's
relations with major powers or important countries in the region, it has delegated overall control of foreign policy implementation to the Ministry of Foreign Affairs (Jacobson and Knox 2010: 8), but the influence of Ministry of Foreign Affair is declining in reality. In the contrast, the power of the National Development and Reform Commission (NDRC) is increasing in its authority over Chinese climate change policy and its role in ensuring Chinese access to critical resources, such as oil and natural gas (Jacobson and Knox 2010: 11).

Facing the energy demand challenge, Chinese government finally came up with a zero-sum energy strategy based on a strongly neo-mercantilist approach, and aimed at acquiring direct control over overseas oil and gas reserves (Kreft 2006: 113). This aim is expected to be achieved through the overseas activities of three major Chinese oil companies CNPC, Sinopec and CNOOC⁶ in oilfields and gasfields and through the pipeline agreements with China's neighbour. Besides the neo-mercantilism, in order to protect pillar industries, such as oil industry, Chinese currency and diversify portfolio, and energy are used as diplomatic tool back up the internationalization of China’s NOCs, together with promotion of oilfield service companies (Andrew-Speed and Dannreuther 2011). The support of Chinese government has four forms: policy support, diplomatic support, financial support and market strategy support (Chen S.F. 2008: 93).

3.3.2. National Oil Companies

Three major state-owned oil companies: CNPC, Sinopec and CNOOC control most of the energy sector in China. Because of the situation of poor social welfare system, the import-export energy trade is likely to be supported by actions in the field of diplomacy and security (Andrew-Speed and Dannreuther 2011:45). Though

⁶ CNPC = China National Petroleum Corporation
Sinopec = China National Petrochemical Corporation
CNOOC = China National Offshore Oil Corporation
businesses actors are on the margins in decision making, their impact is increasing, particular in countries where China's economic ties determines the diplomatic relationship.

Frankly speaking, the western international oil companies already have dominated global oil industry and are much stronger than the Chinese NOCs (Chen S.F. 2008: 86). Beside, many producing countries has exclusive policy towards foreign investments, it makes China's NOCs harder to achieve oil or gas fields. So Beijing regards it's urgent to support NOCs to acquire oil and gas abroad and now Chinese NOCs become monology in domestic market.

In Jacobson and Knox's paper about the actors in Chinese foreign policy, they stated that the leaders of NOCs are usually the members of official decision-making bodies and appointed by the central government. Thus, it is not always clear who is in the driver's seat when decisions are made (Jacobson and Knox 2010). Because of the strong tie between NOCs and government, the energy strategy is largely based on the business activities of NOCs in oil and gas industry, and the performance of NOCs abroad would also affect the bilateral relations between China and energy producing countries. It's common that top Chinese political leaders have diplomatic visits in the states where at least one of the three major companies has oil or gas interests. These visits also offer the leaders of NOCs a chance to propose energy policy to the top decision-making bodies, such as NDRC, Ministry of Foreign Affairs.

Under the guideline of "going out" policy encouraged by the central Government, China's NOCs have been active overseas in the conduct of international mergers and acquisitions for almost twenty years. For these three companies, they have different patterns in investment. CNPC has advanced experience in exploration and development of onshore oilfields (constructing oilfield facilities and pipelines) and marginally economic fields. With its strong expertise and experience, CNPC is quite competitive in world stage, while low-profit Sinopec is more prudent and selective
with main focus in downstream. CNOOC has different formation as its scale is smaller and it has less bureaucratic management system, having advantage in exploration and production offshore, especially in shallow waters. The performance of these three companies in forms of corporate involvement in overseas investment is also different. CNPC and Sinopec may hold the overseas assets by either the fully state-owned holding companies or by the listed subsidiary, or jointly, in contrast, CNOOC’s listed arm- CNOOC Ltd owns all the overseas investments (Andrew-Speed and Dannreuther 2011:79). But on the common ground, all of them largely confined themselves to pursuing projects passed over by the international oil companies, while most of these projects have done little to bolster the companies' reserves and profits (Downs 2008:27). Especially in the example of CNPC's unsuccessful bids for Russia's Slavneft in 2002 and CNOOC Ltd 's for Unocal in 2005, the Chinese NOCs learned that “deep pockets did not guarantee success” in Downs' opinion.

The reasons behind the internationalization of China’s NOCs are on one hand, the necessity, which is because of the limited chance at home and tight price control, on the other hand, the opportunity, which provides the way to become a truly international corporations and expand the scope of activities after the radical restructuring in 1998. In overseas investments, China’s NOCs usually assume partnership with other companies. It’s rarely that China’s NOCs are sole investor. Nevertheless China is often accused of alluring the producers, especially in the third world, with financial assistance and consumer goods through NOCs, in return, gaining more energy or market share with a lower price. Meidan thought China had put forward "unreliable markets" as the reason for increased bilateral ties with producer countries, entailing an image of Beijing's diplomats and leaders securing market access for their companies through diplomatic ties and of a foreign policy that will support the country's energy needs even if it means turning its back on the wider international community (Meidan 2008:43). Yet Zhao(2010) disagreed with this point and argued China was still a newcomer in the Western-dominated market in Africa.
One point should be mentioned here, that is, at the beginning, both government and China’s NOCs taking security of supply as priority, their convergence was in high degree as China's NOC's commercial interests and the government's cost-effective and risk-minimization thinking have both contributed to forming China's preference of gaining direct control over oil and gas assets (Chen S.F. 2008). However as the changes in international environment and domestic market, the disparity of motivation behind the overseas activities, the divergence between Chinese government and NOCs are increasingly clear. Sometimes central government would consider political driven frist and asks NOCs to abandon commercial profits. Yu Shihe, an analyst from The Economic Observer, expressed that actually the overseas expansion of Chinese NOCs is mainly driven by profits, energy supply, aiming at expansion of companies' trade then becoming competitive international oil companies, so the overseas investment and incorporation has little thing to do with energy security (Yu S.H. 2011). In 2010, Chinese NOCs gained more than 60 million tonnes of equity oil but only transported 5 million tonnes back home, while most of energy was sold to South Korea and Japan (ChinaValue 2012). The difference of goal priorities leaves such possibility that the NOCs may run counter to the state’s policies whenever they are required to relinquish their windfall profits, such as the case of CNPC who is irrespective of political pressure from Beijing, continued to transport the oil from its main oilfield in western Kazakstan to the Caspian port of Atryau and sold it overseas rather than ship it home (Chen S.F. 2008: 95). Therefore, it may be more appropriate to say that China's NOCs help the international market to increase production and to expand the market for global actors, not availability of Chinese energy security.

3.4. The Practice

3.4.1. The Government Factor and Price Reform

Unlike the developed countries, China’s social welfare system is not well developed
and government will use energy subsidies as a tool for poverty alleviation (Andrew-Speed and Dannreuther 2011). Thus the gas price set by Chinese government was lower than the global price because of price subsidy, but after the first LNG terminal (in Guangdong) was completed in 2006 which opened a window for the global market, the modification of price mechanism is necessary. Stated-owned companies, such as Sinopec, had already lobbied the government to raise price as the cost of production and transportation was increasing and NDRC accepted the proposal in late 2005.

In the end of 2011, NDRC decided to launch a pilot project to reform the gas price in Guangdong and Guangxi provinces since 26th December 2011. In this trial reform, government tried to open the ex-factory price of natural gas through competition in market, while controlled the price of pipeline transport. However the price is still lower than other imported gas. Most experts believed this reform only offered an example for other provinces and the outcome of reform of price system is still not clear.

China's natural gas market seems to be moving towards a further evolution from a self-sufficient market to a market of high import dependency (Higashi 2009:4). The impetus of this change is still mainly in the hand of government. In a research program about the natural gas market in China, the researchers believed that in the absence of supportive policies to keep gas cost competitive, it would be difficult to reach the goal of demand of gas. The government now faces the challenge how to incentivize such transitions through market-compatible policies, such as joint venture or private investment, rather than relying solely on central planning (GTRDC, JU and TU 2005). To date, except Guangdong Dapeng LNG terminal is proceeded with foreign investment(BP), other LNG terminals, such as that in Fujian, Zhejiang, still remain without foreign ownership.
3.4.2. The Insecurity and The Efforts

Now the main importers for China are: Australia, Qatar, Indonesia, Nigeria, Yemen, Trinidad and Tobago and Malaysia, and it's obvious that the geographic factor has priority. Long-term contract delivery started from Indonesia, Malaysia and Qatar in 2009, together with long-term contract cargoes from Australia and spot cargoes from other sources, and supply agreements with Qatar and Iran will see an increasing volume of LNG coming from the Middle East (Andrew-Speed and Dannreuther 2011: 69).

But China still faces serious issue concerning the security of Malacca Strait, since about 80% of the imported energy of China come through the Malacca Strait and the inability of Chinese marine power. The situation is also not optimistic in Middle East and Africa as well. As a new arrival compared with western countries, China has short history in Middle East and Africa. The international companies in Africa control most production and commercial assets, China only has small place in Africa, pursuing the "empty space" left by United States, such as Sudan, Libya. However, the political situation is disreputable, and on 28th January 2012, twenty nine Chinese staffs in Sudan were kidnapped and one was killed by anti-government army (BBC 2012a).

Under this condition, learning from history, particularly from Iraq War, China is constructing a more mature and safe energy import network through major four projects - The second West-East pipeline, Sino-Russia pipeline, Sino-Burma pipeline and LNG receiving stations, aim at connecting domestic market and global market. This pipeline network from Central Asia (Turkmenistan) to China will be the new "silk road" and the Sino-Burma will shorten the length of sea road from Middle East and Africa therefore bypass Malacca Strait. In northeast Asia, Japan and South Korea are the main competitors in energy import, especially import energy from Russia. After the foundation of Shanghai Cooperation Organization (SCO), China would benefit from the deep cooperation with producer countries and that would offset the
growing dependence on the Middle East. Many experts think that the cooperation and integration in Northeast Asia would be a feasible future, if learn the story from European Union. From SCO to regional integration, China would definitely play a leading role, together with Japan, Korea and Russia.

4. The Review of European Union

EU, as second largest energy consuming country, different from China's strategic approach, is a market-oriented consumer. In 2010, EU consumed 492.5 bcm natural gas which accounts for 15.5% of the world gas consumption (BP 2011:23), while the gas production of EU only took 5.5% of the world gas production with 174.9 bcm (BP 2011:24). EU used 2.5% of GDP in energy and over 60% of its gas and over 80% of its oil are imported. It is anticipated that growing population and rising standard of living could push global energy demand up by 40% by 2030 (EC 2011a: 2). In this complex reality, EU needs to take a strong, effective and equitable position on the international stage to secure the energy it needs, while promoting free and transparent energy markets and contributing to greater security and sustainability in energy production and use (EC 2011a: 2).

In the early 1996, EU planned to integrate energy market first through the electric net. However the outcome was not satisfactory- the price of electricity still has large contrast and the transnational trade is still low between member states (Pan 2007). In order to strengthen the competition of internal energy market, the European Commission asked some big energy companies to split into small sectors in early 2007. Nevertheless this bill was opposed by states, such as France and through the energy diplomacy in 2006, thus EU didn't achieve practical results. In 2009, EU further came up with the idea to open internal market so that to achieve the integration of gas and electricity market. Even if it is still premature to speak energy policy with one voice for EU, a shared market is commonly accepted. Now the current international energy markets are the outcome of policies that were encouraged by
developed countries after 1970s oil shocks and reflect the predominant thinking on energy security in Europe (Meidan 2008:37).

4.1 The European Definition of Energy Security and Its Energy Policy

In Green paper of European Commission, the European dimension of energy security is defined as:

*The ability to ensure that future essential energy needs can be met, both by means of adequate domestic resources worked under economically acceptable conditions or maintained as strategic reserves and by calling upon accessible and stable external sources supplemented where appropriate by strategic stocks* (EC 2006).

In this paper, three main objectives of Europe's energy policy were came up, which are sustainability, competitiveness and security of supply. In order to achieve these objectives, the EU proposed some suggestions. First, the EU needed to complete the internal gas and electricity market, secondly, ensured its internal energy market guaranteed security of supply and solidarity between member states, thirdly, the community-wide debate on the different energy sources was needed and last, Europe needed to deal with the challenges of climate change in a manner compatible with its Lisbon objectives (EC 2006). What's more, for the EU, a strategic energy technology plan was vital and necessary, as well as a common external energy policy.

In the beginning of 2011, the leaders of EU member states got together in Brussel, primarily discussed the energy strategic of EU in the next decade, thus, this summit was also called the "Energy Summit" by the media. The president of the European Council Herman Van Rompuy said in the press conference that, in this summit, the EU confirmed the four targets of EU energy policy, which are, first, ensuring the regular operation of EU energy market, secondly, securing the safety of energy supply,
thirdly, improving the energy efficiency and saving energy through the exploration of renewable energy, and at last, encouraging the connection of energy network within EU (Yan 2011a). More concrete plans were also brought up in this summit, aiming at establishing common energy market before 2014 and rebuilding or merging European electric net before 2015. In the next decades, EU designed to invest 100 billion euro in infrastructure and renewable energy. Soon in the middle of 2011, Energy Efficiency Directive was proposed by European Commission, setting mandatory national targets for the overall share of energy from renewable source in gross final consumption of energy and transportation, so that to achieve 20% energy saving by 2020 and a decarbonised and resource-efficient economy by 2030 (Floridis 2011).

Generally, the framework of energy policy of EU consists of two levels of strategy. On one hand, in internal market, EU emphases on the development of renewable energy and infrastructure, promotion of energy efficiency and competitiveness in European market, saving energy. On the other hand, diversification of energy supply, establishment of international energy network and strategic reserve, reinforcement of dialogue with partner suppliers and implementation of common external energy policies are the main focus in international market (Yan 2011).

4.2. The Gas Supply of EU

In Meidan's view, as only a small share of EU's supply comes from indigenous European sources (37% of natural gas), in the future, Europe will remain depend on external sources of energy, especially oil and gas. Europe increased LNG imports by 15% to 59 bcm in 2008, driven by increases in imports into Spain, France, and Italy, despite the continuing sluggish performance in the United Kingdom (OECD/IEA 2009:98). As the gas production in EU declined, new gas import pipelines and other infrastructures, for example LNG terminals, were urged and a key infrastructure priority for EU was to open the Southern Gas Corridor- a supply route for roughly 10-20% of EU estimated demand by 2020 (Torstila 2011).
In endogenetic supplier, Norway is the EU’s second biggest supplier of oil and gas after Russia, however, only from 2007 did Norway start to export LNG. The gas production of Norway increased from 77 bcm in 2003 to 100 bcm in 2008 which is further expected to raise to between 115 bcm and 140 bcm in the next decades (ECMOE\textsuperscript{7} 2009). After entering the European Economic Area, Norway integrated into EU internal market as an vital producer. In domestic exploration, the Norwegian Continental Shelf took the major work and generally most of the gas production is exported to European terminals. Nevertheless, the export capacity is till the bottleneck of Norway, even if it is offset by the large investment in oil and gas production. The primary gas markets for Norway are the United Kingdom, Germany and France, generally located around the offshore of the North Sea. As its exploration in new fields (eg: Ormen Lange) continue and the need of EU to diversify gas supply, the dependency of EU on Norway is anticipated to grow. In the Natural Gas Review 2009, the Norwegian gas production would exceed oil production in 2013 and the total production of oil and gas would decline after 2015, which brings Norway a new issue-sustainability (OECD/IEA 2009).

Besides, Netherlands, which has highest gas consumption in total primary energy supply in OECD countries, is also an important exporter for EU as a conditioner, connecting pipeline with its neighbour countries. Exports were sharply increase in cold weather or the disruption of Russian supplies for example. In 2008, the production of Netherlands reached 85.7 bcm, of which 45% was produced by Groningen field. While IEA suggests the decline of production in Netherlands in two decades, the Netherlands is converting itself into a transportation hub for the North and West Europe (OECD/IEA 2009). Different from Norwegian market, Dutch market is dominated by the international companies after the liberalisation in gas market in 2004 and the government encourages the small-field discovery aiming at improving

\textsuperscript{7} ECMOE= European Commission's Market Observatory for Energy
the capacity of production (OECD/IEA 2009).

However, without the external dimension of energy, the objectives of EU energy policies set by Lisbon Treaty cannot be reached. Thus, the Energy 2020 strategy identified strengthening the external dimension of the EU energy policy as one of the key priorities in the coming years (EC 2011a:3).

First, Russia is the most important supplier for EU energy demand, accounting for over 25% of EU’s consumption of oil and gas (ECMOE 2009:51), in return, the EU is also the biggest market for Russia, accounting for 47% of the export and 75% of the foreign investment. Even after the interruption of gas supply in January 2006, March 2008, January 2009, Russia still took big share of the import of the EU, which is on one hand because of the decline of gas production in North Sea, one the other hand because of the geographical proximity and abundant production- especially oil and gas account for more than 80% of the total production (OECD/IEA 2009).

By far, energy takes the most crucial part in bilateral merchandise trade between Russia and EU. In the report of Liu Liqun (2010), the security of supply and demand is the basis of the conversation between Russia and EU, within which, security of supply is the emphasis and the possible future would be win-win. The minister of Russian Energy Ministry also agreed with this point. At the end of 2011, the EU representative suggested, in the next decade, the import of gas from Russia to EU would climb up to 150 bcm (Liu K. 2011).

However, under the unstable situation that Russia and Ukraine's disparity grows in price of natural gas, cost of transit and so on, the EU fully realizes the energy is the bottleneck of European economy and seeks for diversification of energy supply. What's more, Russia is usually considered as a power state who uses energy as leverage of political power. Thus the EU planned to construct the Nabucco program from the Southern Caucasus region to Europe, aim to bypass Russia. It's a strategic
choice to prevent gas supply from interruption for the EU and striking back Russia (Yu H. 2009). Whereas after the military conflicts in Georgia, the EU worried if it had enough military ability to secure the safety of the countries along the route. The presidents of Azerbaijan, Turkmenistan and Kazakhstan didn't show clear attitude at the same time, which rose the haze above the Nabucco program (Zhang 2008). Many experts believed the position of EU in EU-Russia conversation was changing, and the Nabucco would become the beginning of the integration of South Caucasus into NATO, furthermore, NATO's enlargement towards Eastern Europe (Tong 2009). In the side of Russia, in order to oppose the Nabucco project, South Stream project arose. The energy war between Russia and the EU is still feasible in the near future, while the reform of energy market is carrying on, whose emphasis is put in the separation between companies and transit network. Considering the Russian profit, the EU may give exception to Russian companies in law (Liu K. 2011). But the result is vague.

Caspian and Middle East are long-term cooperation partner both political and economical. In EU-Russia energy war, Algeria and many North Africa countries may benefit most (Xu 2006). The CEO of Eni SpA company, Paolo Scaroni pointed out, after Russia, Algeria would be a very important pillar for the energy supply of EU (Zhao Y.J. 2007), and Italy would further enlarge its gas import from Algeria, facing the decline of gas supply from Russia (Reuters 2012).

Algeria is outstanding in this region, as it increased its gas production after 1980s and became the third most important gas exporter to the EU (ECMOE 2009: 51). As the demand of natural gas increased in recent years, EU's dependence on Algeria was growing as well, because Algeria is considered as a stable supplier, especially when the image of Russia is ruined after the gas interruption in Europe. In last decade, the cooperation between EU and Algeria was booming. On 3rd July 2009, Algeria signed agreement about the investment in the infrastructure of natural gas that is exported to Europe with Nigeria and Niger, anticipating transport 20-30 bcm natural gas annually to Europe since 2015 (Zheng and Yin 2009). In the evaluation of Algerian natural gas,
in 2020, Sonatrach- a state-owned company who controls the majority of Algeria energy sector- will produce 30 million tones of LNG and become second largest LNG producer company in the world (EPRCA\(^8\) 2011). In 2012 and 2013, there are two LNG projects in Skikda and Arzew will be on stream, which have 5.4 million tones and 7.4 million tones in LNG producing capacity respectively (Reuters 2011).

5. Middle East and Africa for Both Actors

The growing energy dependency has reminded the Chinese leaders of advancing the relationship between producing regions and China. That is why China actively involved in energy diplomacy toward Russia and states in the Middle East, Central Asia, West Africa and even Latin America (Lei and Wu 2006: 39f) through extensive program of reciprocal visits, financial and economic assistance, aiming at expanding trade and intensified military contacts, which results the Chinese government has concluded "strategic energy alliances" with at least eight countries in the past decade (Kreft 2006:114). According to Wood Mackenzie's report, in first ten months of 2010, China's overseas investment in oil and gas accounted for 20% of world investment, which is five times of that in 2008 (Wang 2010).

According to the data of world LNG imports by region in 2009, the main importers for Europe are Qatar (639.63 bcf), Algeria (756.02 bcf), Nigeria (338.92 bcf), Trinidad and Tobago (266.2 bcf) and Egypt (242.08 bcf), while the Chinese LNG imports are mainly from Australia (168.45 bcf), Malaysia (31.43 bcf), Equatorial Guinea (28.96 bcf), Indonesia (25.96 bcf) and Qatar (19.42 bcf) (EIA 2011b). In 2009, most of EU's LNG import are from Middle East and Africa, while China's main LNG source is from Asian Pacific countries. But in Öðüältçü and Ma's paper, they believed that China's LNG supplies would largely come from the Gulf and Asia, especially Gulf region, including Qatar, Iran, Oman, and probably Yemen (Öðüältçü and Ma 2007:104). As the top suppliers and reservoirs, the Middle East and Africa are still in

\(^8\) EPRCA= Embassy of People's Republic in Algeria
the first place in the future for China. So does EU.

For some experts, Beijing's energy foreign policies have undermined European policies to promote good governance, human rights and democratic political systems (Umbach 2007), and they even predict the worse result might question Western economic. Such as Austin and Bochkarev concluded that, this is a poor prospect for joint action in Middle East and Africa by the United States and China on the ground in providing energy security to local states, which may be a mirror for Europe. For other experts, such as Phar and Li, it is unlikely that China’s dependence on Middle Eastern oil would result in any balance-of-power implication predicted by realists (Phar and Li 2005:24). So do the Ziegler (2006) and Chen S.F. (2008). They make this conclusion because China does not yet have the military muscle to challenge the U.S. and its regional allies in the Asian seas successfully. Thus a naval build-up is not conclusion. Zhao H. (2010) and Maleki (2007) both agreed China's potential in cooperation with EU, as the disadvantages of unilateralism would lead to China's integration into global energy market. What's more, Zhao H. (2010) and Austin and Bochkarev (2008) even agreed on the point that energy resources needed the confidence building and cooperation.

6. The State of Qatar

The state of Qatar is an important oil exporter in Organization of the Oil Exporting Countries (OPEC). However, as the world’s largest exporter of liquefied natural gas with the third largest reserves of natural gas and largest non-associated natural gas field in the world, Qatar is more outstanding and vital in world natural gas trade. As major pillar of economy, natural gas sector contributes one third of GDP in Qatar (He 2011).
Qatar first sent exported LNG in 1997. During 2006, it surpassed Indonesia and became the largest LNG exporter in the world. From BP’s statistics, Qatar’s production of natural gas has been increasing since 2000 and in 2010 the share of Qatar in total global production is 3.6 percent, following US and Russia (BP 2011:22). According to Table 3, in 2010 Qatar exported more than six times of LNG amount in 2000, while the production grew to 116.7 bcm, five times as that in 2000. In the same period, Qatari proved reserves rose from 14.4 tcm to 23.5 tcm. Figure 6 also witnesses a steady increase of the LNG export of Qatar between 1997 and 2009 as well as Qatari LNG export in global share, with only a small decline in 2003. In 2009, Qatar exported over 2,400 bcf (about 68.2 bcm) of natural gas, most of which was liquefied natural gas. In 2010, Qatar reached its goal for 77 million tonnes and in 2011, the output capacity even increased 30 per cent (Xinhua 2012a).
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Table 3: The export\(^{10}\), production and proved reserves in Qatar since 2000 to 2010

Source: BP (2011) and EIA(2012)

6.1. Gas Sector

In higher level, the Ministry of Energy and Industry supervises the overall development and sanction of policies in energy sector. In industry, it is state-owned

\(^9\) tcm= trillion cubic meters

\(^{10}\) The original date of export of dry natural gas is calculated in billion cubic feet. In order to compared with data of production and proved reserves, author converts the bcf into bcm, and the date is rounded to the one after decimal point.
company Qatar Petroleum (QP) that takes the most activities in natural gas liquids complex and oil refineries complex, which was established in 1974. For Qatar, its focus is in the large-scale projects in LNG and therefore, foreign company involvement has favored international oil companies with the technology and expertise in integrated mega-projects, including ExxonMobil, Shell, and Total (EIA 2011c). The LNG companies, in which QP takes most share, handle all upstream to downstream natural gas transportation themselves, while the Qatar Gas Transport Company (known as Nakilat) generally is responsible for the LNG shipping (EIA 2011c).

Since Qatar is seeking greater role in world LNG export, it has expanded in LNG ventures through Qatar Liquefied Natural Gas Company (Qatargas) and Ras-Laffan Liquefied Natural Gas Company (Rasgas). Rasgas is 70 percent-owned by QP and 30 percent-owned by ExxonMobil, while the Qatargas consortium includes QP, Total, ExxonMobil, Mitsui, Marubeni, ConocoPhillips, and Shell, within which overall QP owns at least 65 percent of these ventures above (EIA 2011c). Several companies, Qatargas 2, Qatargas 3, Qatargas 4, Qatargas 5 and Qatargas 6 were established with 70% stake taken by QP in both companies and 30% by Exxon Mobil in Qatargas 2 and 30% by Conocophilips in Qatargas 3 (MOFAQ 2012a). What is more prominent is the Ras-Laffan seaport established by QP, which is the largest LNG exporting terminals in the world with annual output capacity of 30 thousand metric tons (MOFAQ 2012a).

So far, there are 14 trains in Qatar. At the moment Qatargas operates seven LNG trains with a total production capacity of 42 million tonnes per annum (mtpa), and Rasgas has 7 LNG trains as well, with a total production capacity of approximately 37 mtpa (Qatargas 2012; Rasgas 2012). The detail about these 14 trains was described in the Table 4. For the train like Train 7 of Qatargas with liquefaction capacity of 7.8

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11 MOFAQ= Ministry of Foreign Affairs of Qatar
mmt\textsuperscript{12}, it could be called as mega-train because it has the largest operating size in world.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
\textbf{Unit} & \textbf{Liquefaction Capacity} & \textbf{Start-up} & \textbf{Primary Market(s)} \\
\hline
Trains 1 & 2 x 3.2 MMT (320 Bcf) & Aug. 1999 & South Korea \\
Trains 1 & 2 x 3.2 MMT (320 Bcf) & Feb. 2004 & India \\
Train 4 & 4.7 MMT (230 Bcf) & Aug. 2005 & Europe \\
Train 5 & 4.7 MMT (230 Bcf) & Nov. 2006 & Europe & Asia \\
Train 6 & 7.8 MMT (380 Bcf) & Jul. 2009 & Asia, Europe & N. America \\
Train 7 & 7.8 MMT (380 Bcf) & Feb. 2010 & Asia, Europe & N. America \\
\hline
\end{tabular}
\caption{Qatar's LNG Infrastructure, January 2011}
\end{table}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
\textbf{Unit} & \textbf{Liquefaction Capacity} & \textbf{Start-up} & \textbf{Primary Market(s)} \\
\hline
Trains 1-3 & 3 x 3.2 MMT (480 Bcf) & Dec. 1996 & Japan & Spain \\
Train 4 & 7.8 MMT (380 Bcf) & Apr. 2009 & UK, Europe & Asia \\
Train 5 & 7.8 MMT (380 Bcf) & Sep. 2009 & UK, Europe & Asia \\
Train 6 & 7.8 MMT (380 Bcf) & Nov. 2010 & Asia & N. America \\
Train 7 & 7.8 MMT (380 Bcf) & Mar. 2011 & Asia & N. America \\
\hline
\end{tabular}
\caption{QatarGas Facilities}
\end{table}

Table 4: Qatar's LNG Infrastructure 2011


6.2. Gas Market

As Qatar’s output capacity of LNG reaching 77 million tonnes in 2010 (He 2011), Qatari government officials stated that they do not have any plan about building new LNG infrastructures in the near future.

For Qatar, Japan, South Korea, and India were the primary LNG importing states, accounting for about 57 percent, while European markets including Belgium, the United Kingdom and Spain were also significant buyers of Qatari LNG, accounting

\textsuperscript{12} mmt= million metric tons
for an additional 33 percent in 2009 (EIA 2011c).

US is also traditional target market for Qatar, however experiencing the low US gas price as a result of the boom of shale gas since 2008 (He 2011), Qatar is searching new destinations, and Asian market is favored by it, e.g. China and India. The Minister of Energy and Industry Abdullah Bin Hamad al-Attiya claimed that China would be the new core of LNG global market (Reuters 2009a). As He Ying analyzed, this strategic change is because, first, the steady increase of gas demand in Asian market, such as South Korea and Japan, especially after the disaster at the Fukushima Dai-Ichi nuclear plant; secondly there are more profits in pacific market if compared with Atlantic market (He 2011).

In 2009, Qatar and Turkey were reportedly considering setting up a “working group” of officials to negotiate agreements on a proposed gas pipeline as well as possible LNG export deals which could be linked to the EU-backed Nabucco pipeline project, while Qatari officials planned to transported gas through deepwater gas pipelines in Arabian Sea to India’s west coast which would be completed by 2014 with transport capacity of 226.5 bcm over a 25-year period (BMI\textsuperscript{13} 2012)

In 2008, Qatargas signed contract with PetroChina and CNOOC respectively to export 3 million tonnes and 2 million tonnes gas annually for 25 years and the source is from Qatargas IV and Qatargas II (Sohu 2008). Furthermore according to the report of China Securities Journal in 2009, CNOOC reached a new agreement with Qatargas that it would import another 5 million tonnes LNG every year, of which 3 million tonnes LNG would be shipped to China since 2013, then add the former deal together, CNOOC will receive 7 million tonnes totally every year (Zhang 2009). Under the contract between CNOOC and Qatargas, the first LNG tanker had arrived at Dapeng LNG terminal in Guangdong province in 2009(Zhang 2009). After two years the first

\textsuperscript{13} BMI= Business Monitor International
LNG carrier from Qatargas IV under the contract with PetroChina arrived at Rudong LNG terminal in Jiangsu province in 2011 (Shell 2011).

6.3. Important Gas Fields

6.3.1. Offshore Operations

North Gas Field The majority of Qatar’s natural gas is located in the massive offshore North Field, which is a geological extension of Iran’s South Pars field (Figure 7) - the world’s largest non-associated natural gas field (EIA 2011c). It is the world's largest concentration of natural gas with total reserves of more than 900 trillion cubic feet (tcf), representing 20% of the world's gas reserves (MOFAQ 2012b). Because the North Gas Field has vast quantities of gas in one area, favorable weather and geographical conditions, which make production easier and less costly compared to other areas in the world, QP has drawn up a strategic plan to develop the field since 1987 with the aim to realize new financial revenues by exporting gas in liquefied form or through pipelines and by setting up new industries and a new port in Ras Laffan for gas exports (MOFAQ 2012b).

In 2005, Qatari government officials placed a moratorium on additional natural gas development projects at the North Field to allow time to study field development optimization (EIA 2011c). The North Gas Field was scheduled to be completed in 2010 and was estimated to produce more than 18 bcf LNG per day (MOFAQ 2012a).
6.3.2 Onshore Operations

**Dukhan Oil Field** This earliest discovered field is 65 kilometres long and 5 kilometres wide which is compose of three crude oil reservoirs and one unassociated gas reservoir (MOFAQ 2012c). Even though Dukhan is outstanding in oil production, it still has facilities for gas, natural gas liquid production that are exported to domestic and external customers.

**Khuff** non-associated gas reservoir was discovered in 1959 at an average depth of
10,000 feet and in 1974 Fahahil Stripping plant was also commissioned to recover raw natural gas liquid from associated gas (QP 2006). Ongoing investments in this industrial city’s facilities include a project to upgrade the existing Arab D plant to produce up to 5,600 tonnes per day of raw natural gas liquid, and to reduce flaring of associated gas and increase the quantity of natural gas liquid recovered, known as the Rich Associated Gas Utilisation project (Rasgas 2008:27).

6.4. Gas-To-Liquid Project

One more advantage of Qatar should be mentioned. Qatar is one of the only three countries- other two are South Africa, Malaysia - have operational Gas-to-liquid (GTL facilities, which are Qatar’s Oryx GTL plant (QP has 51% and Sasol-Chevron GTL has 49%) and the Pearl GTL project (QP has 51% while Shell has 49%) that is the first integrated GTL operation14 (EIA 2011c). GTL projects have received significant attention in Qatar over the past several years and Qatari government had originally set a target of developing 400,000 barrels a day (bbl/d) of GTL capacity by 2012 (Shekhar 2009). Now Oryx GTL has the capacity to produce 34,000 bbl/d of liquid fuels by useing about 330 mcf/d15 of natural gas feedstock from the Al Khaleej field, while the Pearl plant is expected to use 1.6 bcf/d of natural gas feedstock to produce 140,000 bbl/d of GTL products as well as 120,000 bbl/d of associated condensate and LPG (Mabrouk 2012; Shekhar 2009). The capacity will expand due to the increase of production from the North Gas Field, thus by 2012, Qatar is likely to have 177,000 bbl/d of GTL capacity with these two facilities.

6.5. The Relationship between China and Qatar

6.5.1 The Official Visit between China and Qatar

On 9th July 1988, China officially set up diplomatic relationship with Qatar

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14 Integrated GTL operation means it will have upstream natural gas production integrated with the onshore conversion plant (EIA 2011c).
15 mcf/d= million cubic feets per day
Since 1990 to 2011, there were many high-level visits between Qatar and China. There were 6 visits of China-to-Qatar, while there were 9 visits of Qatari leaders to China. The commercial relation between these two states was even earlier set up in 1950s. Historically Qatar has friendly relationship with China in wide aspects, including trade, investment, infrastructure, mutual dialogue in important issues and culture communication, etc.

According to the related news in recent years, which are searched with key words-China, Qatar, meeting, dialogue etc - from the websites of Xinhua News Agency (China) and Ministry of Foreign Affairs of People’s Republic of China, the high-level visits and the contents of these mutual dialogue could be classified chronologically. From Table 5, it’s obvious that during 2006-2012, Qatar and China’s relationship was highlighted by the frequent visits and multi-dimension cooperation, from economy to culture and education. When looking into the content, some fields appeal to China and Qatar most. First, one-China policy constantly appeared in the mutual dialogue as China needs more support in Taiwan issue; secondly energy, investment and infrastructure fields were emphasized and in latest visit, China and Qatar agreed to have joint projects in both China (a refinery in Zhejiang province) and Qatar (infrastructure construction) (Xinhua 2012b); thirdly, military cooperation and mutual trust also appeared as crucial discussion.

Table 5: The recent high-level dialogue between China and Qatar from 2006-2012 (see in the Appendix)

Although diplomatic ties between the two countries are young, Chinese Premier Wen Jiabao commended on China-Qatar relations because of its rapid development (Xinhua 2012c). During these meetings, the importance of energy was gradually brought out and became a key point in the bilateral cooperation when China and Qatar further came up with their blueprint in detail to realize some joints projects, which could be found in the Chinese Premier visit to Qatar in the early 2012. Qatar, as well
as China, fully notices the bilateral cooperation is crucial for shared interests, thus, both of them have willingness to elevate the bilateral relationship and ease the mutual political distrust.

In the energy sector, as Zhang Zhiliang, the Chinese Ambassador to Qatar, said when interviewed by People’s Daily, the two states were highly complementary so that had great potential for cooperation and a number of collaborative projects were being implemented progressively now, especially in the downstream cooperation, thus Zhang showed his confidence in the future bilateral cooperation in the oil and gas production, transportation, comprehensive utilization of petrochemical resources and infrastructure construction (Huang and Liu 2012).

**Vital visit focus on energy security**

From January 14 to 19, the Chinese Premier Wen Jiabao officially visited three nations in Middle East and attended the Fifth Word Future Energy Summit in 2012. This 6-day visit in Middle East caught the attention all over the world, and Western media even called it as “a trip for energy” (Ding 2012), especially under the condition that Western countries decided to embargo the oil from Iran. It’s the first official visit in Middle East after Arab Spring and through this visit, China will better know more about the situation in Middle East (Cao, Pei and Tong 2012).

During this trip, Premier Wen achieved success in some degree. It enhanced the Sino-Arab relation, not only in energy, but also coupled with cooperation in economic and political fields, according to the opinion of Li Weijian, a research fellow on West Asian and African studies in the Shanghai Institutes for International Studies (Ding 2012). In Sino-Qatar discussion, a refinery project in Taizhou, Jiangsu Province was agreed, while in financial sector, trading with Qatari currency was also under negotiation, according to the Wen in the press conference in Qatar (Ma 2012). The recent clash between United States and Iran worried China about its energy security. So most western media believed this trip was for diversification of oil, gas and for
other alternative energy from other Middle Eastern states, using its diplomatic power as a permanent member of United Nations when dealing the issue in Middle East (Huanqiu 2012; Cankaoxiaoxi 2012). However, Premier Wen Jiabao reiterated the purpose of his visit and said "some people said my visit was to secure oil, which is narrow-minded, I came here for friendship" (Xinhua 2012d).

6.5.2. Chinese NOCs in Qatar

After Qatar and China set up the officially diplomatic relation, in 1993, China and Qatar had initialed agreement of Sino-Qatar trade; in 1995, both sides initialed statement to protect the investment; in 1999, China officially signed four agreements with Qatar in order to protect the trade; in 2004, Qatar signed agreement with China concerning the encouragement and reciprocal protection of investments; in 2008, Chin and Qatar signed the agreement about the standardization about employment of Chinese labors and the establishment of China-Qatar investment promotion commission; in 2011, both sides made rules about the avoidance of double taxation (EPRCQ\textsuperscript{16} 2003, 2004, 2009).

With the help from both governments, China-Qatar investment trade promotion center was set up in 2001, which became impetus to the bilateral trade (EPRCQ 2003). Qatar is traditionally a service-based country, thus, more than 6,000 Chinese labors are working in different kinds of sectors (OBSC\textsuperscript{17} 2011), such as petroleum, clothing, services, processing and construction (Yang 2012). Especially after Qatar bided the host of the Doha Asian Games, many infrastructures were planned and it offered Chinese companies opportunities to involve in Qatar.

In addition to bilateral trade, China has also actively participated in the infrastructure construction in Qatar. At the end of 2009, Chinese contracting projects in Qatar,

\textsuperscript{16} EPRCQ= Embassy of the People’s Republic of China in Qatar
\textsuperscript{17} OBSC= Overseas Business Service Center of PRC
which are under construction, totally have $2.46 billion, and in the past five years, Chinese companies accumulatively contracted $1.7 billion projects (OBSC 2011). In 2010, Chinese companies got new construction and labor agreement which accounted for $868 million and in the first half of 2011, China and Qatar signed new construction contract about $1.45 billion (Yang 2012).

Up to 2008, there are more than 30 Chinese companies in Qatar, which including State-own companies, large private enterprises and small companies. The main companies in Qatar are Sinohydro Corporation, China State Construction Engineering Corporation (CSCEC), China Harbour Engineering Company, Huawei Technologies, CNOOC, CNPC, etc. In terms of contracting projects of NOCs, Sinohydro, which generally accounts for large infrastructure construction and real estate projects, holding more than 80% of the total contracts of Chinese companies in Qatar, while CSCEC mainly involved in many high-rise building projects in Qatar (MCOMPRC18 2010). Even though state-owned companies are the pioneers in overseas projects in Qatar, the Chinese and Qatari governments still encourage the cooperation between private companies in low-level.

6.5.2.1. CNOOC

6.5.2.1.1. Purchase
In 2008, CNOOC signed a LNG purchase agreement with Qatargas in Beijing which means CNOOC will purchase 2 million tons LNG every year from Qatargas for its LNG terminal and Trunkline Projects (CNOOC 2008). In October of next year, first cargo of Qatargas carried by Q-Flex ship was received in Guangdong Dapeng terminal (CNOOC 2009a). Before the CNOOC’s Zhejiang LNG terminal brings on production, this LNG will be received and digested in Dapeng terminal. The first cargo marks a milestone in the energy cooperation between the two countries, while CNOOC will further strengthen its role to secure energy supplies and to promote

18 MCOMPRC = Ministry of Commerce of People’s Republic of China
clean energy utilization and structure optimization of energy consumption in China (CNOOC 2009a).

On 13th November 2009, Fu Chengyu, President of CNOOC, and Faisal M. Al Suwaidi., Chairman and CEO of Qatargas, signed the a memorandum of understanding (MOU) for long-term supplies of LNG (CNOOC 2009b). Under the MOU, Qatargas will supply an additional 3 million tons of LNG per year to CNOOC since 2013, and moreover, Qatargas and CNOOC will contemplate the sale and purchase for another 2 million tons of LNG annually, thus combined with the long-term supply of 2 million tons of LNG per year under an agreement signed by both parties in 2008, the annual LNG purchase from Qatar will be 7 million tons (CNOOC 2009b).

6.5.2.1.2. Exploration
In August 2009, CNOOC signed exploration and production sharing agreement of BC block in Qatari east sea area with Qatar (Wang and Du 2009). It’s the first time that CNOOC signed exploration and production sharing agreement in the Middle East. The agreement is for 25 years, which will cost about $100 million, initiate with the first phase of five-year exploration period (CNPC 2009). According to this agreement, CNOOC will have exploration operations in 5649 kilometers square of sea area in Qatar. Further more, in 2011, CNOOC Ltd., China’s biggest offshore oil producer, sold 25% of its stake in a license to explore for hydrocarbons in Qatar to France’s Total SA (Total) as the Chinese company seeks to reduce risk (Bloomberg 2011). In this cooperation, Total holds 25% stock while CNOOC holds 75% stock as main operator (MCOMPRC 2011a).

6.5.2.2. CNPC

6.5.2.2.1 Joint Venture- Refinery and Petrochemical Complex in Taizhou, China
In 2007, the Ministry of Commerce transmitted a nice signal about the cooperation of
petrochemical project in China between QP and CNPC which had been agreed, and the investor may include Shell (CNPC 2008). In the following year, Qatari vice Prime Minister and Ministry of Energy and Industry and Vice Director of NDRC signed a MOU about the enhancement in energy cooperation in March 2008 (Sina 2008). QP officially discussed with CNPC about the feasibility and capital of this project, which could be on line in 2013 with initially annual producing capacity of 0.7-0.8 million tones according to Qatari media (CNPC 2008). The Prime Minister of Qatar stated that the MOU was vital for the first energy cooperation in downstream between two countries, but definitely not the only once, as both sides would boost the investment in other field as well, especially the investment in energy sector, which may account for billions dollars (Sina 2008). Later in June, Qatar Petroleum International (QPI) signed letter of intent about the joint venture of refining and chemical production and sales with Shell and CNPC (CPD19 2008). From the media report, this plant would be in world advanced level with 12.6 billion dollars investment and CNPC had 51% stake while QPI and Shell had 24.5% stake respectively (CPD 2008; Alperowicz 2012).

Most recently, CNPC, QPI and Shell signed another cooperation framework agreement with Taizhou municipal government in October 2011 (Li and Zhang 2011). This Taizhou Project will use imported condensate as feedstock to produce ethylene and other petrochemical goods, which will boom the development in downstream sector and improve the degree of self-sufficiency of Zhejiang Province in petrochemical products (Li and Zhang 2011). During Chinese Premier Wen Jiabao’s visit in Qatar, the partners signed agreement to proceed with the previously announced refinery and petrochemical complex at Taizhou, Zhejiang Province (Alperowicz 2012). Media believe this agreement will complement each other’s advantages as both China and Qatar show their sincerity in cooperation. The refinery will have throughput of 400,000 barrels per day and the petrochemical complex will be based on a 1.2 million tones/year ethylene plant (Alperowicz 2012).

19 CPD= China Petroleum Daily
6.5.2.2. Purchase

In April 2008, CNPC’s subsidiary-PetroChina signed agreement with Qatari Minister of Energy and Industry and Shell about purchase of LNG from Qatargas 4 project (Yang and Liu 2008). The agreement is for 3 million tones per annum of LNG for 25 years (Qatargas 2008). In the next year, Qatargas signed a MOU with Petrochina, to supply two million tonnes per annum liquefied natural gas to China which will increase the total volumes of the long-term LNG deliveries from Qatargas to PetroChina to five million tonnes per annum (Qatar gas 2009). The timing of the supply of the two million tonnes of LNG from Train 7, under the Qatargas 4 Company, is expected to start in the first half of the next decade (Qatargas 2009). In November 2011, the first LNG cargo from Qatar arrived at CNPC’s Rudong terminal in Jiangsu Province (Shell 2011).

6.5.2.2.3. Exploration

In 2010, Qatargas, Shell and CNPC signed a deal about the gas exploration and production in Qatar Block D which is 8089 square kilometers and close to the Ras Laffan city. According to this 30-year-contract, CNPC and Shell will be responsible for the technology research in exploration, data collections, analysis and drilling wells, with 25% share and 75% share respectively (PetroChina 2010). If the exploration in pre-khuff level is successful, QP will probably buy all the natural gas from this region. In Chinese side, the CNPC showed its interest in this upstream cooperation with Qatar, as China is usually downstream market. As He Wei, the chief energy analyst in Bank of Communications, said, CNPC wanted to find source of gas to supply for its LNG projects in coastal China, and in 2020, the Chinese demand for import of natural gas will be 50 million tones and this project will take 6% of the future demand with its capacity of 3 million tones every year (PetroChina 2010).

6.5.2.3. Sinopec

In 2011, Qatar has begun talks on supplying natural gas to Sinopec Corp., in the latest
move by the resource-rich Arab emirate to build exposure to fast-growing Asian demand for cleaner fuels (Delmar-Morgan and Winning 2011). Qatari oil minister Abdullah bin Hamad Al Attiyah told to the media that Sinopec would like to enter for LNG but didn't specify the LNG volumes that Sinopec was seeking to buy (Tuttle 2011).

6.5.3. What is the Character of Bilateral Relations?

As I mention above, the main focus in Sino-Qatar intergovernmental dialogues are, first, one-China policy; secondly energy, investment and infrastructure fields; thirdly, military cooperation and mutual trust. The most remarkable one is the recent visit of Chinese Premier Wen to Middle East. China consistently puts Qatar in high priority and during many meetings, China and Qatar both agreed in boosting and elevating the bilateral relations so that to strengthen a long-term, stable, strategic partnership.

In reality, the infrastructure construction and service are the main activities of Chinese companies in Qatar, especially the NOCs. As Qatar is lack of labor, China has already exported labor and contracted with Qatari government in many infrastructure projects, including airport construction, road building, etc. Unlike general expectation, in energy sector, there are not frequent exchanges and cooperations, even though both sides showed their willingness to do it and they actually did communicate in high political level. The cooperation, such as refinery complex in Taizhou, is carrying quite slowly. The number of the joint venture is also very limited. Although China indicated it would expand the imported LNG from Qatar, generally speaking, the LNG from Qatar only accounts for small part of Chinese imported natural gas. For instance, in 2009, Europe imported 639.63 bcf LNG from Qatar, while the Chinese LNG import from Qatar was only 19.42 bcf (EIA 2011b). China’s largest gas supplier is still Australia.
In the review of China, Chinese government approaches is generally characterized as zero-sum energy strategy based on a strongly neo-mercantilism, which aimed at acquiring direct control over overseas oil and gas reserves through the overseas activities of three major Chinese oil companies. But the reality in Qatar is different. In this case, China only acquire small share of oil or gas filed. CNPC subsidiary-PetroChina and CNOOC only gain the exploration and production share of Block B, C, D near Ras Laffan city. Even these contracts are long-term, it’s not sure if China could truly discover large mount of oil or gas here. What’s more, Qatari company would probably buy the production from these regions, then China’s reserve is still the same as China still needs to buy energy from Qatar or international market. It is more possible that China NOCs’ entering in Qatar is for experience and profits, not really base on neo-mercantilism.

Another vital point should be discussed here as well. In Ziegler’s opinion, as China shares interests with other major energy importing states, the new energy security concept of China is gradually involving the dimension of "winning the recognition from more and more countries (Ziegler 2006:6)". This is an outstanding character in Chinese new dimension of energy security and policy, which is also brought up in the broader “going-out” policy. China intents to use the bilateral mechanism to strengthen the dialogues and communications with producing and consuming countries, so as to promote Chinese energy policy and eliminate the distrust, then further deepen the cooperation (Wang, Du and Li 2011). Therefore in diplomatic contact with producing country- here is Qatar, China keeps trying to eliminate the distrust between both sides in the different approaches in energy reserves and persuading Qatari government that China sincerely hope to cooperate with Qatar as both sides have prominent complementary advantages. Premier Wen recent visit to Qatar further confirmed the partnership in natural gas and both sides came up with more concrete proposals in bilateral relations, such as using local currency in trade.
6.6. The Share of EU in LNG Export of Qatar

Historically, Qatar primarily served the Asia-Pacific market, but more recently Atlantic buyers have accounted for nearly half of Qatar's exports (Jacobs 2011: 21). According to the natural gas market review 2009, one aspect of Qatar's massive investments from 2009 is diversification in marketing (OECD/IEA 2009: 102).

In 2003, the majority of Qatari LNG went to Japan (47%), South Korea (40%) and Spain (13%); while in 2007, the main destinations were South Korea (30%), Japan (23%), India (23%), Spain (13%) and Belgium (4%) (OBG 2009: 129). It's clear that Qatar is expanding and diversifying its market through medium or long term basis. France, Italy, the UK, the US and Taiwan also acquire LNG from Qatar. Qatari official have said they would like LNG exports to be distributed equally among Europe, the US and Asia, however, in practice the targeted geographical distribution between Asia, Europe and North America has evolved from one-third evenly in early 2008 to 40% in Asia, 35% in Europe and 25% in North America in early 2009 (OBG 2009: 129; OECD/IEA 2009: 102). Qatar is the EU's leading supplier of LNG, supplying 25%, 24% and 23% of all LNG imports in the EU in 2009, 2008 and 2007 respectively (EC 2011b).

In 2010, Qatar sent a total of 10.2 million tonnes of LNG to the UK, followed by India with 7.7 million tonnes, and South Korea and Japan with 7.5 million tonnes each (Figure 8). Qatargas eventually aims to supply up to 14 million tonnes per year of LNG to the UK, where the gas received at the South Hook terminal from Qatargas 2's Trains 4 and 5 has already made the UK the biggest buyer of the fuel in Europe, surpassing Spain (Godier 2011). In this year, the European countries took 26.3 million tonnes LNG out of 55.5, accounting for about 47.7% of the total export of Qatari LNG (Figure 8).

OBG= Oxford Business Group
From Figure 9, some trends about the development of Qatari LNG export could be concluded. Overall, the export of Qatari LNG was growing in the last decade. The traditional market, Japan and South Korea steadily increased their LNG import from Qatar in this period while their markets both shrank a little bit in 2010. Spain emerged as a obvious importer since 2002, while UK became important importer around 2009 for Qatar. The amount of imported LNG of Spain and UK climbed up a lot, compared with that of Japan and South Korea, which only slightly varied during this period.

Table 6 further illustrates the European share in total export of LNG of Qatar. In 2007, there were only Belgium, Spain and UK outstanding in European countries who imported LNG from Qatar, while in 2010, France, Italy, Portugal (Figure 11) and Turkey became the new importers. Accompanying with the growth of Qatari LNG export, the European import of LNG also increased. UK had the most dramatic increase in importing Qatari LNG, from 0.7% in 2007 to 18.3% in 2010, while Spain's share gradually declined in the same period. The share of Belgium generally stayed
the same, but the new importers, such as France, Italy, had large growth between 2009 to 2010. It could be inferred that the European dependency on Qatari LNG is increasing in the near future as European countries took more and more share in Qatari LNG export.

Figure 9: Qatar LNG exports by destination

Source: Godier (2011)

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<tr>
<th>Destination\Year</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Korea</td>
<td>28%</td>
<td>27%</td>
<td>18.9%</td>
<td>13.5%</td>
</tr>
<tr>
<td>India</td>
<td>21.5%*</td>
<td>25%</td>
<td>16.7%</td>
<td>13.8%</td>
</tr>
<tr>
<td>Japan</td>
<td>28.2%</td>
<td>23%</td>
<td>20.8%</td>
<td>13.5%</td>
</tr>
<tr>
<td>Spain</td>
<td>11.6%</td>
<td>12%</td>
<td>10%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Belgium</td>
<td>7.1%*</td>
<td>7%</td>
<td>12%</td>
<td>7.7%</td>
</tr>
<tr>
<td>UK</td>
<td>0.7%*</td>
<td>0.3%*</td>
<td>9.7%</td>
<td>18.3%</td>
</tr>
<tr>
<td>Italy</td>
<td></td>
<td></td>
<td>3.2%</td>
<td>8.1%</td>
</tr>
<tr>
<td>France</td>
<td></td>
<td></td>
<td>0.3%*</td>
<td>3.2%</td>
</tr>
<tr>
<td>Turkey</td>
<td></td>
<td></td>
<td>0.6%*</td>
<td>3.2%</td>
</tr>
<tr>
<td>China</td>
<td></td>
<td></td>
<td>1.1%*</td>
<td>2.1%</td>
</tr>
<tr>
<td>European Share</td>
<td>19.4%</td>
<td>19.3%</td>
<td>35.8%</td>
<td>47.8%</td>
</tr>
<tr>
<td>Total LNG export</td>
<td>42bcm</td>
<td>51.2bcm</td>
<td>55 million tonnes</td>
<td></td>
</tr>
</tbody>
</table>
Table 6: The share of Qatar LNG export by states 2007-2010 (bcm)

<table>
<thead>
<tr>
<th>Total LNG export*</th>
<th>38.48 bcm</th>
<th>39.68 bcm</th>
<th>49.44 bcm</th>
<th>75.75 bcm</th>
</tr>
</thead>
</table>

The statistics with * are (calculated) from the BP data.

Source: BP statistical review of world energy 2009-2011; The Peninsula (2011); Europe's energy position- Annual reports 2010 and 2009;
http://ec.europa.eu/energy/observatory/annual_reports/annual_reports_en.htm
EC market observatory- Third country information: Qatar 2010.
http://ec.europa.eu/energy/observatory/third_country_en.htm

If looking into the data of selected European countries, it is evident that Qatari LNG is quite important for some European countries. Belgium has the largest dependency on Qatari LNG export, while Portugal generally not depends on Qatari LNG. The share of Qatari LNG in the import of LNG of UK and Italy were 55% and 34% respectively in 2009, while in 2010, both shares grew to 76% and 51.1%. But the difference between Italy and UK LNG import is that, UK has more sources than Italy, thus its dependency on Qatar is lower than that of Italy. In Spain, the source of LNG is the most diversified among these countries and Qatar only accounted for 17% of total LNG import in 2009 while it slightly grew to 19.8% in 2010. From Figure 10 and Figure 11, the main exporters for European LNG are Qatar, Nigeria, Algeria and Trinidad and Tobago but their shares in LNG import varies in different countries. Among these five countries, except Belgium decreased a little bit even thought Qatar takes majority of its LNG import, other countries all grew their LNG import from Qatar in 2010.
Figure 10: structure of LNG imports of selected EU countries in 2009

Source: European Commission - market observatory - Third country information:
Figure 11: structure of LNG imports of selected EU countries in 2010

Source: European Commission- market observatory- Third country information: Qatar

6.7. The Possible Effect on EU

To sum up the data above, the amount of Qatar LNG to EU is increasing in recent years. Since 2006, Qatar started to market some of the expected mega-train to other regional markets on medium or long term, notably to China and to a lesser extent to new LNG markets in Europe (OECD/IEA 2010: 172).

In 2010, UK became the most important importer for Qatar, instead of Japan and South Korea, who were the traditional target market for Qatar. Since 2009, China started to purchase LNG from Qatar, however the amount is quite small, taking 1.1% of total exported LNG of Qatar (Table 6). Even in 2010, this amount didn't increase too much, only taking 2.1% of the total share. Chinese share is much lower than its European and Asian counterparts. This could overthrow the opinion, that China's increasing role in Qatar may take EU's share in LNG export of Qatar. As discussed before, the Chinese NOCs' activities in Qatar did not show any neo-mercantilism. In Qatar, the Chinese assets and acquirement are small and the LNG import from Qatar is also limited. But in the contrast, European performance is quite active. From Table 7, it could be saw that for European market, in the future, the LNG supply from Qatar will dramatically increase, as France and UK will get double amount of LNG in 2015 compared with that in 2009. Belgium, Italy and Spain have stable long-term supply relationship with Qatar as well, importing 5.5 mtpa since 2008, 4.7 mtpa since 2009 and 3.7 mtpa since 2007 respectively. It's fresh that Poland will start to import LNG from Qatar since 2014. Compared with outstanding performance of EU, China acts quite later than its European counterparts and only takes small share. So the statement that China will take EU's share in the future is not true. European countries generally act in Qatar for a long time. As China enter in Qatar late, there is not too much space for China to develop if Qatar doesn't improve its output. Thanks to the improvement in Qatari LNG output and large demand in Asian market due to its fast economic development, it provides Asian market, notably China and India, with spare LNG, without taking EU's share.
Not only did China not compete with EU, but Europe, especially UK became the target market of the current massive expansion phase of Qatar. In the report of IEA about the oil and gas market in 2010, there were four terminals on stream, two in UK, one in Italy and one in France, whose capacity increases coincided with the major expansion of LNG availability from Qatar (OECD/IEA 2010: 177). As the production of North Sea may continue declining, it is also foreseeable that EU, probably UK will highly depend on Qatar LNG. Thus South Hook terminal- a joint venture of QP, ExxonMobil and Total in Walse - is crucial for LNG supply in UK. The United Kingdom's LNG import capacity increased from 17 bcm to 34 bcm with this two additional new LNG terminals (OECD/IEA 2010: 177). On 20 March 2009, first cargo from Qatar arrived at South Hook terminal, which is the largest terminal in Europe and could provide 25% of UK's current gas requirement, together with Dragon terminal (BBC 2009). 55% of the supply was from Qatar, including long-term supply under vertically integrated arrangement from Qatargas 2 to the South Hook terminal and occasionally spot cargoes into the expanded Isle of Grain terminal (OECD/IEA 2010: 177). Other terminals in Italy (Adriatic LNG terminal) and southern France (Fos Cavaou terminal) also receive LNG from Qatar in recent years.

Overall although China imports more and more LNG from Qatart through long-term contract, it didn't take the share of EU in recent years, as the output of Qatar is increasing at the same time. In the future, EU will be important importer for Qatar, especially because the demand in UK grows and the receiving capacity of LNG terminal expands.
7. The Islamic Republic of Iran

Iran holds the world’s fourth-largest proven oil reserves and the world’s second-largest natural gas reserves. It is a member state of OPEC with second-largest oil production and the third-largest crude oil export in the world, while in natural gas, Iran was the world’s fourth largest producer and third largest consumer of natural gas in 2010 (EIA 2012a). According to Iranian media, Alireza Gasemi Javid, a manager from National Iranian Gas Export Company, said that in 2015, Iran would be the leading supplier in global natural gas market if its LNG projects on stream with 7
billion tones capacity (Shan 2009).

According to Oil & Gas Journal in January 2011, Iran's estimated proven natural gas reserves stood at 1,046 trillion cubic feet (tcf), only second to Russia (EIA 2012a). According to BP statistical review of world energy 2011, by the end of 2010, Iran took 15.8% of the world proved natural gas reserves (BP 2011). During 2000 to 2010, the consumption and production of natural gas of Iran are summarized in Table 8.

<table>
<thead>
<tr>
<th>Year (bcm)</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>60.2</td>
<td>66.0</td>
<td>75.0</td>
<td>81.5</td>
<td>84.9</td>
<td>193.5</td>
<td>108.6</td>
<td>111.9</td>
<td>116.3</td>
<td>131.2</td>
<td>138.5</td>
</tr>
<tr>
<td>Consumption</td>
<td>62.9</td>
<td>70.1</td>
<td>79.2</td>
<td>82.9</td>
<td>86.5</td>
<td>105.0</td>
<td>108.7</td>
<td>113.0</td>
<td>119.3</td>
<td>131.4</td>
<td>136.9</td>
</tr>
</tbody>
</table>

**Table 8: Production and Consumption of natural gas of Iran from 2000 to 2010**

Source: BP statistical review of world energy 2011

From Table 8, it could be seen that during this decade, Iran consumed quite large mount of natural gas compared with its production. In another word, its consumption always catches up with its production. As EIA forecasts, natural gas consumption in Iran is expected to grow around 7 percent annually for the next decade that would result the shortfalls in natural gas supply grows (EIA 2012a). Besides, as Iran anticipates increasing crude oil production through advanced oil discovery techniques, a sizable share of natural gas will be used for re-injection as EIA predicts (EIA 2012a). All the factors limit Iran’s development in natural gas export, even if it has large reserves.

### 7.1. Gas Sector

In Iran, foreign or private ownership of natural resources is prohibited in constitution. But the Iranian government allows international oil companies to enter exploration and development through buyback contract, under which, foreign firms hand over operations of fields to the National Iranian Oil Company (NIOC), and receive payment from natural gas production to cover their investment after development.
Because of the poor investment climate and international political pressure, some international oil companies, such as Total and Shell, have abandoned Iran. Therefore, Iran has looked toward eastern firms, like state-owned Indian Oil Corp., China's Sinopec, and Russia's Gazprom, taking an increased role in Iranian natural gas upstream development (EIA 2012a).

The Ministry of Petroleum is responsible for the activities in energy sector. Founded in 1950, National Iranian Oil Company - the affiliate of Ministry of Petroleum - has been directing and making policies for exploration, drilling, production, research and development, refining, distribution and export of oil & gas and petroleum products. In 2008, it is estimated that the company holds 137 billion barrels of liquid hydrocarbons and 29 trillion cubic meters of natural gas (NIOC 2012). The foreign companies in oil industry in Iran are supervised by NIOC, while the National Iranian Gas Company (NIGC) is responsible for natural gas infrastructure, transportation, and distribution. The National Iranian Gas Exports Company (NIGEC) was created in 2003 to manage and to supervise all gas pipeline and LNG projects. Until May 2010, NIGEC was under the control of the NIOC, but later the Ministry of Petroleum incorporated NIGEC under NIGC in an attempt to broaden responsibility for new natural gas projects (EIA 2012a).

### 7.2. Gas Market

So far, the production of natural gas was digested in domestic market and re-injection projects. Despite Iran's huge reserves, there are both projects for export and import as the country is till a net importer. In short term, projects usually aim at enhancing its import capacity, while some projects still exist to export gas by pipeline to Asia (OECD/IEA 2010: 264). In terms of export, Iran only exports small volumes of gas. The reasons for these are: (1) lack of financial resources especially international financing for development of gas resources; (2) large domestic grid at prices of
S0.4/MMBtu$^{21}$; (3) massive gas re-injection requirements of some 10 bcf/d at the minimum (Fesharaki and Adibi 2009). In 2009, Iran exported an average of 21 million cubic meters of natural gas to Turkey everyday and in 2010, a daily growth of 11 million cubic meters was indicated as it is Turkey’s second-biggest supplier after Moscow (PressTV 2011a). In May 2009, Iran began to export natural gas to Armenia after a couple of years of delays with 24 mmcf/d$^{22}$ of gas in 2010 so as to exchange for electricity and this pipeline exports to Armenia are expected to increase to 224 mmcf/d in 2020 (EIA 2012a).

**Export Commitments:**

<table>
<thead>
<tr>
<th>Export Project</th>
<th>Export Volumes (mmcf/d)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iran-Turkey</td>
<td>up to 970</td>
<td>Operational (Startup: 2001)</td>
</tr>
<tr>
<td>Iran-Armenia</td>
<td>106-320</td>
<td>Operational (Startup: 2009)</td>
</tr>
<tr>
<td>Iran-Sharja</td>
<td>up to 500</td>
<td>Suspended Due to Price Dispute</td>
</tr>
<tr>
<td>Iran-Azerbaijan-Nakhichevan Gas</td>
<td>20-34</td>
<td>Operational (Startup: 2005)</td>
</tr>
<tr>
<td>Swap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iran-Europe (EGL)</td>
<td>50-532</td>
<td>Signed Contract (Possible Startup: 2010/2011)</td>
</tr>
<tr>
<td>Iran-Pakistan</td>
<td>750</td>
<td>Signed Contract (Startup: 2014)</td>
</tr>
</tbody>
</table>

*Table 9: Iran export commitment of natural gas in 2009*

*Source: Fesharaki and Adibi (2009)*

In import term, since 1997, Iran has been importing natural gas from Turkmenistan. According to FGE imports jumped to 1.1 bcf/d between January and October 2011 as a result of completion of the Dauletabad-Hasheminejad pipeline (EIA 2012a).

### 7.3 Important Gas Field

Iran's natural gas reserves are predominantly located offshore, although significant production originates from onshore oil fields (associated gas). Over two-thirds of Iranian natural gas reserves are located in non-associated fields, and have not been developed (EIA 2012a). In the ranking of world largest non-associated gas fields, Iran takes six out of nineteen (Oilgas 2012a). Major natural Iranian gas fields include:

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$^{21}$ MMBtu=million British Thermal Units  
$^{22}$ mmcf/d= million standard cubic feet per day
South and North Pars, Kish, Golshan, Tabnak and Kangan, etc. These gas fields’ locations are shown in Figure 12. In order to further develop in South and North Pars, NIOC established a subsidiary- Pars Oil and Gas Company (POGC) in 1998 (POGC 2012a).

Figure 12: Iran gas fields location map
Source: Oilgas (2012b)

7.3.1. South Pars

Qatar’s North Field and Iran’s South Pars are connected and the Iranian part is the field with both oil and gas, which produces about 35 percent of total gas production in Iran (EIA 2012a). South Pars gas field is one of the largest independent gas reservoirs in the world which covers an area of 9700 square kilometers, of which 3700 square kilometers belongs to Iran with estimated some 14 tcm of gas reserves and some 18 billion barrels of gas condensates (POGC 2012b). Generally South and North pars gas fields are managed by Pars Oil & Gas Company, but NIOC sets up a subsidiary- National Iranian South Oil Company (NISOC)- to be responsible for much of the southern natural gas production (EIA 2012a).
Presently, Iran has designed 24-phase-development in South Pars, aiming at producing 790 million cubic meters of gas per day and South Pars is expected to have maximum production in 2015 (POGC 2012b; NIOC 2011). So far, phases 1-10 are online. The majority of South Pars natural gas production will be used for consumption and gas re-injection, while the remainder will either be exported as LNG and/or used for GTL projects (EIA 2012a).
Table 10: South Pars Project

Source: EIA (2012a)

As a result, Pars Special Economic Energy Zone (PSEEZ), from west by Shirino village, from south by Persian Gulf coastline, from north by Zagross range and from east by Chah Mobarak village, was established in 1998 to accommodate South Pars...
related refining facilities and various activities in the oil, gas and petrochemical upstream and downstream industries and also to render support services to these industries (POGC 2012b).

7.3.2. North Pars

This field with 58.9 tcf gas reserves, discovered in 1967, is located some 120 kilometers south east of Bushehr in water depths of 2 to 30 meters in the Persian Gulf (POGC 2012c).

At present, final studies for development of this field - 4 phases- equivalent to 3600 mmcf/d are under implementation. The whole recovered gas from this field will be used for producing 20 mtpa of LNG (NIGEC 2012a). In September 2006, China's CNOOC signed a memorandum of understanding with NIOC for development of the North Pas field, which was extended in December 2006 again, to incorporate development of a four-train LNG facility with 20 mtpa capacity (Oilgas 2012). Half of the products belong to NIOC and after 25 years all the equipments will belong to Iran (NIGEC 2012a).

There are also many potential large gas fields, however, international sanctions and unfavorable investment conditions have impeded developments across the energy sector, thus these projects usually are delayed. The start-ups of additional fields, including the Golshan, Ferdowsi gas fields, are likely to occur in the next decade (EIA 2012a).
7.4. Important Projects

7.4.1. Liquefied Natural Gas

POGC is responsible for LNG development, although various companies including the National Iranian Gas Export Company are also involved (EIA 2012a). In order to become a major exporter of natural gas, Iran is planning to construct two separate GTL facilities as well as four LNG plants on the Persian Gulf coast with a total annual capacity of nearly 37 million tonnes (Sarmadi-Rad 2005:4).

The LNG projects in Iran are:

1- Persian LNG with a capacity of 10.6 mtpa targeting European countries;
2- Iran LNG with a capacity of 8.8 mtpa targeting European and Indian markets;
3- Pars LNG with a capacity of 8.8 mtpa targeting Far East market;
4- NIOC LNG with a capacity of 10 mtpa targeting variety of world markets (Sarmadi-Rad 2005:5).

A number of LNG projects have been proposed in the past, however only one South Pars LNG project still remains an option. However, sanctions continue to delay the development of this project. The other projects, Pars LNG (South Pars Phase 11) and Persian LNG (South Pars Phase 13) have also largely been shelved as a result of financing difficulties (EIA 2012a).

The purpose of Iran LNG is to establish a gas liquefaction plant in Tombak, 15 km South East Kangan. It includes two trains with an expected capacity of 5.4 mtpa of LNG, each of which has one sweetening and one liquefaction utility (NIGEC 2012b).

The Perisan LNG project first will have two sweetening and Natural Gas Liquid (NGL) extractions and one LNG production utility, then, one utility will be added to each, totally three sweetening and NGL extractions and two LNG production utilities (NIGEC 2012c). This project is expected to start up in 2014 with 16.2 mtpa LNG.
production (NIGEC 2012c).

7.4.2. Pipelines

For Iran, its cross-broader pipeline plans are mainly:

(1) *Iran-UAE (DUSUP)*: (Dubai) The main contractual terms have been agreed upon, but negotiations have stopped because of Gas Sales and Purchase Agreement with the Dolphin Energy;

(2) *Iran-UAE (Mobadalla)*: (Abu Dhabi) No final deal due to price;

(3) *Iran-Kuwait*: A term sheet has been agreed upon but has been suspended pending a price revision, as well as a gas discovery (35 tcf) by Kuwait;

(3) *Iran-Bahrain*: An MOU was signed in 2007 for 1.0 bcf/d but no final deal has been reached yet (primary negotiations);

(4) *Iran-Oman*: Potential exports for 1-2 bcf/d of gas. Iran and Oman signed several MOUs since 2005 for the joint development of the Hengam (Bokha) field and the development of the Kish gas field and exports to Oman by pipeline;

(5) *Iran-Syria*: Signed an MOU for 3 bcm-per-year in October 2007 but no final deal has been reached;

(6) *Iran-Europe (Nabucco Project)*: Several discussions but no final agreement has been reached;

(7) *Iran-Pakistan-India (IPI) line*: a proposed 1,700 miles and a 5.4 bcf/d capacity (Fesharaki and Adibi 2009; EIA 2012a).

The pipeline - IGAT 9 - 1863 km from Asaluyeh (South Pars Gas Field) to European Market, possibly targets Greece, Austria, Italy, Germany and Switzerland, through other available pipelines such as Nobacco Pipeline or Persian Pipeline with capacity of 30-35 billion cubic meters per year (NIGEC 2012d). It is determined to implement
this project by collaboration of foreign investors and local contractor and could transport Iran’s natural gas by 2017 (Shana 2007a). However, because European Union decided to implement energy and financial sanction on Iran, EU would stop import crude oil and oil production since July 2012, together with US and Australia, even though European countries, such as Spain, Greece and Italy highly depend on Iran’s oil and gas (Sina 2012). This may harm Iran’s economy. Yet in February 2012, the official from National Petrochemical Company said that imposing sanctions against Iran’s petrochemical industry had no impact on production and exports of petrochemical products because too many customers, like Asian, Latin American and Iran’s northern neighboring countries, were interested in continuing buying Iran’s petrochemical products (Shana 2012).

Nonetheless, the futures of pipeline projects, such as the Iran-UAE pipeline, Iran-Pakistan pipeline and Iran-Syria pipeline, are quite vague due to the political, economic unstable factors in negotiation.

7.5. The Relationship between China and Iran

7.5.1. The Official Visits between Iran and China

In 1971, Iran established diplomatic relations with China on August 16 and even after the founding of the Islamic Republic of Iran in 1979, the high-level visits between the two countries still increased as well as the continuous development of friendly relations and cooperation in various fields (MFAPRC 2011).

Iranian leaders visited China nine times during 1985 to 2002, while the Chinese leaders visited Iran nine times as well (EPRCI23 2004). In recent years, frequent high-level contacts in political, economic and trade fields often appeared. The bilateral contacts between China and Iran are summarized in Table 11. During the

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23 EPRCI = Embassy of People’s Republic of China in Iran
14th session of Iran-China Joint Economic Commission held in Beijing in 2011, the Iranian Minister and Chinese Minister of Commerce signed the memorandum, and decided to form a joint oil and gas committee in order to accelerate energy cooperation, the execution of energy projects between the two countries, according to the Iranian media- Fars News Agency (FNA 2011).

**Table 11: High Level PRC-IRAN Interactions, 2003-2011 (vice minister and above) (see in Appendix)**

In the paper of Professor John W. Garver, he disaggregate China’s activities in Iran into 6 major policies:

1. Cooperate with the United States on the Iran nuclear issue to the extent necessary to convince the U.S. that China is not a peer competitor or a strategic rival, but is a responsible stake-holder and strategic partner;
2. Support the Islamic Republic of Iran (IRI) diplomatcially and politically against U.S.-led international pressure over the Iran nuclear issue. Help the IRI win time to push forward with its nuclear programs;
3. Expand economic cooperation with the IRI especially cooperation in the energy sector, and guard this cooperation against infringement by sanctions arising over the Iran nuclear issue;
4. Allow the flow of a wide array of sensitive dual use technologies to Iran to continue, rejecting U.S. and other countries “national,” extra-Security Council restrictions;
5. Cooperate with Iran to strengthen its military capabilities;
6. Use China’s good offices to mediate U.S.-IRI conflict seeking a compromise over the Iran nuclear issue (Garver 2011:1).

Garver concluded that the China's policies are either strategic deception or/bureaucratic politics, however, China's inconsistent Iran policies show it is more from a bureaucratic compromise of leaders much concerned with expanding and
maintaining their domestic power base (Garver 2011:24).

7.5.2. Importing Energy From Iran

During 1993 to 1995, the bilateral trade between Iran and China was only 0.4 billion dollars and there was no energy cooperation in Iranian upstream industry (Li R. 2010). Since 1995, because of the economic sanction, many international oil companies gradually drew out of Iran, which made Iran started to look eastwards. China started importing large quantities of crude oil from Iran under the blank condition left by international oil companies and now it is the largest buyer of Iran (Andrew-Speed 2012).

After entering the 21st century, China increased its import from Iran because of the high-speed economic development. In 2000 to 2002, the import of crude oil from Iran grew from 7 million tonnes to 11.1 million tonnes, which took 15% of China’s total oil import in 2002, however during this period, the bilateral cooperation only stayed at China-import-from-Iran level (Li R.2010). After 2002, Iran was unable to keep pace with China’s surging import requirement and Saudi Arabia soon took over as China’s top supplier of crude oil, even by 2005 Iran had slipped into third place behind Angola (Andrew-Speed 2012). Since 2007, Iran managed to keep its supplies to China at 20 million tonnes or above this (Li H.M. 2010). In 2009, China exceeded Germany and became the largest trade partner of Iran with 21.2-billion-dollar bilateral trade (Li R. 2010). Last year (2011) saw a substantial boost in the quantity of oil supplied by Iran to China (27.6 million tonnes), which suggests that China was trying to compensate for reduced Iranian supplies to Europe (Andrew-Speed 2012).

7.5.3. Bottleneck of Iranian LNG sector

Among the three major LNG projects based on the South Pars gas reserves, only Iran
LNG claimed some progress- 24% of the project were completed. Although Iran has large gas reserves and marine facilities for LNG storage tanks are under construction, the development in energy sector still lags behind and none of the core liquefaction facilities are being built, because of the lack of capital and technologies. Washington PFC Energy analyst Andrew Clayton said, without the western LNG technology, it’s impossible to impel any LNG projects for Iran (Fineren 2010). For example Phase 12 of South Pars used to be developed by NIGC using German technology under license (OECD/IEA 2010: 236). The industry believes that what impedes Iran's LNG plan is mainly the technical bottleneck. Most technology for large-scale LNG projects is not available for Iran because of the economic sanctions, therefore it is unlikely that any LNG will be exported from Iran in the near future (OECD/IEA 2010: 249).

On one hand, the recent European sanction on Iran in 2010 broke the dream that Iran may got LNG technology from SIMENS- a famous German electronics corporation; on the other hand, another LNG technology was in the hand of American company- General Electric, and based on U.S. attitude, it is impossible to get this technology from America (Fineren 2010). Thus many analysts believe that China is vital in Iran’s development. Noel Tomnay, a analyst on global gas issue from Wood Mackenzie, stated that if Iran wanted LNG technology, the only source was China and China had to develop autonomous technology. An Sinopec official told reporters that the Chinese decisions of investment in Iran was wise, otherwise, in the next 10 years, ten-billion-cubic-meter gas gap in China will not be filled (Li 2007). In this regard, Sinopec expert said, although the Chinese company did not fully grasp the design and construction technology of LNG liquefaction and related infrastructure, if the two sides reach an agreement, China has the ability to help Iranian companies in project bidding (Li 2007).
7.5.4. The Chinese NOCs in Iran

7.5.4.1. Sinopec

Sinopec Corp, Sinopec Group's listed arm, buys over half a million barrels of crude oil from Iran a year, making it the world's largest Iranian oil buyer (Chen 2011). It also takes great responsibility for the upgrading projects of Iranian refineries.

7.5.4.1.1. Exploration

In January 2001, Sinopec was awarded exploration of Zavareh-Kashan, an onshore oil block in central Iran (ChinaDaily 2006). However except the first drilling, the other three trials were not successful in producing commercial qualities of oil, making Sinopec thought about to leave the exploration project.

In 2004, Sinopec signed MOU with Iran on the exploration in Yadavaran oilfield and China would pay about 100 billion dollars over 25 years for the oil and gas (10 million tones LNG annually) from Yadavaran (Liao 2006; Eastday 2006). According to the MOU, Sinopec would have 51 percent stock in Yadavaran, while India company- Oil and Natural Gas Corporation, and Iran held 29 percent and 20 percent stock respectively (Liao 2006). At the end of 2007, Sinopec signed the buy-back contract concerning the development of gaint Yadavaran oilfield and it is duty-bound to invest and develop the field (Shana 2007b). However in the same year, Sinopec decided not to buy LNG from Iran as the price was too expensive, which was a surprise for Iran (Shana 2007c).

In 2006 Sinopec signed a second deal to explore Iran's oilfield - onshore Garmsar block for oil and gas, committing to invest $19.61 million (Shana 2006; Shana 2009).

7.5.4.1.2. Refinery plants

According to the official website of Sinopec Engineering Inc. (SEI), an arm of Sinopec Group, its main refinery projects in Iran by 2008 were summarized in Table
12. Compared with other Chinese NOCs, Sinopec has more assets in Iran.

<table>
<thead>
<tr>
<th>No.</th>
<th>Projects Completed:</th>
<th>Description</th>
<th>Contract Price</th>
<th>Contracting Mode</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tehran Refinery</td>
<td>Unit Revamp</td>
<td>144 Million USD</td>
<td>EPC Independent Contractor</td>
<td>2001-2003</td>
</tr>
<tr>
<td>2</td>
<td>Tabritz Refinery</td>
<td>Unit Revamp</td>
<td></td>
<td>EPC Independent Contractor</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>NEKA Crude Oil Tank Farm</td>
<td>9’28,000m3 Crude Oil Tank and offloading facilities</td>
<td>EPC Independent Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Shiraz Refinery</td>
<td>Basic Design</td>
<td>2.00 Million USD</td>
<td>Independent Contractor</td>
<td>2003</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II</th>
<th>Projects Being Built:</th>
<th>Description</th>
<th>Contract Price</th>
<th>Contracting Mode</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arak Refinery</td>
<td>15 New Processing Units, 3 Revamping Units, Tank Farm, System Optimizing.</td>
<td>2,168 Million EUR</td>
<td>EPC, Consortium</td>
<td>2006</td>
</tr>
<tr>
<td>2</td>
<td>Esphahan Refinery</td>
<td>RFCC+PRU</td>
<td>650 Million EUR (Estimate)</td>
<td>EPC Independent Contractor</td>
<td>2008</td>
</tr>
<tr>
<td>3</td>
<td>Hormuz Refinery</td>
<td>Basic Design for Coking Unit</td>
<td>3.24 Million Euro</td>
<td>Independent Contractor</td>
<td>2007</td>
</tr>
<tr>
<td>4</td>
<td>Hormuz Refinery</td>
<td>17 Processing Units</td>
<td>2,600 Million EUR (Estimate)</td>
<td>Lump Sum E+PC Convertible, Consortium</td>
<td>2008</td>
</tr>
<tr>
<td>5</td>
<td>Tabritz Refinery</td>
<td>Increase Gasoline Production, NHT/CCR/ Benzene Extraction</td>
<td>108 Million EUR</td>
<td>EPC, Consortium</td>
<td>2006</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>III</th>
<th>Bidding projects:</th>
<th>Description</th>
<th>Contract Price</th>
<th>Contracting Mode</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Condensate Refinery</td>
<td>Capacity: 360,000 BPD, 26 Processing Units+ Utilities+ System</td>
<td>3,300 Million EUR (Estimate)</td>
<td>EP Subcontractor (15 main units)</td>
<td>2008</td>
</tr>
<tr>
<td>2</td>
<td>Abadan Refinery Upgrading Project</td>
<td>15 Processing Units</td>
<td>2,500 Million EUR</td>
<td>Converted Lump Sum, Consortium</td>
<td>2008-2009</td>
</tr>
<tr>
<td>3</td>
<td>Khozestan Refinery</td>
<td>Capacity: 180,000 BPD</td>
<td>2,880 Million EUR</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Neka Refinery Project
Capacity: 300,000 BPD, Including Neka to Abbas Port Oil Pipeline

Tabriz Second Refinery Project
Capacity: 110,000 BPD
Max. Gasoline Production and Products Upgrading.

Shiraz Second Refinery Project
Capacity: 120,000 BPD
Max. Gasoline Production

Table 12: Sinopec Engineering Inc. (SEI) overseas projects in Iran

Since 2001 Sinopec has built a huge oil terminal at the Caspian Sea port of Neka and has upgraded Iranian refineries at Tehran, Rey and Tabriz, as well as Arak, Isfahan and Abadan (Shana 2006; Chen 2011). Iran and China sought to expand the Abadan refinery by 210,000 barrels per day and to build the new Hormuz refinery in southern Iran, according to Shana's report (Hafezi 2010).

In 2009, Sinopec signed a MOU with its Iranian partners to invest $6.5 billion in oil refinery construction in Iran (UPI 2009). In August 2011, SEI started up a unit in Iran's Arak refinery, offering a rare clue on the progress the state-run Chinese oil firm is making in the sanctions-hit country (Chen 2011).

7.5.4.2. CNPC

7.5.4.2.1. Exploration
In May 2004, CNPC acquired the MIS oilfield holding 75% stock of the project, while Naftgaran Engineering Services Company (NESCO) owns the remaining 25% (CNPC 2012a). On August 20, 2007, CNPC received a notice from NIOC which approved the Supplementary Agreement of the Iran MIS project marked the beginning of the MIS project, and in 2009, the central processing station of MIS oilfield enjoyed
smooth sailing (CNPC 2012a).

CNPC signed contract with NIOC about the exploration in Kouhdasht, into which $18 million investment in exploration and $69.5 million in its description has been put (Shana 2009). In 2007, the discovery of light and sweet oil in "Baba Habib" anticline of Kouhdasht block was confirmed by the exploration manager of NIOC (Shana 2007d). In 2009, the overall evaluation plan of Block 3 in BAB oilfield has been approved by National Iranian Oil Company and has successfully entered the evaluation period (CNPC 2012a)

In December 2006, NIGEC announced to supply 3 million tones LNG annually from South Pars to CNPC. In the same year, facing the pressure of U.S. sanction, Japanese company Inpex drew out the development of Azadegan. In 2009 CNPC further gained the development right in Azadegan oil&gas field, which is the largest oil field in the world with output of 0.26 million barrels everyday (Reuters 2009b), and the Phase 11 of South Pars gas field (CNPC 2012a). Citing the news from Shana, CNPC would be responsible for 90% of the cost in this project and at the same time China was seeking to gain 70% profits of this oil field (Li R. 2010).

7.5.4.2.2. Oilfield Service

In 2001, CNPC obtained a service contract from NIOC for drilling 19 wells and workover of two wells; in 2003, CNPC tested well KUSHK-2, achieving two successful operations; in 2006, CNPC won the tender of the South Pars project to provide offshore well logging and perforating services with a contract term of three years; in 2008, CNPC acquired 3D seismic data with improved quality from complex mountains in Iran's Block 3 in the MIS project; in addition, a well logging project of NIOC South, an NIOC offshore project, and a PTTEP (PTT Exploration and Production Plc) project were newly developed (CNPC 2012a).
7.5.4.3 CNOOC

In 2006, CNOOC gained 50% stake of North Pars natural gas project (Li R. 2010). CNOOC has 50% of the total production of this project and it is also responsible for the construction of plant as well as transportation and sales (Zhou, Wang and Qi 2006). In 2008, China National Offshore, the parent of CNOOC indicated it would provide "technical service" to help to develop Iran's North Pars gas field (The Australian 2008).

In 2009, Amona company (Malaysia) signed with China Oilfield Service Limited (COSL) and CNOOC to develop the Resalat oilfield, and COSL will be responsible for drilling well while CNOOC will install offshore machines used in the project (Li 2009). Thus these three companies will develop Resalat together.

7.5.4.4 The Unflat Road to Iran

In 1993-2002, there was only cooperation between China and Iran in importing oil. In Table 13, during 1999 to 2009, the main foreign investors in Iran were summarized by Garver. It demonstrates that since 2004, Chinese NOCs started to seek cooperation with Iran in upstream industry, as only vague drilling projects were mentioned in 2001. From this table, it it clear that China entered into Iran's investment later than other companies and after 2004, its investment in Iran increased a lot and China almost became the exclusive investor.

<table>
<thead>
<tr>
<th>Date</th>
<th>field</th>
<th>Companies</th>
<th>Countries</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 1999</td>
<td>Doroud (oil)</td>
<td>Total, ENI</td>
<td>France, Italy</td>
<td>$1 billion</td>
</tr>
<tr>
<td>Apr. 1999</td>
<td>Balal (oil)</td>
<td>Total, Bow Valley, ENI</td>
<td>France, Canada, &amp; Italy</td>
<td>$300 million</td>
</tr>
<tr>
<td>Nov. 1999</td>
<td>Soroush and Nowruz (oil)</td>
<td>Shell</td>
<td>Dutch</td>
<td>$800 million</td>
</tr>
<tr>
<td>Apr. 2000</td>
<td>Anaran (oil)</td>
<td>Norsk Hydro</td>
<td>Norway</td>
<td>$137 million</td>
</tr>
<tr>
<td>Date</td>
<td>Location</td>
<td>Company</td>
<td>Country</td>
<td>Value</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------</td>
<td>-------------------------------------</td>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>Jul. 2000</td>
<td>S. Pars (gas), phase 4, 5</td>
<td>ENI</td>
<td>Italy</td>
<td>$1.9 billion</td>
</tr>
<tr>
<td>Mar. 2001</td>
<td>Caspian Sea</td>
<td>GVA Consultants</td>
<td>Sweden</td>
<td>$225 million</td>
</tr>
<tr>
<td>2001</td>
<td>19 oil wells</td>
<td>CNPC</td>
<td>China</td>
<td>$85 million</td>
</tr>
<tr>
<td>Jun. 2001</td>
<td>Darkhovin (oil)</td>
<td>ENI</td>
<td>Italy</td>
<td>$1 billion</td>
</tr>
<tr>
<td>May. 2002</td>
<td>Masjid-i-soleym an (oil)</td>
<td>Sheer Energy</td>
<td>Canada</td>
<td>$80 million</td>
</tr>
<tr>
<td>Sept. 2002</td>
<td>S. Pars (gas), phase 9, 10</td>
<td>LG</td>
<td>South Korea</td>
<td>$1.6 billion</td>
</tr>
<tr>
<td>Oct. 2002</td>
<td>S. Pars, phase 6, 7, 8</td>
<td>Statoil</td>
<td>Norway</td>
<td>$2.65 billion</td>
</tr>
<tr>
<td>Feb. 2004</td>
<td>Azadegan</td>
<td>Inpex</td>
<td>Japan</td>
<td>later reduce share to 10%</td>
</tr>
<tr>
<td>May. 2004</td>
<td>Masjid-i-soleym an Zagros Mts.</td>
<td>CNPC (75% share) other PRC firm = 25%</td>
<td>China</td>
<td>unknown</td>
</tr>
<tr>
<td>June. 2006</td>
<td>Gamsar block (oil)</td>
<td>Sinopec</td>
<td>China</td>
<td>$50 million</td>
</tr>
<tr>
<td>May. 2007</td>
<td>North Pars</td>
<td>CNOOC (MOU only)</td>
<td>China</td>
<td>$16 billion</td>
</tr>
<tr>
<td>Dec. 2007</td>
<td>Yadavaran (oil)</td>
<td>Sinopec (51% share) contract; MOU in 2004</td>
<td>China</td>
<td>$2 billion</td>
</tr>
<tr>
<td>Dec. 2007</td>
<td>Golshah and Ferdow</td>
<td>SKS (MOU)</td>
<td>Malaysia</td>
<td>$16 billion</td>
</tr>
<tr>
<td>Jan. 2009</td>
<td>N. Azadegan</td>
<td>CNPC</td>
<td>China</td>
<td>$5.76 billion</td>
</tr>
<tr>
<td>Mar. 2009</td>
<td>S. Pars</td>
<td>CNPC Total &amp; Shell decline</td>
<td>China</td>
<td>$3.4 billion</td>
</tr>
<tr>
<td>Mar. 2009</td>
<td>S. Pars, Phase 12</td>
<td>Hua Fu Energy Co.</td>
<td>China</td>
<td>$3.2 billion</td>
</tr>
<tr>
<td>Jun. 2009</td>
<td>S. Pars</td>
<td>CNPC, Petronas</td>
<td>China, Malaysia</td>
<td>$5 billion</td>
</tr>
<tr>
<td>Jun. 2009</td>
<td>Resalat</td>
<td>Amona, CNOOC</td>
<td>Malaysia, China</td>
<td>$1.4 billion</td>
</tr>
<tr>
<td>Jun. 2009</td>
<td>refinery modernization</td>
<td>Sinopec</td>
<td>China</td>
<td>$6.5 billion</td>
</tr>
<tr>
<td>Jul. 2009</td>
<td>supply drilling rigs</td>
<td>ZMPC</td>
<td>China</td>
<td>$2.20</td>
</tr>
<tr>
<td>Aug. 2009</td>
<td>S. Azadegan</td>
<td>CNPC, Inpex</td>
<td>China, Japan (Japan = 10%)</td>
<td>$2.5 billion</td>
</tr>
</tbody>
</table>

Sources: "The Iran Sanctions Act," CRS Report for Congress, RS20871, Kenneth Katzman

Table 13: Major Foreign Investment in Iranian Energy Sector, 1999-2009
However the path of Chinese NOCs in development in Iran is not flat. Despite the apparently grand scale of these opportunities, little progress has been made on most of these projects due to a mix of technological and administrative challenges, as well as the difficulties in making their payments (Andrew-Speed 2012). In 2011, Iran warned CNPC and CNOOC because of the slow development and investment in 11th project of South Pars and North Pars. POGC stopped the project so as to urge CNOOC to take action, while in South Pars 11th project, NIOC announced that Iran may give ultimatum to CNPC since CNPC only finished 10% of the planned exploring progress, not 17% and it's possible that Iran would even transfer the project to domestic contractor (MCOMPRC 2011b). Media and official from CNPC indicated that the lack of capital in investment is the most crucial reason (Gao 2011). Nevertheless, in Andrew-Speed’s opinion, CNPC and CNOOC will not be too dismayed by these delays as they have many other upstream projects in their portfolios (Andrew-Speed 2012).

7.6. The Disparity between China and Western Countries

When interviewed by ifeng journalist, Vice President of Iran believed there was great potential in energy cooperation for China and Iran and in the future Iran would be a safer and more credible supplier for China because Iran was a country with large amount of energy who also consistently stuck to independent foreign policy (ifeng 2009). Yet in the view of Andrew-Speed, China’s relationship with Iran is not just based on oil and gas, it is a strategic relationship which goes back decades and involved the shipment of weapons and nuclear technologies in 1980s and early 1990s (Andrew-Speed 2012). Generally because of the disparity in nuclear project and the
unstable Israel-Iran relation, the relationship between Western countries and Iran is intense. The U.S. implemented restrictions on trade with Iran after the taking of American hostages in 1979, and in 2010 additionally targeted Iranian finances, shipping and the Revolutionary Guard (BBC 2012b).

The Western countries, most notably US, used to ask Iran to give out its uranium enrichment and stop its nuclear plan through different sanctions, while China seizes the chance to enter Iranian market under high risk. Thus China is often accused as supporter of Iranian nuclear development and supplier of military weapons.

However Javad Mansouri, Iranian ambassador to China, said in 2009 that, in last year (2008), Sino-Iranian trade was about 28 billion dollars which did not include the military trade due to the low priority, and the majority of the bilateral trade was still in energy, mechanism and infrastructure construction (Qin and Wang 2009). Chinese Premier Wen also stated in the press conference in Qatar in 2012 that, the bilateral trade between China and Iran was legally commercial act which should be protected, and in the nuclear weapon issue, China insisted the establishment of non-nuclear zone in Middle East and would support resolution of United Nations on Iran issue (Ma 2012).

In this situation, China is neither likely to abandon Iran; nor will it follow the USA under pressure. According to Andrew-Speed, for China, there are three choices: to reduce imports, to maintain them unchanged, or to increase them to make up from falling flows to Europe (Andrew-Speed 2012). China seems to choose the first option, at least in the short-term, as it has reportedly halved the quantity of oil to be supplied in January and February of 2012 (Andrew-Speed 2012). In 2012, U.S. decided to give sanction on Iran and its national bank. It also urged other countries to decrease and stop importing oil from Iran, otherwise, U.S. would give sanction to countries who oppose the American decision. On March 20, U.S. exempted eleven European countries and Japan from sanction as their large decrease in imported oil from Iran,
while China, India and South Korea were not in the exempted list (Sheng 2012).

For China, reducing import from Iran means increasing import from other regions. The largest producing country, Saudi Arabia is the only one with large spare capacity in production. As a consequence, Premier Wen’s visit to Saudi Arabia in mid-January 2012 was in time. In March 2012, Saudi Arabia showed its willingness to improve its production capacity to the world (Zhang 2012). The Chinese oil companies which trade with Iran will find ways to continue their business and diversify their imported source, albeit it is at a reduced level and probably on more favorable terms (Andrew-Speed 2012).

7.7. What is the Character of the Bilateral Relations?

The activities of Chinese NOCs are somewhat similar with that summarized by Garver. First, in economic terms, it's quite obvious that Chinese NOCs have large assets in Iran, especially Sinopec. But the way to Iranian energy sector is not flat due to the financial problem and political difficulty. In addition, under the buy-back regulation, China doesn’t have advantage in Iran, leaving Beijing an uncertain future. Sometimes Chinese NOCs feel exhausted and even want to give up (such as Sinopec). Thus China did not realize “neo-mercantilism” in Iran.

Secondly the visits in military terms, which western states most care about, are showed in Table 14. This table from Garver's paper demonstrates the top three military supplier of Iran are Russia, China and North Korea, and China slightly decreased arm supply to Iran during 2002 to 2009. Although there is not enough evidence that China supports Iran in nuclear technology, it is somewhat true that Iran gains support from Russia in operational term and from China in political and diplomatic term (Hameed 2010).
Thirdly even though Iran has large potential in LNG export, as its huge demand for natural gas and lagged LNG projects, there are no more spare gas to export. Especially without sufficient finance and LNG technology from Western countries, the task in developing LNG primarily depends on China. So far, the Chinese import of natural gas from Iran is generally Liquefied Petroleum Gas (LPG). Its imports of LNG from Iran have risen by 49 and 72 percent respectively in the first half of 2011 compared to the similar period last year (PressTv 2011b). If China dedicates to Iranian LNG projects, it is still possible that in the future, Iran will be a large LNG supplier in the world.

Fourthly, in political terms, the high-level communication was reinforced. Since Iran and China have complementary advantages in energy, the cooperations in energy sectors are always in the first place. But the bilateral communication refers to different fields, such as media, tourism, education, etc. Recently even under the pressure from U.S., China still insists its trade with Iran is purely commercial within the framework of UN charters and international laws, which could not be affected by third party. In the issue of Iranian nuclear, China still believes the best solution is communication or dialogue in diplomacy. But China didn't show its clear opposition again U.S. sanction on Iran. In some field, China still support the non-nuclear zone in Middle East and pass the resolutions proposed by America. It is interesting that, generally it's Iranian media that report more about the activities of Chinese NOCs and

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>95</td>
<td>86</td>
<td>14</td>
<td>14</td>
<td>389</td>
<td>267</td>
<td>14</td>
<td>14</td>
<td>893</td>
</tr>
<tr>
<td>China</td>
<td>111</td>
<td>88</td>
<td>90</td>
<td>63</td>
<td>81</td>
<td>77</td>
<td>77</td>
<td>77</td>
<td>664</td>
</tr>
<tr>
<td>North Korea</td>
<td>116</td>
<td>114</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>257</td>
</tr>
</tbody>
</table>

their projects. For example, in February 2012, according to Iranian media's report, Iran claimed that with the help of Sinopec, Iran would increase its oil output and decided to increase the export to China, while official from Sinopec refused to reply and stated the trade was business secret (Sohu 2012). The most possible reason is that, on one hand, Iran wants to set signal to U.S. about its partnership with and big support from China, on the other hand, these projects are somewhat in Chinese high-secret level, facing the challenge from Washington. Yet actually, China reduced its import from Iran in 2012 and searched supply from Russia (Sohu 2012). Therefore, China's attitude towards Iran is more ambiguous and it would be unfair to say China opposes U.S.-led international pressure over the Iran nuclear issue. Chinese strategy is to negotiate agreements but delay major spending in the hope of securing access to Iran's resources over the long term while minimizing the immediate risks of taking on legal and financial commitments in an unpredictable environment (Downs and Maloney 2011). According to Zhu Wenhui, a commentator from ifeng, "being righteous alone in a community where the moral tone is low" is very hard for China (ifeng 2012). Maybe China will perform well in this energy sanction, yet the situation is quite in danger, like walking in thread.

Another unnoticed point was brought out by Downs and Maloney, that Iran was also much more ambivalent about China's economic activities in Iran. Although Tehran appreciates Chinese investments, in order to express its displeasure with China's support for the latest sanctions, the Iranian parliament's national security committee pledged to launch an inquiry into Chinese-Iranian relations and Tehran even briefly agitated about the plight of China's Muslim population, soon after the UN Security Council resolution was passed in June 2010 (Downs and Maloney 2011)

7.8. The Possible Effect on EU

In the context of international concern over Iran's nuclear power and uranium enrichment program, bilateral U.S. sanctions and successive UN Security Council
resolutions have effectively discouraged large-scale foreign investment and technology which the Iranian government was hoping could contribute to upstream gas development (OECD/IEA 2010: 236).

In Table 13, the trend of foreign investment in Iran could be concluded. From 1999 to 2004, the source of foreign investment in Iran is diversified, from west European countries to Nordic countries, from North America to Asia. The amount of investment capital is also large, such as Doroud (oil) field, Darkhovin (oil) field and South Pars (gas), phase 4 and 5. But after 2004, the foreign investment from Western countries largely declined, while the investment from Asia became outstanding, notably from China, which accounted for majority of foreign investment in Iran. Between 2004 and 2009, western investments gradually retreated from Iran and left the vacuum for China and other Asian countries. For example, Phases 11 and 13-14 of South Pars gas production which were intended to bring in Total and Petronas in the first case and Shell with Repsol in the second. But most progresses have been slow and in February 2010, the Iranian have replaced Total (at a price of 4.7 billion dollars) and received a fresh boost as CNPC finalised appraisal drilling plans at the Pars LNG project (South Pars phase 11) of the South Pars gas field, which used to be part of an integrated LNG project by a Total-Petronas partnership until 2009 (OECD/IEA 2010: 236; 249).

Since 2010, U.S. continued to give pressure on international environment about the sanction on Iran. In 2011, it also renewed its opposition to the multi-billion-dollar Iran-Pakistan gas pipeline, warning that Islamabad's continuous pursuit of the plan may invoke U.S. sanctions (Rana 2011). In January 2012 the U.S. imposed sanctions on Iran's central bank and against three oil companies that trade with Iran, including China's Zhuhai Zhenrong Corp. Later China demonstrated the unilateral sanctions on Zhuhai Zhenrong based on U.S. law was "unreasonable" (BBC 2012c). The U.S. state department said the sanctions - preventing the firms from receiving U.S. export licences, US Export Import Bank financing or any loans over $10 million from U.S. financial institutions - were part of efforts to persuade Iran to rein in its nuclear
ambitions (BBC 2012c).

Later that month the European Union has also agreed to follow the U.S. by freezing Iranian central bank assets and imposing an embargo on oil imports, which involved an immediate ban on all new oil contracts with Iran, while existing contracts will be honored until 1 July 2012 (BBC 2012c; Andre-Speed 2012). EU's new sanctions includes a range of extra restrictions on Iran that went well beyond UN sanctions agreed in January 2012. It includes a ban on dealing with Iranian banks and insurance companies and steps to prevent investment in Tehran's lucrative oil and gas sector, including refining (Hafezi 2012). Although no specific sanctions on gas, the sanction will increase the oil price in international market, which effects gas price indirectly. What's worse, the global LNG trade will be largely damaged if Iran blocks the Hormuz Strait. Response to European sanction, Iran is cutting oil export to UK, Spain, France, Italy and other EU countries. Stefano Saglia, an lawmaker from Italy's People of Liberty Party said the decision taken by the EU to adhere to tighter sanctions against Iran was a difficult decision and Italy is the European country that will be largely damaged from this situation as Iran and Italy have always been close business partners (PressTV 2012).

Thus, driven by economic interests, as well as sympathy for Iran's grievances, China is the only major player still active in the Iranian oil patch, whereas firms from most other countries have withdrew due to international pressure and Iran's unfavorable business climate (Downs and Maloney 2011). The continued Chinese investment in Iran's upstream market shows China's interest in securing huge fields that might have gone to Western companies in the absence of sanctions, aiming at a prospect of large position in Iran. For China, it just chases the blank left by Western countries and gains more position in the countries with large energy potential so as to ensure its economic development and supply security in the future. While it is European companies (or countries) themselves that leave Iran under the high diplomatic pressure and unstable business environment, basically there will be no intensive competition between EU
and China in Iran in next few years, as many European companies already left there. However the future after sanction is not clear, and it depends highly on the disparity between China and U.S. on Iran nuclear issue.

But many projects of Chinese NOCs are suspended or warned by Iran due to the tardy movement. The absence of suitable imported technologies is one of key factors delaying some of China's more ambitious oil and gas field projects in Iran (Andrew-Speed 2012). The Iran issue is complicated and if it could really have win-win consequence still leaves China a serious question which makes China more prudent in future actions. To conclude, China is most likely to reduce its oil imports from Iran below the levels in 2011, since it's not possible to retreat Iran completely, while sustaining its trade with Iran, China will seek additional supplies from other countries.

8. The Democratic and Popular Republic of Algeria

Algeria is a member state of OPEC, as well as a significant producer and exporter of natural gas and LNG. Algeria was the eighth largest natural gas producer in the world in 2010 and the third largest gas supplier to Europe (EIA 2012b). Algeria's gross natural gas production in 2010 was 6.8 tcf compared with 6.9 tcf in 2009, of which, 3.2 tcf was reinjected for enhanced oil recovery, 3.5 tcf was marketed, while 0.2 tcf was vented/flared (EIA 2012b).

<table>
<thead>
<tr>
<th>Year (bcm)</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>88.2</td>
<td>84.8</td>
<td>85.8</td>
<td>79.6</td>
<td>80.4</td>
</tr>
<tr>
<td>Consumption</td>
<td>23.7</td>
<td>24.3</td>
<td>25.4</td>
<td>27.2</td>
<td>28.9</td>
</tr>
</tbody>
</table>

Table 15: The production and consumption of natural gas of Algeria from 2006 to 2010.
Source: BP statistical review of world energy 2011

Algeria had 159 trillion cubic feet of proven natural gas reserves, the tenth largest natural gas reserves in the world and the second largest in Africa after Nigeria. From
Table 15, it can be seen that Algeria's consumption of natural gas was increasing from 2006 to 2010, while its production met a decrease in this period. It shows that Algeria is a net exporter as its consumption only takes less than one third of its production in recent years. In 2010, Algeria was the world's seventh largest exporter of LNG, exporting about 7 percent of the world's total LNG exports. According to Algerian Energy Minister's saying in 2009, the capacity of Algerian natural gas will reach 85 bcm in 2013 (Xia and Zheng 2009).

8.1. Gas Sector

Natural gas, which accounts for about 48 percent of Algeria's total hydrocarbons production, is important for Algeria. With the start-up of the LNG plant at Arzew in 1964, Algeria became the world's first producer of LNG (EIA 2012b). It is the first achievement of the new state which made Algeria the founder of the global liquefied natural gas trade (Drury 2010). Sonatrach is a state-owned company which is responsible for majority of oil and gas development and wholesales distribution in Algeria. According to a research of Evaluate Energy, Sonatrach will produce 30 million tonnes LNG per annum in 2020 and become the second largest LNG producer in the world (MCOMPRC 2011c). Thus the development of Algerian gas business, together with the growth of Sonatrach, which was established in 1963, are nationalistic pride in Algeria.

However the development of Algerian gas is not plain. During 1970s and 1990s, Algeria experienced the boost of American gas and insurgency in domestic politics, but fortunately, the energy sector were not affected by the ferment and there was no serious disruption in gas exports. The ex-Minister of Energy used to set a goal of 85 bcm/y\(^{24}\) by 2005 through expansion of investment in new infrastructure (Drury 2010). But because Algeria’s Skikda LNG plant, built in 1972, was partly destroyed by an explosion in 2004, this goal will not be reached until 2013 or 2014 (EIA 2012b; Drury

\(^{24}\) bcm/y= billion cubic metre/ year
In 2005, Algeria amended the Hydrocarbons Law, confirming at least 51% stake of Sonatrach in every joint venture with other international oil companies, aiming at protection of national energy resource (Hou 2006). Besides, it introduced a new tax - the windfall profit tax, which may resulted in reduction of profits and made many oil companies turn into gas. Yet in 2011, Algerian Minister of Energy and Mining said the law would be amended with new conditions profitable for the foreign investment (APS 25 2011).

8.2. Gas Market

In term of LNG export, UK, Belgium, France, Portugal, Spain, Italy, Greece and Turkey are the main destinations, while Spain and Italy are the primary destinations (probably include Portugal and Slovenia) (Figure 13). According to the data from Xia and Zheng's report, during 2000 to 2008, Europe and U.S. took 56% and 35% of the natural gas export of Algeria, indicating Europe and America are always vital Algerian energy export destinations (Xia and Zheng 2009).

The trend of LNG export in recent years could be observed from Table 16. Mainly due to the gloomy demand resulted from global economic crisis, the export of LNG has declined since 2008, while the total export of natural gas only decreased in 2009 and in 2010, the data grew back, which is probably because of the big leap of gas export by pipeline in 2010. But the general trend of export of LNG is stable, fluctuating around 20 bcm, 37% of the total gas export.

<table>
<thead>
<tr>
<th>Year (bcm)</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export by LNG</td>
<td>20.24</td>
<td>21.87</td>
<td>20.90</td>
<td>19.31</td>
</tr>
<tr>
<td>Export by pipeline</td>
<td>34.04</td>
<td>37.05</td>
<td>31.77</td>
<td>36.48</td>
</tr>
<tr>
<td>Total Export of Natural Gas</td>
<td>54.27</td>
<td>59.37</td>
<td>52.67</td>
<td>55.79</td>
</tr>
</tbody>
</table>

25 APS= Algeria Press Service
| LNG share in Total export | 37.3% | 36.8% | 39.7% | 34.6% |

Table 16: The share of Algerian LNG export in total natural gas export

Source: BP statistical review of world energy 2008-2011

Figure 13: The routes of exportation of Algerian gas by pipeline and LNG.

Source: Sonatrach http://www.sonatrach-dz.com/V_English/commercialisation.html

8.3. Important Fields

Algeria's largest natural gas field is Hassi R'Mel with 85 tcf proven reserves, which was discovered in 1956, taking more than half of Algeria's total proven natural gas reserves (EIA 2012b). The remainder of Algeria's natural gas reserves mainly come from other gas fields in the south and southeast regions (Figure 14).

Algerian Southwest Gas Project, which includes the Repsol-led 102 bcf/y\(^{26}\) Reggane

\(^{26}\)billion cubic feet/ year
Nord fields, the 56 bcf/y Timimoun project led by Total, and GDF Suez's 159 bcf/y Touat project, is a complex of gas gathering facilities, linking pipeline to Hassi R'Mel gas hub (EIA 2012b). The Consortium of Sonatrach, Cepsa, and Total will invest $1.5 billion to exploit gas fields in Timimoun, including the exploitation of eight gas fields, sources from the national agency for hydrocarbons resources development (ALNAFT) in February 2012 (APS 2012). Southwest Gas Project will come online in mid-2016, while the Timimoun project is projected to come onstream in 2014, and the Touat project is also expected to be given the green light soon, according to Algeria's state news agency in February 2012 (EIA 2012b).

The Menzel Ledjmet East (MLE) project led by Eni, is projected to start production of 116 bcf/y in mid-2012, along with associated gas liquids and oil (EIA 2012b). In 2009 Sonatrach has signed a $1.8 billion turnkey contract with Saipem27 and SPA to construct the onshore natural gas treatment facilities for Menzel Ledjmet East field and future development of the central area field complex on Block 405b, including pipelines to transport gas, Liquefied Petroleum Gas, and condensate from Ledjmet to Gassi-Touil (Izundu 2009).

Since there is a possible trend of decrease in gas production, the development of gas from the southwest is of great importance for sustaining Algeria's gas output and growing domestic demand.

---

27 Saipem, 43% owned by Eni, is organized in three business units: offshore, onshore and drilling, with a strong bias towards oil & gas related activities in remote areas and deepwater.
8.4. Important Projects

8.4.1. Pipeline Project

Pipeline is an important means of gas transportation for Algeria. In domestic term, Algeria's 4,000-mile domestic pipeline system centers on the Hassi R'Mel natural gas field (EIA 2012b). Since Hassi R'Mel is the largest gas field, it became the hub of distribution and transportation of domestic gas, connecting with the export pipelines to Europe and other LNG terminals as well. In cross-border term, the main pipelines
projects in exportation are summarized in Table 17, from which it could be learnt that southern Europe is crucial in Algerian pipeline exportation.

<table>
<thead>
<tr>
<th>Name</th>
<th>Online year</th>
<th>The stock of project</th>
<th>Export destination</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medgaz undersea pipeline</td>
<td>March, 2011</td>
<td>Sonatrach-36%; Iberdrola-20%; Cepsa-20%; Endesa-12%; Gaz de France-12%</td>
<td>Spain, may connect with France and operate in 2013-2015</td>
<td>403 bcf/y</td>
</tr>
<tr>
<td>Trans-Mediterranean line</td>
<td>Completed in 1983, third line opened in February 2010</td>
<td></td>
<td>via Tunisia and Sicily, to mainland Italy, with an extension running to Slovenia</td>
<td>1059 bcf/y</td>
</tr>
<tr>
<td>Maghreb-Europe Gas pipeline</td>
<td>Completed in 1996</td>
<td>International consortium, led by Spain's Enagas, Morocco's SNPP, Portugal's Transgas and Sonatrach</td>
<td>Spain via Morocco</td>
<td>424 bcf/y</td>
</tr>
<tr>
<td>Galsi natural gas pipeline</td>
<td>2014</td>
<td></td>
<td>Link mainland Italy via Sardinia</td>
<td>282 bcf/y</td>
</tr>
</tbody>
</table>

Table 17: Main pipeline projects in Algeria
Source: EIA (2012b)

8.4.2. LNG Plants

So far, there are two important LNG plants in Algeria. First it's the Arzew plant with three trains. The oldest train was closed down in February 2011, which deprived Algeria around 53 bcf/y of LNG (EIA 2012b). A new LNG plant (GNL3Z) with capacity of 4.7 million tonnes of LNG per annum, is under construction and will be completed by the end of 2012, whose gas supplies will come from the Gassi Touil fields (Saipem 2008). In the initiative phase, the new plant was a joint venture of Sonatrach, Repsol YPF and Gas Natural of Spain, yet in 2007, Algeria canceled the project including Gassi Touil gas fields development after two Spanish companies delayed the start of work due to what they claim was the sharp rise of costs in the
LNG industry (Watkins 2008). In 2008, Algeria found a new partner- Snamprogetti and Chiyoda Corp. with 2.8 billion euro contract in Arzew LNG project (Saipem 2008). In the next year, Air Products, which has been selected by Sonatrach in the development of 14 LNG trains in Algeria, announced that it had signed a contract with Saipem to provide its proprietary process technology and main cryogenic heat exchange technology for Sonatrach's GNL3Z LNG project in Arzew (Hill 2009).

The second one is Skikda LNG plant with six trains. But due to a disastrous explosion in 2004, half of the trains were repaired and the other three were destroyed and thus planned to be replaced by a new train with a 250 bcf/y capacity, which is expected to come online in 2013 (EIA 2012b). In 2007, KBR\(^\text{28}\) was awarded the engineering, procurement and construction contract from Sonatrach Skikda LNG project, which had an approximate value of $2.8 billion (KBR 2007). The other LNG facilities are described in Table 18.

<table>
<thead>
<tr>
<th>Existing</th>
<th>Start-up</th>
<th>Number of trains</th>
<th>Capacity (bcm/y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arzew GL1Z (Beltouia)</td>
<td>1977</td>
<td>6</td>
<td>10.5</td>
</tr>
<tr>
<td>Arzew GL2Z</td>
<td>1981</td>
<td>6</td>
<td>10.5</td>
</tr>
<tr>
<td>Arzew GL4Z (not operational)</td>
<td>1964</td>
<td>3</td>
<td>0.0</td>
</tr>
<tr>
<td>Skikda GL1K phase I &amp; II</td>
<td>1972</td>
<td>3 (6)</td>
<td>5.0 (7.8)</td>
</tr>
<tr>
<td>Under Construction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skikda GL1K</td>
<td>2012</td>
<td>1</td>
<td>4.9</td>
</tr>
<tr>
<td>Arzew GL3Z</td>
<td>2012/13</td>
<td>1</td>
<td>4.9</td>
</tr>
<tr>
<td>Total (by 2013)</td>
<td></td>
<td></td>
<td>35.8 bcm</td>
</tr>
</tbody>
</table>

Table 18: Algerian liquefaction facilities

Source: Mott MacDonald (2010)

### 8.5. The Relationship between China and Algeria

#### 8.5.1. The Official Visits between China and Algeria

In September 1958, China established diplomatic relation with Algeria and especially

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\(^{28}\) KBR is an American company who defines itself as a technology-driven engineering, procurement and construction (EPC) company with a wide range of services of downstream; gas monetization; infrastructure and minerals; Oil and Gas; services and technology, etc.
after 1962, Algeria made great contribution to the restoration of China's legitimate seat at UN (EPRCA\textsuperscript{29} 2004). In April 1997, the Ministry of Foreign Affairs of the two countries decided to establish a regular consultation mechanism which has so far been held seven times (MFAPRC 2011). Here, the recent high-level visits and communications are summarized in Table 19.

Table 19: The high-level visits between China and Algeria from 2004-2011 (see in Appendix)

It is until the Chinese President Hu visit Algeria in 2004 that China and Algeria established strategic relationship and in 2006, both sides announced statement on the development of bilateral strategic and cooperative relations. This statement provided a guide for the development and cooperation of two states. In terms of energy and mining resources, both parties agreed:

(a) to encourage the relevant departments of the two countries to sign and implement energy cooperation agreement, to support enterprises from both countries to cooperate in the fields of oil and gas exploration and development, transportation, storage facilities, oil refining and chemical; (b) to strengthen cooperation in exploration, development and utilization of mineral resources, so as to achieve the effective development of the mineral resources of the two countries through mutual investments and technical cooperations; (c) to use nuclear energy peacefully according to protocol signed in 1983, and to strengthen cooperation in the fields of nuclear power and human resources (Xinhua 2006).

In 2012, the two sides signed the Agreement on Economic and Technical Cooperation between China and Algeria (MFAPRC 2012b).

\textsuperscript{29} EPRCA= Embassy of People's Republic of China in Algeria
8.5.2. The Chinese NOCs in Algeria

8.5.2.1. CNOOC

Until 2009, did CNOOC started to entering Algerian energy market (Yu C.L. 2009). In that year, a CNOOC-led consortium won the license of exploration in Hassi Bir Rekaiz, southeast Algeria (Xu 2009). This joint venture was with Thai company-PTT Exploration and Production Public Company Limited (PTTEP) and Sonatrach. On $9^{th}$ March 2012, PTTEP announced that they discovered new oil and gas, and the production of crude oil could be 1000 barrels per day while natural gas could have 0.3 million cubic feet per day output (Jittapong 2012). The consortium plans to drill more wells in the future for further exploration.

8.5.2.2. Sinopec

Different from the late come of CNOOC, Sinopec and CNPC already entered in Algerian market in 2001 and 2000 respectively (Yu C.L. 2009). Zarzaitine oilfield is the first project Sinopec gained in Algeria. This oilfield located in the east of Sahara, near the boundary of Libya, was on stream in 1957, however the production was decreasing after many year's exploitation. In 2001, Sinopec beat Repsol-YPF of Spain, and won contract with Sonatrach, aiming at improving the cumulative production of Zarzaitine to 162 million barrels within 20 years, together with 525-million-dollar investment (Wang 2007). Sinopec is responsible for 75 percent of the investment of this project (Sinopec 2012). In the first five years, Sinopec roughly invested 168 million dollars and improved the production rate from 40% to 50% (Wang 2007). In 2005, Sinopec gain 0.5 billion yuan from 1.04 million barrels of oil because its production exceeded the contracted target (Yahoo 2006). This project became the center of Sinopec's overseas projects, considering it as breakthrough for Sinopec's overseas strategy.
Sinopec also holds licenses for blocks 418,419,438 in the Amguid Massaoud Basin and blocks 416a and 417 in Oued Mya Basin (Eurasia Group 2006: 12), which were won in Algeria's fifth licensing round in 2004. Sinopec will conduct 2D seismic surveys and drill exploratory wells over the next 5 years (Wu 2005).

In October 2009, Sonatrach announced that Sinopec was among a group of four international companies on a shortlist for consideration to design and engineer a new oil refinery in Tairret, in western Algeria, a project estimated to cost $6 billion, while Sinopec was also represented along with other companies bidding for engineering, procurement, and construction of the Algiers refinery, a project estimated to cost $300 million (Henni 2009).

8.5.2.2. CNPC

CNPC has the largest assets and most projects in Algeria, including complex, exploration and refinery.

8.5.2.2.1. Adrar Upstream and Downstream Complex

On 14th July 2003, CNPC signed contract with Sonatrach concerning the exploration of Adrar, construction of refinery, purchase and management, which was the first time that Algeria cooperated with foreign companies in integrated upstream-downstream project (Wang 2007). This is the second oil project gained by Chinese NOCs, following the Zarzaitine project. The total investment is 0.37 billion dollar, 186.4 million dollars of which is in upstream, 186.6 million dollars of which is in downstream, while in term of distribution of profit, China and Algeria have 49 percent and 51 percent stock respectively (Wang 2007). According to this 20-year-contract, CNPC is responsible for 75% of the total investment and should guarantee within the date the cumulative production is at least 162 million barrels (Ba 2005).

In the upstream, the partners develop Sba oilfield together for 23 years, with expected
production of 0.6 million tonnes per annum; in refinery construction, it has 36-month construction time to build mechanism, such as machine of catalytic cracking platforming, with expected production of propane, butane, gasoline and other hydrocarbon products, and according to CNPC news, the refinery successfully passed the inspection by the Algeria in 2007; in purchase term, Naftal established a new sales company - Naftachin - with Soralchin- a joint company of China and Algeria, of which 49 percent stake was in hand of Naftal, 51 percent was in hand of Soralchin, and this company is mainly responsible for the sales of oil and gas products to southern Algeria provinces, eg, Bechar, Tindouf (Wang 2007; CNPC 2007a).

8.5.2.2.2. Exploration

In late 2003, CNPC was awarded two upstream blocks, Block 102a/112 in Chellif and Block 350 in Oued Mya Basin, which is the first oil and gas prospecting contract that Chinese company obtained in Algeria (HB\textsuperscript{30} 2003). CNPC will conduct 3D seismic surveys, and drill exploratory and appraisal wells over 5 years in two phases, with a total cost of $27 million (Wu 2005). Based on these contracts, CNPC would invests around $31 million in oil and gas prospecting project in two blocs in Chelliff Basin and Oue Mya Basin, holding 75% stake and CNPC could gain return profits if it succeeds in exploration (Wang 2007). In the same year, CNPC again won the license in Adra/Sbba Basin.

In July 2004, CNPC won block 438-b in El M'zaid perimeter, the Oued Mya basin, and it signed production sharing agreement, holding 100% profits (Wang 2007). In 2007, Heba-1 well was discovered with 7 million cubic meters light oil and 220 thousand cubic meters natural gas flow (CNPC 2007b)

8.5.2.2.3. Refinery and Others

In 2004, China Petroleum Engineering CO.,Ltd, a subsidiary of CNPC, won the bidding of overall design and service project of Octouat oilfield, which means CNPC

\textsuperscript{30} HB= Highbeam Business
would have $3-million-contract in exploration, design, support service of project management contractor, etc (Wang 2007).

In 2005, China Petroleum Engineering & Construction Corporation and Sonatrach officially signed a 28-billion-dinar contract for the construction of the Skikda Gas Condensate Refinery (CNPC 2012b). This project is composed of two contracts - one is the construction of a 5 million tonnes per annum condensate refinery, and the other is the storage installations of naphtha, LPG and of forwarding installations of naphtha, and fuel oil of the Skikda Refinery which went on stream in July 2009 (CNPC 2012b).

**8.5.3. What is the Character of Bilateral Relations?**

From the key words in bilateral visits (Table 19), some main focus for both countries could be summarized. First, as a traditional Chinese friend, Algeria consistently adhere to one-China policy in Taiwan issue; secondly, China and Algeria agree to cooperate within the framework of Sino-Africa Forum and both of the countries would like to become the model in international cooperation between developing countries; thirdly, both actors also agree to enhance the bilateral visits, communication and exchange in political, economic and social fields; fourthly, the focus of cooperation is diversified, not only concentrate on energy, trade, infrastructure, but also in education, medicine, legislative system.

It is certain that China fist needs international support in Taiwan issue, especially Algeria is traditional friend of China. In cooperation, it suits both interests, but it is a little bit surprised that energy resource is not central as normal expectation. Although the cooperations in oil and gas fields of course are encouraged by both governments, the concrete actions are vague. Cooperation in other fields is important in bilateral relations as well, such as infrastructure, trade. Except Chairman Wu of NPC Standing
Committee meeting with Algerian Premier in 2008, it could be said there is rare meeting only focus on economic cooperation. During this meeting, China clearly showed its willingness to work together with Algeria, standing in a long-term and strategic perspective, and to strengthen mutually beneficial cooperation, focusing on infrastructure construction, development and utilization of energy resource, trade and economic cooperation zones which could further encourage and support the large enterprises of the two countries to collaborate in large projects, and effectively improve quality and level of bilateral trade and economic cooperation. In Algeria term, it also showed its interest in learning experience from Chinese companies in processing sector, infrastructure and energy exploration, so that to change the economic frame in order to fit the demand of sustainable development, thus Algeria would provide more support when Chinese companies invest in Algeria (MFAPRC 2008). But in practice, there isn't to much privilege for Chinese companies. There are contracts in infrastructure construction or service support, but Chinese NOCs rarely gain direct control of energy in Algeria, probably because Algeria is still in charge of most stake of its oil and gas fields.

In two-way trade, Algeria becomes one of the most important overseas project contracting markets of China in Africa, but Algeria doesn't have many projects in China according to information from the web of Chinese embassy in Algeria.

Turn to Chinese NOCs' actions in Algeria and the neo-mercantilism strategy. In Algeria case, it's almost the same as that in Qatar. The form of cooperation is somewhat various, from refinery, complex construction to exploration. Among Chinese NOCs, CNOOC entered Algerian market quite late and even though Sinopec and CNPC enter it early, the acquisition is not satisfied. Only few blocks of oilfield are in the hand of Chinese NOCs, and generally it is consortium that holds the exploration, as based on the Algerian hydrocarbon law, Sonatrach must have at least 51% stake, otherwise the foreign companies cannot involve in Algeria. The amendment in 2011 may send good signal to foreign companies, but it still needs
more time for Algeria to open its market completely. In some projects, only after a certain production, can Chinese NOCs gain profits, which means these projects are primary for exploring new source for Algeria. Thus, even if CNPC has more assets in Algeria than other Chinese NOCs, the gas production it has is still very limited.

Mutual trust is also another important issues when the leaders of China and Algeria meet and discuss. Although there is no further explanation about the meaning of this mutual trust, but during the high-level meeting, it's often brought up, and more often means political trust. Like what is analysed in Qatar part, it's somewhat similar that, as a communist country, when acting in international stage, one of important issues is to eliminate the disparity no matter in politics, economy or social culture. If China wants to have more direct controls in oil and gas fields, it has to set up close or strategic relations with producing countries. It's the same in Algeria. Even though China and Algeria has long-history friendship, the situation in Algeria is not guaranteed all the time. It's necessary to deepen mutual trust, so as to make sure that China has consensus with Algeria in energy security.

8.6. The Share of EU in Exported LNG of Algeria

Table 20 indicates that the European dependency of natural gas on Russia, Algeria Nigeria reduces, while the that on Norway and others rises. It's probably because of the increase of gas production of Norway and the demand of diversification in energy security as consuming actor.

<table>
<thead>
<tr>
<th>Country</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>18%</td>
<td>17%</td>
<td>15.4%</td>
<td>14%</td>
</tr>
<tr>
<td>Russia</td>
<td>42%</td>
<td>41%</td>
<td>39.3%</td>
<td>34%</td>
</tr>
<tr>
<td>Norway</td>
<td>24%</td>
<td>27%</td>
<td>30.1%</td>
<td>31%</td>
</tr>
<tr>
<td>Nigeria</td>
<td>5%</td>
<td>5%</td>
<td>4.2%</td>
<td>2%</td>
</tr>
<tr>
<td>Others</td>
<td>11%</td>
<td>10%</td>
<td>11%</td>
<td>19%</td>
</tr>
</tbody>
</table>

Table 20: The source of EU’s imported natural gas 2006-2009

Source: Europe's energy position- Annual reports 2008-2010; http://ec.europa.eu/energy/observatory/annual_reports/annual_reports_en.htm
Table 21 shows that because of the large increase of imported LNG from Qatar and slight increase of that from Nigeria, the share of other producer was squeezed in different degree. Compared with Trinidad and Tobago, Egypt and Norway, the decreased amount of Algerian exported LNG is not large and Algeria continued as a stable LNG supplier to EU. Table 22 illustrates that majority of Algerian LNG goes to EU. In European market, Belgium almost doesn't import LNG from Algeria, while France imports the largest amount of LNG from Algeria, even if this amount reduced in recent year. Italy and Turkey gain certain amount of LNG from Algeria but these amount still decreased.

According to Table 21 and Table 22, in the source of European LNG import, Algerian share decreased from 17.9% to 16.6%, while EU took more and more share in exported LNG of Algeria, from 83.3% to 99.2%, almost all the LNG of Algeria was exported to EU. This shows a very interesting trend that, the European dependency on Algeria decreased in recent years, while Algerian dependency on EU market increased.

<table>
<thead>
<tr>
<th>Country</th>
<th>2009</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qatar</td>
<td>35.1%</td>
<td>47.5%</td>
</tr>
<tr>
<td>Algeria</td>
<td>17.9%</td>
<td>16.6%</td>
</tr>
<tr>
<td>Nigeria</td>
<td>14%</td>
<td>18.4%</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>13%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Egypt</td>
<td>10.9%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Norway</td>
<td>4.2%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Oman</td>
<td>2.8%</td>
<td></td>
</tr>
<tr>
<td>Libya</td>
<td>1.8%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.2%</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

Table 21: The European LNG import sources in 2009 and 2011

Source: Europe's energy position- Annual reports 2010;
http://ec.europa.eu/energy/observatory/annual_reports/annual_reports_en.htm
Rocío Prieto. Accessing European LNG terminals

<table>
<thead>
<tr>
<th>Country (bcm)</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>0.35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>7.85</td>
<td>7.6</td>
<td>7.68</td>
<td>6.27</td>
</tr>
<tr>
<td>Greece</td>
<td>0.5</td>
<td>0.7</td>
<td>0.53</td>
<td>0.98</td>
</tr>
<tr>
<td>Italy</td>
<td>2.43</td>
<td>1.56</td>
<td>1.27</td>
<td>1.77</td>
</tr>
<tr>
<td>Spain</td>
<td>4.32</td>
<td>4.9</td>
<td>5.19</td>
<td>5.01</td>
</tr>
<tr>
<td>Turkey</td>
<td>4.45</td>
<td>4.25</td>
<td>4.20</td>
<td>3.87</td>
</tr>
<tr>
<td>UK</td>
<td>0.64</td>
<td>0.37</td>
<td>1.68</td>
<td>1.25</td>
</tr>
<tr>
<td>EU share</td>
<td>20.54 (83.3%)</td>
<td>19.38 (88.6%)</td>
<td>20.55 (98.3%)</td>
<td>19.15 (99.2%)</td>
</tr>
<tr>
<td>China</td>
<td>0.42 (1.7%)</td>
<td>0.17 (0.8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total LNG export</td>
<td>24.67</td>
<td>21.87</td>
<td>20.90</td>
<td>19.31</td>
</tr>
</tbody>
</table>

Table 22: The destinations of Algeria exported LNG 2007-2010

Source: BP statistical review of world energy 2008-2011

The reason of these phenomenons could be inferred from Figure 15. In this figure, the share of Algeria decreased although its amount didn't decrease so much, while the amount and share of Qatar and Egypt largely grew. Compared the composition of imported LNG of EU in 2001 and 2009, the successful diversification was visible. The EU gradually imports more LNG from Qatar, Egypt, Trinidad and Tobago, few amount from Norway, Yemen and Asian-Pacific countries.
When looking into Figure 10 and Figure 11, the changes of the imported LNG from Algeria in different European countries could be seen. For Italy, it largely shrank Algerian market (66% to 39.5%) in order to diversify the source (Trinidad & Tobago, Egypt and Norway) and expanded LNG from Qatar (34% to 51.1%). Qatar took more share in UK's import of LNG in 2009-2010, from 55% to 76%, and the share of Norway increased somewhat as well, while the shares of Algeria, Egypt and Trinidad and Tobago reduce in 2010. Belgium is not traditional market for Algeria, so does Portugal, according to the recent trend. But Portugal may be Algerian target market of natural gas via pipeline. The change of Spain's proportion of import source was not so obvious between 2009 and 2010. Nevertheless some new producers emerged, such as Yemen, Peru and USA, taking 3.3% of Spain's total imported LNG in 2010. France's proportion is more diversified than Greece, yet Algeria is important and takes big share in both countries. To sum up, Algeria is still an crucial exporter for Europe, notably in southern Europe, but its importance is reducing, possibly because of the challenge from Qatar, Norway and other emerging producers.
8.7. The Possible Effect on EU

As Figure 16 shows, before 2014, Algeria takes the largest proportion while in the near future, Nigeria, Qatar and Egypt are stable LNG supplier for EU, taking the major responsibility among other producing countries between 2014 to 2021. Generally, the import source of LNG of EU is various and most of the supply is based on long-term contract. According to Mott MacDonald forecasts (Figure 17), it could be seen that Algeria and Iraq will increase its export to EU while Egypt will decrease after 2025. But probably the biggest supplier are from other countries, accounting for about five sixths of demand of EU in the future.

Figure 16: Long-term and Medium-term LNG contract in force in 2008.
Source: Mott MacDonald (2010)
Compared with China, in 2006, China only import 0.42 bcm LNG (about 1.7% of total LNG export of Algeria) from Algeria and in 2007, the amount even fell into 0.17 (about 0.8% of total LNG export of Algeria) (Table 22). In 2007 and 2008, it's reported that China paid high cost- $427 a ton for an individual LNG cargo from Algeria and $52.2 million for 64,679 tons respectively (Bloomberg 2007; Bloomberg 2008). So far, there is no long-term contact between China and Algeria, only spot trade every now and then.

In the contrast, almost all of Algeria’s gas export goes to Europe, not China. China’s import of Algerian gas, especially LNG, remains marginal compared to its gas imports from Asian Pacific. At the same time, China’s role in exploration and future development in Algerian gasfields is small, especially compared to the role of other energy giants such as Statoil, Shell, British Petroleum, or Total SA. Thus, even thought China wants to involve more in Algeria market. Due to the international competitors and local investment environment, China only plays a small role in Algeria. The LNG trade between China and Algeria is often individual cargo or spot trade, not like the long-term contract China signed with Qatar. Even the China gained
project in Algeria, it was interrupted by some reasons. The Adrar refinery was closed for almost two months because of strikes by employees and in 2012, based on request of CNPC, Sonatrach has reviewed the contract related to Adrar refinery, due to the shortage of refined products in the south part of the country, added to the maintenance work at other refineries (Hanni 2012)

Historically, Algeria is a traditional supplier to EU. Nowadays, in energy markets with intensive competition, China intends to seize chance to enter Algerian energy market for ensuring its energy security of supply. Algeria is not only also keen on expanding its energy production and export capacity as well as increasing its proven reserves, but also facing the decrease of EU's dependency, it appears that Algeria would also need to diversified its export destinations and in return China may succeed its dream in Algeria. However the road is not flat and China still needs to work hard and improves its NOCs' capabilities. In the years to come, China's position won't change so much, but if China continues its cooperation with Algeria and Algeria gradually opens its market in the future, it is possible that China will collaborate with Algeria in different aspects, no matter in political term or economic term, which satisfies both actors' interests.

9. Conclusion and Suggestion

Compared with the previous discussion about Chinese international energy strategy and its possible impact on EU, there are some points could be concluded here.

From the case studies, the political color of China's NOCs is not strong enough to be identical with China's diplomatic relations with producing countries. In all cases, China dedicates to boost its bilateral relations with producing states, however these relations are not only focus on energy fields, but also in infrastructure, trade, education, culture, etc. So it's inappropriate to assume that the energy cooperation is the only centre of bilateral communications between China and producing countries.
However it is not saying that Chinese diplomatic events didn't help China's NOCs at all. There is still an interesting and important thing. During the diplomatic contacts with producing states, China worked hard on mutual trust or political trust, as it has bad reputation as "new colonialist", accused of environmental destruction, has conflicts with dominant Western idea concerning energy security, etc. At least this effort will help China's NOCs walk in a smoother way abroad and reinforce the new dimension of Chinese energy security.

Secondly, it is obvious that China's NOCs try best to involve in Middle East and Africa. But the preference not only lies in states left by Western countries. In order to diversification its import source, China draws its energy picture from global perspective. Thus no matter the state is rich or poor states, is with high competitiveness or low competitiveness, China would like to do business with all producing countries, putting main focus on Middle East and Africa, who hold the largest energy reservers in the world. From Western opinion, Iran as target of China is reasonable, however Chinese NOCs in Algeria and Qatar are neglected. These two states are the traditional suppliers for Europe. Even if under this disadvantages, China still enters in these regions, although generally, the results are not optimistic. No matter in Qatar or Algeria, China's investment and assets in LNG are not big as its international or western counterparts and the LNG exported to China based on long-term contract or individual cargo is also less than that to Western states. This is mainly because the energy fields are still state-owned and competitiveness is intensive in these regions. Even in Iran, before the sanctions, international oil giants still took majority of foreign investment (Table 14). If it is not because of the poor relations between U.S. and Iran, Western countries will not open a door for China in Iranian market.

Thirdly, in Kreft's view, based on neo-mercantilist approach, Chinese companies aim at acquiring direct control over foreign oil and gas fields and competition for energy worsens the rivalries between China and other countries (Kreft 2006). However the
reality in case study is quite different. Even if Chinese government intends to ensure its energy security through direct control of energy, the practice doesn't reach its expectation. From the projects gained by China abroad and its overseas investments, it's clear that China's overseas assets are limited and its projects meet barriers when moving on, due to jural, economic and political reasons. What's more, the overseas story of Chinese NOCs is not sanguine. The recent income of three Chinese giants is disappointed. In the first three quarters of 2011, the deficit in refinery of CNPC and Sinopec was 64.5 billion yuan (ChinaValue 2012). Because it lacks of experience when doing international business, China's NOCs often find out many overseas projects have deficits and the projects, such as CNOOC in North Pars field and CNPC in 11th phase of South Pars project, are suspended due to the financial problem.

Fourthly, the Chinese NOCs activities abroad are various, covering from upstream to downstream. In all these three cases, China holds rights or assets in both upstream and downstream, however with this endeavour, the assets in energy sectors are not large as China's projects in other fields, such as infrastructure or service field. This could be seen from the discussion in Qatar as example. As China also puts many investments in Asian countries, thus the relations and cooperations between China and Middle East or Africa sometimes are overemphasized.

Whether or not, it could not be denied that the expansion of China’s presence as an importer will be one of the key factors in the international market of natural gas. China’s demand-supply balance, its pricing policy and security strategy may directly affect the Asia-Pacific LNG market, and the European gas market indirectly. However, generally speaking, China doesn't take EU's share of LNG in Middle East and Africa and the share of China in export of LNG of producing countries is smaller then that of EU. This is illustrated in the figures in three cases. The fluctuation of EU's share may result from various reasons, not only because of China. Compared with experienced EU, China is still a freshman in international energy market with many disadvantages. Even if in recent years, with the growing status and energy demand of China and
other Asian countries, Asia became new target for producers, EU is still a traditional targets for producing countries with high demand, because it is obvious that states of Middle East and Africa won't totally turn back on EU just because of Asia (or China).

For EU, it also needs to diversify its import source, thus in the near future, EU would probably increase sources from different countries in Middle East and Africa (Figure 15 and Figure 17) in terms of LNG if EU cannot largely get rid of high dependency on these regions. China's involvement in these regions would possibly worry EU's concern, but so far, the situation is not bad. When China boosting its relations with states in Middle East and Africa, EU also tried hard in building partnerships with energy suppliers, such as OPEC members and Northern African countries (EC 2011a). So, China did not harm the availability, affordability of European energy security.

According to the research of this study, it is found that China is on the way of diversification so as to ensure its supply security. As an importer, EU basically has common interest with China - sustainability and diversification. Thus it would be possible for EU and China to cooperate for the expansion of energy supply in the future. However since EU and China adopt different approaches towards energy security, probably only based on a more comprehensive concept and integrated strategy, could the EU-China dialogue achieve effects (Umbach 2009). Thus for both EU and China, it's feasible to establish structured and continued dialogue on Middle East and Africa through different channels.

Further more, the experiences of the EU in comprehensive strategy and energy technology would be helpful for closer EU-China energy cooperation. EU can functions in leading China, turning China's energy policy into multilateral ones and encouraging market reforms. At the same time, the regional cooperations or projects, for example APEC, EU-China Summit, are also useful in promoting multilateral relations between consuming and producing countries, offering advantage for the member outside the region as well. Yet as Umbach said, whether EU and China
follow a "market strategy" or "strategic approach" may ultimately decide whether they are able to cooperate for regional and global energy security or whether they will increasingly compete (Umbach 2009).

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### Appendix

**Table 5: The recent high-level dialogue between China and Qatar from 2006-2012**

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The leader of China</strong></td>
<td>(1) Minister of Foreign Affairs</td>
<td>(1) Vice President</td>
<td>(2) Chinese Defense Minister</td>
<td>(3) Premier</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2) Chinese Defense Minister</td>
<td>(1) Vice Foreign Minister</td>
<td>(1) Premier</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3) Premier</td>
<td>(2) Chief of the General Staff of the People's Liberation Army (PLA) of China</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4) President Hu</td>
<td>(2) Vice Premier</td>
<td>(3) Qatari Culture Minister</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5) President Hu Special Representative- Vice Foreign Minister</td>
<td>(3) Vice Minister of Foreign Affairs</td>
<td>(4) China's National Energy Bureau</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(5) Defense Minister</td>
<td></td>
</tr>
<tr>
<td><strong>The leader of Qatar</strong></td>
<td>(1) Qatar's crown prince and Prime Minister</td>
<td>(1) Qatari head of state (Emir) and Crown prince</td>
<td>(1) Qatari Crown Prince</td>
<td>(1) Prime Minister and Minister of Foreign Affairs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2) Qatar's Emir, Qatar's crown prince and deputy commander in chief of the armed forces</td>
<td>(2) Deputy Qatari Prime Minister and Minister of Energy and Industry</td>
<td>(2)(5) Chief of the General Staff of Qatar's armed forces</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3)(4) Prime Minister and Minister of Foreign Affairs</td>
<td>(3) Vice Emir of Qatar and Crown Prince</td>
<td>(3) Chinese Vice Culture Minister</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(3) Chinese Vice Culture Minister</td>
<td>(4) Qatari Ministry of Energy and Industry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5) Qatar's cabinet members- Minister of State for Foreign Affairs</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Key words</strong></td>
<td>(1) Fruitful</td>
<td>(1) Elevate relationship in</td>
<td>(1) Boost bilateral</td>
<td>(1) Strengthen cooperation in</td>
</tr>
<tr>
<td>content of the meeting</td>
<td>business relation and appreciate Qatar's one-China policy</td>
<td>economic cooperation (investment and infrastructure); Persian Gulf issue and cooperation in education and between GCC and China; set up China-Qatar investment promotion council; sign energy memorandum</td>
<td>relation in economy, energy, culture and education to a new high</td>
<td>energy and financial sectors/mutual trust/mutual investment/oil &amp; gas; signed memorandum of understanding in the field of energy and finance</td>
</tr>
<tr>
<td>-----------------------</td>
<td>----------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>(2)</td>
<td>Strengthen political trust and military relations; adherence to the one-China policy</td>
<td>(2) Further closer energy cooperation on natural gas, oil and energy transportation to achieve win-win results.</td>
<td>(2) Deepen friendly relations and expand military, multi-level, extensive cooperation</td>
<td>(2) Bilateral cultural cooperation to a new height</td>
</tr>
<tr>
<td>(3)</td>
<td>Breakthrough in energy cooperation, bilateral friendly relationship; one-China policy; promote mutual trust, joint efforts in energy, aviation and investment</td>
<td>(3) Promote cooperation and exchange in economy, energy, education, personnel in a new level, strengthen anti-corruption</td>
<td>(3) Bilateral cultural cooperation to a new height</td>
<td>(4) The memorandum of understanding on energy and financing.</td>
</tr>
<tr>
<td>(4)</td>
<td>Further cooperation in trade, energy, contract and projects, expand trade scale, enhance dialogue in regional and international issues</td>
<td>(4) Further cooperation in trade, energy, contract and projects, expand trade scale, enhance dialogue in regional and international issues</td>
<td>(4) Bilateral cultural cooperation to a new height</td>
<td>(5) One-china policy; further boost military cooperation; further exchanges and cooperation of the two nations and armed forces</td>
</tr>
<tr>
<td>(5)</td>
<td>Bilateral relation and financial crisis</td>
<td>(5) Bilateral relation and financial crisis</td>
<td>(5) One-china policy; further boost military cooperation; further exchanges and cooperation of the two nations and armed forces</td>
<td>(5) Bilateral relation and financial crisis</td>
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China, Qatar ink document on energy, financial cooperation (2010)
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Supplement from Other media


Table 11: High Level PRC-IRI Interactions, 2003-2011 (vice minister and above)

<table>
<thead>
<tr>
<th>Year</th>
<th>PRC to IRI</th>
<th>IRI to PRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>deputy head of legislature</td>
<td>foreign minister; twice, Aug. &amp; Nov.</td>
</tr>
<tr>
<td></td>
<td>vice minister of commerce</td>
<td>Transportation minister</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commander Internal Security Forces</td>
</tr>
<tr>
<td>2004</td>
<td>Foreign minister</td>
<td>vice president accompanied by oil minister</td>
</tr>
<tr>
<td></td>
<td>Director CCP International Liaison Dept.</td>
<td>vice foreign minister for Asia &amp; Pacific</td>
</tr>
<tr>
<td></td>
<td>Deputy director COSTIND</td>
<td>vice minister of economics</td>
</tr>
<tr>
<td></td>
<td>vice minister agriculture</td>
<td>vice minister for legal and international affairs</td>
</tr>
<tr>
<td></td>
<td>vice minister of commerce</td>
<td>vice minister for policy research</td>
</tr>
<tr>
<td></td>
<td>vice foreign minister</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>Presidents meet &amp; talk at SCO summit</td>
<td>Presidents meet &amp; talk at SCO summit</td>
</tr>
<tr>
<td></td>
<td>Premier meets w/ IRI 1st vice President at SCO</td>
<td>1st vice President meets w/ Premier at SCO</td>
</tr>
<tr>
<td></td>
<td>Foreign minister</td>
<td>minister of labor and social affairs</td>
</tr>
<tr>
<td></td>
<td>Commander Nanjing Military Region</td>
<td>minister of Information Technology</td>
</tr>
<tr>
<td></td>
<td>Director CCP International Liaison Dept.</td>
<td>minister of international cooperation</td>
</tr>
<tr>
<td></td>
<td>vice minister labor and social security</td>
<td>vice foreign minister for economics</td>
</tr>
<tr>
<td></td>
<td>deputy director environmental protection agency</td>
<td>vice foreign minister for international affairs</td>
</tr>
<tr>
<td>2006</td>
<td>Presidents meet / talk at SCO summit</td>
<td>Presidents meet / talk at SCO summit</td>
</tr>
<tr>
<td></td>
<td>Premier meets 1st vice president at SCO meet</td>
<td>1st vice president meets Premier at SCO meet</td>
</tr>
<tr>
<td></td>
<td>deputy head legislature</td>
<td>Secretary Supreme National Security Comm.</td>
</tr>
<tr>
<td></td>
<td>vice foreign minister</td>
<td>vice foreign minister for Asia and Pacific</td>
</tr>
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<td></td>
<td>Foreign ministers exchange many phone calls</td>
<td>vice foreign minister for legal and international</td>
</tr>
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<td></td>
<td></td>
<td>vice foreign minister for education &amp; research</td>
</tr>
<tr>
<td>Year</td>
<td>Event</td>
<td>Details</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>2007</td>
<td>Presidents meet / talk at SCO summit</td>
<td>Presidents meet / talk at SCO summit</td>
</tr>
<tr>
<td></td>
<td>Premier meets 1st vice president at SCO meet</td>
<td>1st vice president meets Premier at SCO meet</td>
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<tr>
<td></td>
<td>Foreign minister</td>
<td>Special Presidential Envoy and Nat Sec. advisor</td>
</tr>
<tr>
<td></td>
<td>deputy head legislature foreign affairs committee</td>
<td>vice foreign minister for international affairs</td>
</tr>
<tr>
<td></td>
<td>vice minister of commerce</td>
<td>vice foreign minister for Asia &amp; Pacific</td>
</tr>
<tr>
<td></td>
<td>vice director CCP International Liaison Dept.</td>
<td>Minister of Interior and special government rep.</td>
</tr>
<tr>
<td></td>
<td>Foreign minister phones PRC foreign minister</td>
<td>minister of public health</td>
</tr>
<tr>
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<td>minister of information technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>vice minister of energy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>deputy head legislature education committee</td>
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<td></td>
<td>2008</td>
<td>Premier meets w/ Premier at SOC summit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>President to PRC; talks w/ Hu Jintao</td>
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<td></td>
<td></td>
<td>Head CCP Propaganda Dept.</td>
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<td></td>
<td></td>
<td>Vice-president to PRC for Olympics ceremony</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vice head Consultative Assembly</td>
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<td></td>
<td></td>
<td>Presidential Envoy and National Security Advisor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 vice foreign ministers visit separately</td>
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<tr>
<td></td>
<td></td>
<td>Commerce minister</td>
</tr>
<tr>
<td></td>
<td></td>
<td>vice minister of Justice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 vice foreign ministers visit separately</td>
</tr>
<tr>
<td></td>
<td></td>
<td>vice minister of Culture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chair, Organization of Islamic and Cultural Affairs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Foreign ministers talk frequently via telephone</td>
</tr>
<tr>
<td>2009</td>
<td>Presidents meet at SCO summit in Russia</td>
<td>First vice President to China; talks w/ Wen Jiabao</td>
</tr>
<tr>
<td></td>
<td>PRC Special ME envoy represents MFA</td>
<td>First vice President to China; talks w/ Wen Jiabao</td>
</tr>
<tr>
<td></td>
<td>Assistant Foreign Minister for 8th political talks</td>
<td>8th meeting of SCO Heads of Government</td>
</tr>
<tr>
<td>2010</td>
<td>Li, the member of the Standing Committee of the Political Bureau of the Central Committee; talk w/ president and parliament speaker</td>
<td>President to China, attend Shanghai Expo.</td>
</tr>
<tr>
<td></td>
<td>Foreign Minister met w/ FM at UN GA session</td>
<td>Vice Foreign Minister</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Petroleum Minister</td>
</tr>
<tr>
<td>2011</td>
<td>vice chairman of the NPC Standing Committee</td>
<td>Deputy Secretary of Iran's Supreme National Security Council</td>
</tr>
<tr>
<td></td>
<td>President met w/ at SCO summit in Astana</td>
<td>President met w/ at SCO summit in Astana</td>
</tr>
<tr>
<td></td>
<td>He, the member of the Standing Committee of the Political Bureau of the Central Committee</td>
<td>Iranian Foreign Minister; talk w/ vice president and Foreign Minister</td>
</tr>
<tr>
<td></td>
<td>vice Foreign Minister met w/ vice FM</td>
<td>Minister of Economic Affairs and Finance</td>
</tr>
</tbody>
</table>

Table 19: The high-level visits between China and Algeria from 2004-2011

<table>
<thead>
<tr>
<th>Year</th>
<th>2004</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>(1)(2) President</td>
<td>(1) Foreign Minister</td>
<td>(1) (2) (3) Vice Premier</td>
<td>(1) (2a) Member(Li) of Politburo Standing Committee;</td>
</tr>
<tr>
<td></td>
<td>(2) Chairman of NPC Standing Committee</td>
<td></td>
<td></td>
<td>(2b) (3) Chairman of NPC Standing Committee</td>
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<tr>
<td></td>
<td>(3) President</td>
<td></td>
<td></td>
<td>(4) Vice Minister of Commerce</td>
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<tr>
<td></td>
<td>(4) Vice Premier</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algeria</td>
<td>(1) President</td>
<td>(1) Foreign Minister</td>
<td>(1) Minister of Algerian agriculture</td>
<td>(1) (2) Prime Minister and Speaker of National Assembly</td>
</tr>
<tr>
<td></td>
<td>(2) other Algerian leaders</td>
<td>(2) (3) (4) President</td>
<td>(2) Premier</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>(3) President</td>
<td></td>
<td>(3) (4) President</td>
</tr>
<tr>
<td>Key words</td>
<td>(1) (a) keep strategic relationship and enhance the visits of both leaders; (b) strengthen economic cooperation, not only in traditional fields, but also in development of oil &amp; gas; infrastructure; HR; agriculture; (c) further cooperation in culture, medicine, technology and education; (d) negotiate in international or regional issues so as</td>
<td>(1) strengthen cooperation in political, economic, technology and energy fields; willing to deeply and comprehensively cooperate in different fields</td>
<td>(1) intensive communication and exchange between two states in agriculture; enlarge friendship</td>
<td>(1) (2a) economic cooperation, will encourage Chinese companies to enter Algeria; promote the scale and level in trade cooperation; one-China policy; deepen mutual trust</td>
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<td></td>
<td></td>
<td>(2) one-China policy; deepen cooperation in political, economic, culture fields, learning from each other in political system</td>
<td></td>
<td>(2) success in political visits, encourage cooperation in high-level politics, trade, agriculture, technology and international or regional issues</td>
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<td></td>
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<td>(2b) complementary advantages in economy; emphasis on infrastructure construction, energy development, economic zone; open policy to Algeria in</td>
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<tr>
<td>to enhance cooperation between developing countries; announce the strategic relationship between two states</td>
<td>(3) contribute to the cooperation between developing countries; hope to cooperate in trade, investment, agriculture, culture, politics, security, technology, infrastructure, transportation; coordinate in international issue; Sino-Africa relation; mutual trust</td>
<td>investment and technology so as to further economic cooperation; exchange experience with China in politics and wish to deepen cooperation in various aspects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) the communication between legal systems in two countries; deepen cooperation in different fields; great potential in cooperation, Algeria welcome Chinese companies to involve in Algerian projects</td>
<td>(4) win-win relation; the fruit of Sino-Africa forums in tax, law, oil&amp;gas development, economic field</td>
<td>(3) review the history of bilateral relations; emphasis on economic cooperation; invest in each other state; enhance cooperation in energy, information, infrastructure</td>
<td></td>
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</tr>
<tr>
<td>(3) enhance political trust and coordination in international issue; deepen strategic relationship; one-China policy; high pride on China's reform; willing to cooperate in various fields and welcome Chinese companies invest in Algeria; continue enhance mutual trust between two states</td>
<td>(4) deepen strategic relations; cooperation between two states</td>
<td>(4) enlarge cooperation with African countries; consistently develop bilateral relations in more concrete aspects</td>
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<td></td>
</tr>
</tbody>
</table>
Li Zhaoxing met with Algerian Foreign Minister. "李肇星与阿尔及利亚国务部长兼外长举行会谈"


Wu Bangguo met Presidents of Egypt, Algeria and South Africa and Premier of Mauritius. "吴邦国会见埃及、阿尔及利亚、南非总统和毛里求斯总理"


Hu Jintao talked with Algeria President "胡锦涛同阿尔及利亚总统布特弗利卡会谈"


Huang Ju met with Algerian President. "黄菊会见阿尔及利亚总理布特弗利卡"


Hui Liangyu met with Algerian Agriculture Minister. "回良玉会见阿尔及利亚农业部长"


Hui Liangyu met with Algerian Premier. "回良玉会见阿尔及利亚总理"


Li Changchun met with Algerian Premier and 李长春分别会见阿尔及利亚总理和国民议会议长


Wu Bangguo met with Speaker of Algerian National Assembly 吴邦国会见阿尔及利亚民族院议长


Wu Bangguo met with Algerian Premier. "吴邦国会见阿尔及利亚总理乌叶海亚"


Wu Bangguo met with Algerian President. "吴邦国会见阿尔及利亚总统布特弗利卡"


Xi Jinping met 64th session of UN General Assembly President and Speaker of Algerian National Assembly respectively. "习近平分别会见第64届联大主席、阿尔及利亚民族院议长"


Yang Jiechi met with Algerian Foreign Minister and Moroccan Foreign and Cooperation Minister respectively. "杨洁篪会见阿尔及利亚外长和摩洛哥外交与合作大臣"

Algerian President met with Chinese Foreign Minister. "阿尔及利亚总统会见中国外交部长杨洁篪"

Algerian President met with Dai Bingguo。 "阿尔及利亚总统会见戴秉国"

Vice Chairman of CPPCC Wang Gang visited Algeria. 全国政协副主席、中国经社理事会主席王刚访问阿尔及利亚