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Development of Chinese Strategic Petroleum Reserves Base on Comparable Research about Japanese Situation and Policies

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Abstract

Petroleum is one of the most important energy which can't be regenerated. During the increasing development of world economy, petroleum has become significant energy to keep a county's economy survival. Japan which has almost no petroleum capacity had started strategic petroleum reserve since last century. Abundant reserve helped Japan conquering twice petroleum crises. As the biggest and fastest developing country, China has the main purpose to protect economy rise consecutively. Petroleum reserve also is emphasized more by Chinese government in present time. According to research base on Japanese and Chinese petroleum situation, legislation, policies, and response measures, the article put forward three stage reserve system of China, and discussed some relative issues about development of Chinese strategic petroleum reserve.

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1. Introduction

Many developed countries started their strategic petroleum reserves (SPR) from the 1970s. To this point, Japan of which petroleum import and consumption rank the third place can be considered as the typical model. Because of almost no domestic production, all petroleum needed by Japan depends on

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import. Building SPR system is the only pathway to keep the Japanese economy survival and to resist the threat from international crude oil market.

Under the economics of developing countries grown rapidly, China had realized the importance of petroleum to their development. As the biggest developing country in the world, China although still has the abundant natural capacity of crude oil which has the ability to carry on the supply of petroleum sufficiently for many years; it also has to start SPR strategy due to deal with complex international oil relationship hardly and solve increasingly domestic petroleum consumption every year.

Nevertheless, there are many differences between two countries in petroleum reserve and consumption situation, and reserve policies. Although two countries have particularities during their own development process, they have comparability in many fields except different domestic petroleum capacity. However, the present Japan would be the future of China probably, in SPR system, Japan has much more experience and methods which can be considered and adopted by China.

2. Understanding Strategic Petroleum Reserves

2.1. Objectives of Strategic Petroleum Reserves

SPR is a kind of pathway to deal with the pinch of petroleum supply in short term. It concerns to harmonize the relationship between petroleum supply and demand, stable the petroleum price in order to protect the national energy security. Moreover, it also is a kind of applied measures to maintain the steady and sustainable economic development under the continued increase of petroleum consumption all over the world.

It should be pointed out that the SPR aims to keep supplying petroleum for the country consecutively in special period such as war, natural disaster or international economic sanction. The main measure of SPR is to release reserved petroleum to the market for reducing the market pressure and restraining the rising price, in order to slow down the strike to the national economy. Moreover, the more important ability of SPR is gaining an advantage of the time for stipulating industry structure and energy consumption structure to the petroleum imported country. On the other side, nationwide SPR also can keep stabilizing the international relationship between petroleum imported and exported countries.

Furthermore, according to the International Energy Agent (IEA) methodology for calculating minimal petroleum stockholding, a country should have obligation of reserve petroleum amount within 90 days of net imports. [1]

2.2. The background research of petroleum balance

Japan is the third petroleum consumption country, also is the second petroleum import country, after United States in the world. Table 1 shows the GDP and petroleum balance of 2007 to 2009. The petroleum dependence on foreign of Japan was 97% nearly all the times [2]. According to the data, from 2007 to 2009, the GDP rising has direct ratio with petroleum consumption.

Table 1. Japanese Petroleum Balance from 2008 to 2010 [2]

Sector	Modules	2007	2008	2009
GDP (Billion Yen)		560650	553914	525015
Petroleum (Thousand Barrels per Day)	Total Oil Production	132.44	134.08	132.66
	Consumption	5037.06	4788.42	4367.21
	Net Export/Import	-4904.62	-4654.34	-4234.56
	Dependence on Foreign	97%	97%	97%

According to the data from Ministry of Economy, Trade and Industry (METI) in 2007 [3], Figure 1 shows the industrial consumption percentage of Japanese petroleum.

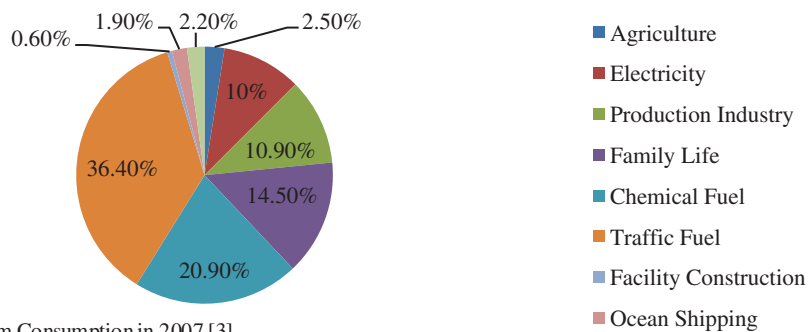


Fig. 1. Japanese Petroleum Consumption in 2007 [3]

In recent years, as the rise of Chinese GDP, the dependence on energy has to be considered as the most important problem on the table of Chinese government.

According to the data from National Statistic Bureau (NSB), the total amount of GDP of 2010 will arrive to forecast in 42.7 thousand billion RMB, the GDP per capita almost in 26.4 thousand RMB, while looking at the petroleum consumption was 408.38 million tons in 2009. If we considered no effects on the Chinese industrial reforming, the petroleum consumption has direct promotion with the raising of GDP. Indeed, Chairman Hu Jintao said the GDP per capita of 2020 will rise two times of 2000 [4]. Consequently, we can simply predict that the petroleum consumption of 2020 will rise to another high level.

Table 2. GDP Rise and Petroleum Consumption of China [5]

Year	PCGDP (RMB)	GDP (10 million)	Petroleum Consumption (10000 tons)
2000	7858	99214	22439
2005	14053	183217	32535
2007	19524	257306	36570
2009	23785	335353	40838
2010	26400	427000	

Turning to the petroleum supply analysis, according to the data of NSB, the petroleum import amount raised every year, and the dependence on foreign rate had been over 50% since 2005.

Table 3. The Petroleum Balance of China [5]

Year	Total supply (10000 tons)	Domestic production (10000 tons)	Import (10000 tons)	Export (10000 tons)	Dependence on foreign (10000 tons)
2000	22632	16300	9749	2172	43%
2005	32539	18135	17163	2888	52.7%
2007	36649	18632	21139	2664	57.7%

The 50% of dependence of foreign is considered as an alert line of a country’s energy security. The data indicates that China will be affected by or depended on other countries and international crude oil

market more intensively. And it is shown that Chinese consumption of petroleum has turned from domestic production into imported. “The energy development of China”, issued by Chinese Social Science Institution, advised the rate of dependence on foreign won’t rise to 65% until 2020.

According to the Pang, Liu and Wang [6], there was mutual cause effect between petroleum consumption and GDP rise long term in China. Ma and Yue [7] also pointed out there was straightway cause effect in petroleum consumption and GDP rise in China. Meanwhile, in response to the data from NSB, Table 4 indicates that the second and third industry which consumes almost 94% petroleum of total amount, supply nearly 89% GDP in 2007.

Table 4. Industry composition of petroleum consumption and GDP in 2007 [5]

Industry	Sector	Petroleum Consumption (10000 tons)	GDP (100 million)
Total	Total consumption	36570	257305.6
First industry	Agriculture, Forestry, Animal Husbandry, Fishery and Water Conservancy	2130	28627
Second industry	Industry	15040	
	Construction	1823	124799
	Transport, Storage and Post	12297	
Third industry	Wholesale and Retail Trades, Hotels and Catering Service	1117	
	others	1896	103879.6
	Household consumption	2267	

3. Discussion

3.1. Legislation of Strategic Petroleum Reserves

Japan has complete legislation system about SPR. After “Petroleum Reserve Law” issued by 1975, Japan began to construct its petroleum reserve polices formally [8]. The law stipulated petroleum corporations had the obligation to reserve petroleum, and corporations, which had to be compelled reserving petroleum for the nation. In 1978, Japan revised “Japan National Oil Corporation Law”, which refer to Japan National Oil Corporation (JNOC)[†] should take non-profit responsibility to reserve petroleum and to construct reserve bases for the nation [9]. In 1989, Japan revised “Petroleum Reserve Law”, indicated that SPR strategy would base on national reserve and would reduce the amount of private reserve. Meanwhile, Japanese parliament issued two other laws consecutively called “Petroleum Supply and Demand Optimization Law” and “Emergency Law for Stabilization of National Life”, in order to formulate the method for adjusting the relationship between demand and supply during the emergency time.

Although China has begun SPR strategy in 2003, it hasn’t any Formulation” had been enrolled within legislation plan of National Council since 2006, but haven’t issued yet. After that, Chinese “Energy Law (Discussion Version)” had been issued in 2009, of which the 65th theme stipulated National Development and Reform Commission (NDRC) in charging of petroleum reserve. At the same time, the law indicated

[†] Japan National Oil Corporation was held in 1967, when original called Japan Petroleum Development Corporation.

Chinese SPR would be departed into two models in national and corporation reserve. After all, the law did not explain and illustrate the definition and details of these two models.

3.2. Administration Process

According to the “Petroleum Reserve Law”, Japan has two basic reserve models which are national reserve and private reserve. National reserve includes two kinds of principles, national reserve base and private base lease. Private reserve refers to private individual petroleum corporation reserve. Furthermore, Japanese SPR system has three levels in administration, Japanese Ministry of Economy Trade and Industry (METI) which on the top floor is in charge of planning and issuing policies, making supervision of JNOC. JNOC takes responsibility to access reserves bases and supervise national reserve companies. Finally, national reserves companies preside over operation of bases and other facilities. On the other side, only some individual private corporations which had been stipulated with obligation take responsibility of reserve petroleum for the nation. These corporations are also administrated by JNOC [10].

Looking at Chinese situation, because of no formally legislation about petroleum reserves, according to the present information from the news, Chinese SPR system also is divided into two parts, national reserve and corporation reserve. NDRC is the top level of SPR program. In 2008, National Energy Bureau (NEB) which is directly conducted by NDRC was found. There was a Petroleum Reserve Office (PRO)[‡] emplaced in NEB being in charge of administrative affairs management. In additional, National Petroleum Reserve Centre (NPRC)[§] found in 2007, China had constructed comprehensive administration system completely. Meanwhile, at the bottom, executive processes are managed by two national owned groups China National Petroleum Corporation (CNPC) and China Petroleum & Chemical Corporation (Sinopec). Nevertheless, in May 2010, Chinese National Council issued “New 36 Principles”^{**}, which stipulated the private individual corporation permitted entering national petroleum reserve system. Then in August, CNPC announced recruiting 6 corporations into the system. And all the entering corporations would administrated by CNPC.

3.3. Reserve Amount

Japanese petroleum reserves was started originally from the 60s last century. Till 1975, Japan had 60 days of petroleum net imports. Since affiliation in IEA, and according to IEA petroleum stockholding obligation, a country should have 90 days of net imports petroleum amount [1], Japan achieved 90 days from 1975 to 1979. More importantly, this 90 days amount was only defined by public reserve. After the second oil crisis, Japan formally implement national petroleum reserve program. Till October 2010, Japan has 201 days of net import including national 115 days and private 86 days [11]. Figure 2. shows the Japanese reserve amount from 1975 to 2009. According to the data from the METI, Table 5 shows Japanese ten reserve bases and their reserve amount.

[‡] Petroleum Reserve Office was originally found within NDRC in 2003.

[§] National Petroleum Reserve Centre is a public institution in order to manage reserve affairs directly and efficiently. Found of NPRC also can improve Chinese executive administration system.

^{**} New 36 Principles is a short name of “National Council Advises about Rational Development of Public Investment Guidance” which has 36 principles. The “New” also shows its different of “Non-public Ownership Economy” which issued in 2005.

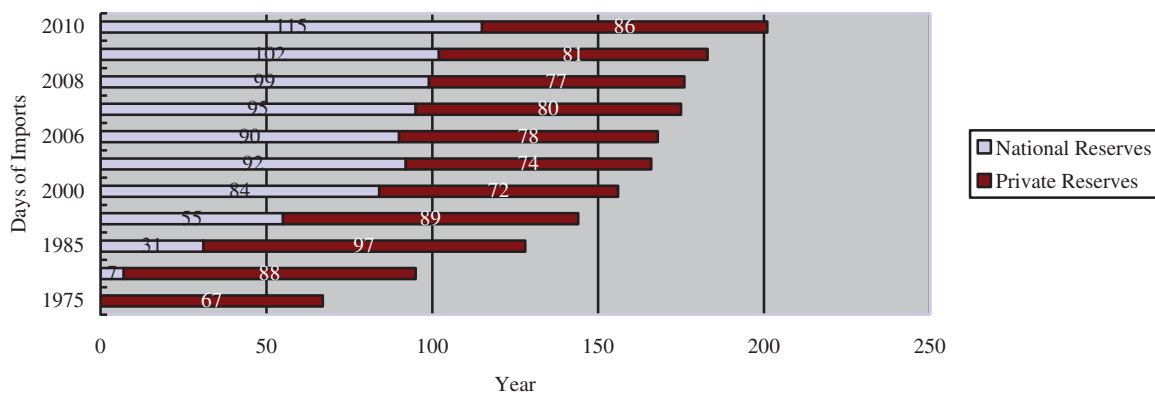


Fig. 2. Japanese Reserve Amount from 1975 to 2009 (Days of net Imports) [11]

Table 5. Japanese Petroleum Reserve Bases [11]

Private Reserves			National Reserves		
Location	Corporation	Total Amount (1000 KL)	Location	Reserve Manner	Total Amount (1000 KL)
Okinwa Oil Base		3000	Kami-Goto	Above on sea	3420
Okinwa		1270	Kushikino	Ground	1680
Kiire	JX	2360	Fukui	Ground	2840
Niigata		940	Kikuma	Underground	1330
Eastport Niigata	Showa-Shell	300	Shibushi	Ground	410
Tokuyama	Idemitsu Kosan	130	Kuji	Underground	1670
Yamaguchi	Seibu Oil	1310	Akita	Underground	3950
Osaki	JX	340	Mutsu-Ogawara	Ground	4960
Wakayama	Exxonmobil	170	Tomakomai	Ground	5430
Aichi	Idemitsu Kosan	440	Hirashima	Above on sea	4750
Chita	JX	310			
Chiba	Idemitsu Kosan	290			
Sodegaura	Fuji Oil	470			
Kashima	Kashima Oil	1000			
Onahama	Mitsubishi	350			
Hokkaido		297			

Chinese government observed petroleum reserve since the issue of “The Tenth Five-Year Program”. In 2003, National Petroleum Reserve Office approved there would constructed 4 reserve bases in the country. Table 6 shows the present amount of petroleum reserve after 4 bases constructed completely till 2010. In response to the data, China has 21600 thousand tons petroleum reserve to supply for 35 days import.

Table 6. The First Term petroleum reserve amount of China

Sector	Base	National Reserve (10000 square meters)	Commercial Reserve (10000 square meters)
The First Term	Zhenhai	520	380
	Zhoushan	300	
	Huangdao	320	180
	Jinzhou	300	60

To be pointed out that, actually, China still has more bases for petroleum reserves. According to some news, there are more than 20 million cubic meters container constructing or to be constructed in China for reserving petroleum, although there has not authorized or announced by NDRC formally.

3.4. Emergency Response

Basically, because Japan is a member country of International Energy Agency (IEA), it has to comply with policies of IEA. Then, the same manner also can be found in the related laws including “Petroleum Reserve Law”, “Petroleum Supply and Demand Optimization Law” and “Emergency Law for Stabilization of National Life”. Pointed out needed is that the procedure of basic manner in emergency of IEA called “Co-ordinate Emergency Response Measures” (CERM) three stages. The first stage is to reduce the corporation obligation, and secondly drawing down the corporation reserves, finally drawing down national reserves. However, the procedure of CERM indicates that the national reserve only can be drawn down after the corporation releasing. In terms of “New Guideline on Emergency Response” issued in 1999, Japanese national reserves was defined as “Last Resort” in times of emergency. In this issue, Japanese national reserve can be drawn down into the market anytime when emergency occurs. On the other hand, when reserved petroleum into the market, it would be bid by oil companies stipulated by “Petroleum Reserve Law” entering sales process [10].

4. Conclusion

Due to earlier development of petroleum reserve, Japan has complete special legislation system about SPR including reserve organization, bases construction, investment manner, response measures and other issues. This legislation system also establishes integrated administrative structure. Although China has not issued any law special for petroleum reserve, in terms of the “Energy Law (Discussion Version)”, it only stipulated the main department, who is in charge of reserve, but not complete in other relative issues. In management system, along with establishment of NPRC, the administrative system of organization was complete relatively. It has already formed a management system which is executed directly by Sinopec and CNPC, supervised by NPRC, and conducted finally by NDRC. However, a law about petroleum reserve has to be issued formally. It should not only stipulate the administrative department, also in reserve formality, national and corporation reserve administrative system, investment manner, response measures. More importantly, the law would illustrate the strategy of Chinese SPR, it could be planned in years including reserve amount, bases construction plan, and other issues.

To be pointed out, due to lack of SPR legislation in China, considered about special ownership relation, there are many disorderly issues during the administrative procedure. Japan build obvious reserve structure, national reserve and public reserve, and all the public reserve managed by private ownership corporations. In china, because of the national ownership of Sinopec and CNPC, the reserve bases which managed by these two group corporations divided into two parts for national and corporations interiorly. As a result, confusion probably occurs during the executive procedure. More importantly in emergency drawing down measures, the country cannot calculate release amount distinctly and result in losing

response efficiency. Therefore, in my opinion, Chinese petroleum reserve system should also include three stages. The top stage is national reserve which would be authorized by NPRC, and managed directly by Sinopec and CNPC. The second stage should be national corporation reserve. Sinopec and CNPC are two group corporations whose ownership belonging to the nation, and administrated directly by Chinese Communism Party. Furthermore, they have also attended Chinese marketing economy system. To this point, this kind of reserve would managed by Sinopec and CNPC, and all particularity of the reserve manners are the same with private reserve. The only difference between them can be distinguished by ownership. The third stage is private reserve undoubtedly.

Meanwhile, turning to the response measures, Japan has complete response measure process, and the whole process had been stipulated in laws. Basically, Japan mainly applies to advices by IEA. The only creation is about “Last Resort” which was held for feasibility of Japanese national reserve. If China would form three stages of SPR, the middle one, national corporation reserve can be considered as the feasible amount. Nevertheless, China still has advantage in national reserve amount, due to the special ownership. However, the premised condition of this trend is the plentiful of reserve amount.

Japan started petroleum reserve firstly is formed with private reserve, and formed national reserve due to national energy security in the 70s last century. During the whole process of Japanese petroleum reserves, private reserve is always considered as the most useful and feasible measures to conquer petroleum crisis. Japan can reduce private reserve obligation or draw-down it to deal with lack of petroleum in the earlier stage. Indeed, according to the Table 5, Japan has 16 private petroleum reserve bases more than its national bases. Moreover, there are many more corporations taken reserve obligation for the country. Comparing with Chinese situation, since the “New 36 principles” issued, Chinese government began to emphasize impressive effect of private corporations. To be more rationally, Chinese government should be more opened in private reserve. Firstly, as the development of free economy, there is a lot of idle capital in public. Opening more with private reserve can take advantage of idle capital in order to reduce national financial cost for reserves. Secondly, private reserve has become the first shelter of petroleum crisis undoubtedly to make government have more feasibility to deal with national reserve. As a result, the country would obtain stronger protection from petroleum crisis.

In reserve amount sector, according to the industry consumption of Japanese, nearly 36% of petroleum consumption is use for traffic fuel, and about 10% for production and 20% for chemical fuel. All kinds of industry consumption are more balance in Japan. Comparing with Chinese petroleum consumption, nearly 82% of consumption in second industry is in use for producing, traffic fuel and electricity, which are also in 50% of GDP contribution. Petroleum has more important significant in China. However, the main purpose of China is development which can be achieved with keeping fast increase of GDP. Indeed, only 35 days reserve is completely short. Although China still has abundant petroleum capacity than Japan, it would not explore and produce unlimitedly in order to protect energy security in the future. Due to the increase of petroleum consumption every year, China have no choice but expanding petroleum reserve and broadening petroleum exploration and corporation overseas.

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