2012

OIL & GAS SECURITY
Emergency Response of IEA Countries

People's Republic of China

List of Figures

Note: This section on China was written by the IEA, based on public information, IEA statistics, press reports and reports from various energy analysts, and does not represent the official view of the Chinese government. All errors and omissions are solely the responsibility of the IEA.

International Energy Agency

China

Key Oil Data

	1985	1990	1995	2000	2005	2007	2008	2009
Production (kb/d)	2,504.7	2,773.7	3,009.2	3,268.9	3,637.0	3,736.6	3,819.2	3,800.2
Demand (kb/d)	1,842.4	2,321.3	3,289.8	4,626.1	6,730.2	7,609.3	7,801.9	8,045.8
Motor - gasoline	326.3	443.9	680.0	819.0	1,134.6	1,289.8	1,436.2	1,442.6
Gas/diesel oil	396.4	550.1	883.2	1,391.1	2,242.5	2,554.1	2,765.8	2,811.6
Residual fuel oil	517.7	614.5	674.0	706.6	774.0	758.6	590.7	516.0
Others	602.0	712.7	1052.6	1709.4	2579.0	3006.8	3009.2	3275.7
Net imports (kb/d)	-662.4	-452.4	280.6	1357.2	3093.2	3872.7	3982.6	4245.7
Import dependency	-36.0%	-19.5%	8.5%	29.3%	46.0%	50.9%	51.0%	52.8%
Oil in Total Energy Consumption	17.1%	16.6%	17.5%	22.2%	19.8%	18.8%	18.3%	17.9%

Source: Calculated by the IEA based on China Energy Statistical Yearbook 2010, National Bureau of Statistics of China, China Statistics Press

Key Natural Gas Data

	1985	1990	1995	2000	2005	2007	2008	2009
Production (mcm/y)	12,930	15,300	17,950	27,200	49,320	69,240	80,299	85,269
Consumption (mcm/y)	12,930	15,250	17,741	24,503	46,763	70,523	81,294	89,520
Industry	10,960	12,020	15,440	19,900	32,879	47,967	53,160	57,790
Construction	1,410	1,060	30	82	149	209	99	100
Transport, Storage and Post	80	190	160	881	3,801	4,689	7,155	9,110
Wholesale, Retail Trade and Hotels, Restaurants	-	-	60	344	1,079	1,711	1,775	2,400
Residential Consumption	430	1,860	1,940	3,232	7,943	14,339	17,012	17,770
Others	50	120	120	64	912	1,609	2,092	2,360
Net imports (mcm/y)	-	-	-	-3,140	-2,970	1,420	1,350	4,420
Import dependency	0.0%	0.0%	0.0%	-12.8%	-6.4%	2.0%	1.7%	4.9%
Gas in Total Energy Consumption	2.2%	2.1%	1.8%	2.2%	2.6%	3.3%	3.7%	3.9%

Source: Calculated by the IEA based on China Energy Statistical Yearbook 2010, National Bureau of Statistics of China, China Statistics Press

OVERVIEW

Although coal is the dominant energy source in China, accounting for some 70% of the country's Total Energy Consumption (TEC) in 2009, oil and gas are also essential energy sources. Despite strong growth in consumption of oil, its share of TEC fell from 22% in 2000 to 18% in 2009, as coal use rose even faster to meet burgeoning demand for electricity. A strong policy push boosted natural gas supplies, particularly to residential customers, so that the share of natural gas doubled from 2% in 2000 to 4% in 2009.

China is one of the important oil and natural gas producing counties in the world. In 2010, China's crude oil production exceeded 4 million barrels per day (mb/d). However, with strong and sustained economic growth, its demand for oil has also increased, from 4.6 mb/d in 2000 to over 8 mb/d in 2009. In the New Policy Scenario (NPS) of the IEA *World Energy Outlook* (*WEO*) 2011, China's primary oil demand rises to 12.2 mb/d in 2020. Although China is now the world's fifth-largest oil producer, the country has been a net oil importer since 1993. In 2011, China imported over 5 mb/d of crude oil, accounting for about 54% of its total demand. More than 50% of the total crude oil imports came from counties of the Middle East.

To prevent a potential shock to the economy caused by an oil supply disruption, the Chinese government has been steadily pushing building an oil stock reserve system. China has completed four stockpiling facilities with a capacity of around 103 mb in the first phase of its Strategic Petroleum Reserve (SPR) plan, and has begun construction of its second phase, which comprises eight storage sites that will reportedly have a combined capacity of around 207 mb. Among them, two sites were completed in the second half of 2011 and the Tianjin site is reportedly set to be completed in 2012. According to unofficial reports, the remaining four SPR-II sites are expected to become operational by 2013. The third phase is expected to boost total SPR capacity to approximately 500 mb by 2020. Stockholding obligations for industry may be considered, but are not now a formal part of the emergency response system, authorising legislation for which is still in preparation.

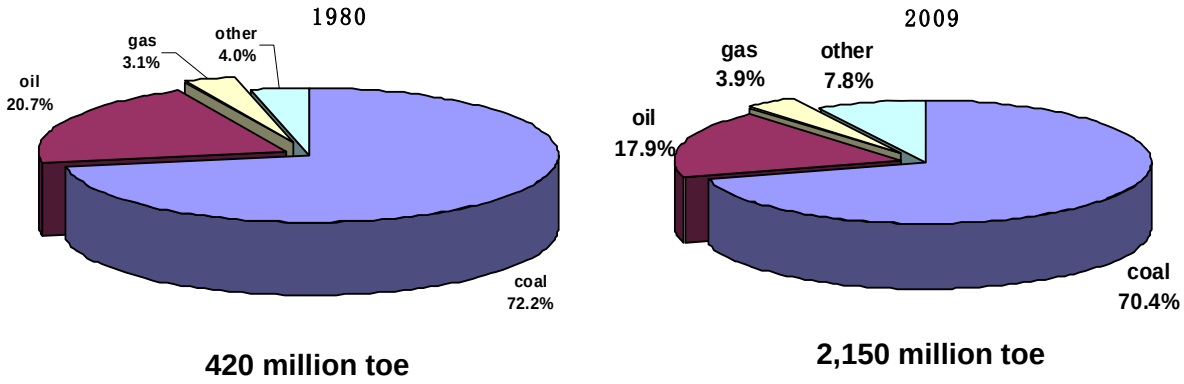
Domestic natural gas production surged from about 27 bcm in 2000 to 96.8 bcm in 2010, or a compound average growth of 14% annually. In 2010, domestic supplies met 90% of domestic consumption. As natural gas use has grown, China started importing LNG in 2006 and became a net importer in 2007. In 2010, gas demand reached around 106 bcm (290 mcm/d), while it is estimated to have increased to 130 bcm in 2011. China imports natural gas both in the form of LNG and through gas pipelines. By country, China imported LNG from Australia (5 bcm), Qatar (3.2 bcm) and Indonesia (2.7 bcm) in 2011.

The key elements of China's approach to gas security are to further promote domestic production from conventional and unconventional resources, to expand reserves, to construct gas storage facilities, and to accelerate construction of LNG terminals and interregional gas pipelines in order to strengthen supply of gas imports. Although China does not have government gas stocks or mandatory industry stocks, the government promotes the expansion of commercial inventories. So far, some storage facilities have been built for coping with seasonal demand fluctuations.

1. Energy Outlook

With economy development, China's energy consumption increased gradually in recent years. In 2009, China's Total Energy Consumption (TEC) reached around 2.15 billion toe. The energy mix of the TEC remained relatively unchanged over the past 30 years: coal accounted for around 70% in 2009, followed by oil (18%) and natural gas (4%). According to China's Energy Development Report 2011, in 2009 the indigenous production of coal met its domestic demand, while more than half of oil demand depended on imports.

Total Primary Energy Supply

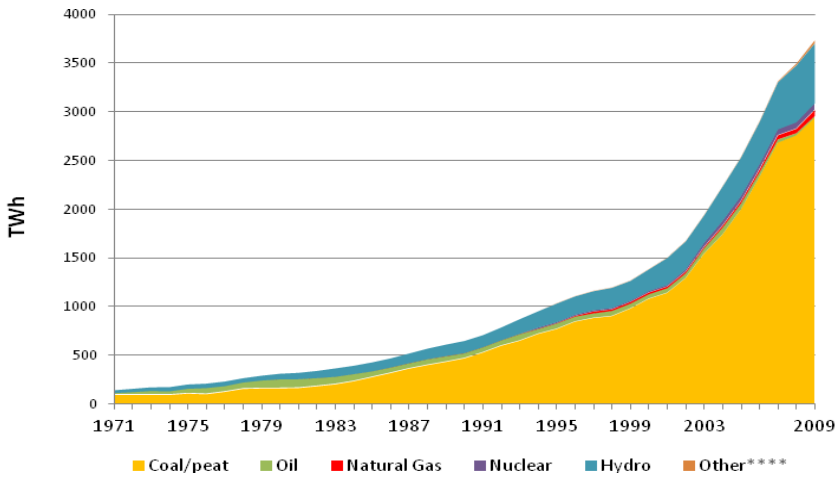


420 million toe **2,150 million toe**

Source: calculated by the IEA based on China's Energy Development Report 2011, National Energy Administration of China

In order to enhance energy security, the Chinese government has attached more importance to energy efficiency. According to China's Energy Development Report 2011, 12th 5-year energy plan, the Administration has a target for energy consumption to keep less than 2.9 billion toe/year by 2015.

Electricity Generation, by Fuel Source



Source: Energy Balances of Non-OECD Countries 2011, IEA

2. Oil

2.1 Market Features and Key Issues

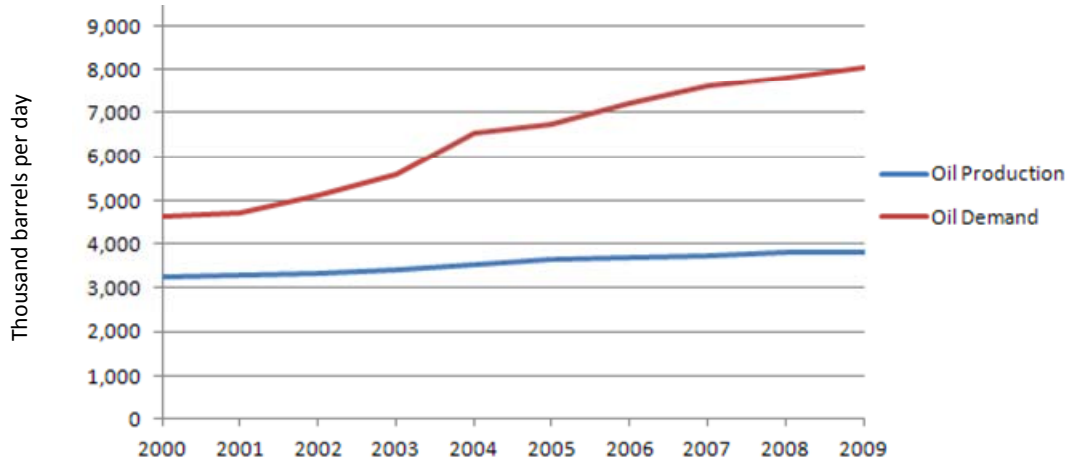
Domestic oil production

In 2010, China's crude oil production has increased to 4.1 million b/d (203 million tons), exceeding 4 mb/d (200 Mt) for the first time.

China's remaining proven oil reserves have steadily grown since 2000 due to exploration in the Northwest and offshore, where oil production increased by 60% and 24% in 2009 respectively, compared to 2000. China's offshore oil production rapidly increased in 2010, reaching 0.9 mb/d (46.4 Mt), accounting for 23% of the total oil production of the country. In contrast, oil production in the Northeast has gradually decreased each year.

To secure oil supplies, the main state-owned oil companies have enhanced investment in domestic and foreign oil exploration in recent years, and crude oil production is expected to remain relatively stable.

Domestic Oil Production and Demand



Source: Calculated by the IEA based on China Energy Statistical Yearbook 2010, National Bureau of Statistics of China, China Statistics Press

Oil demand

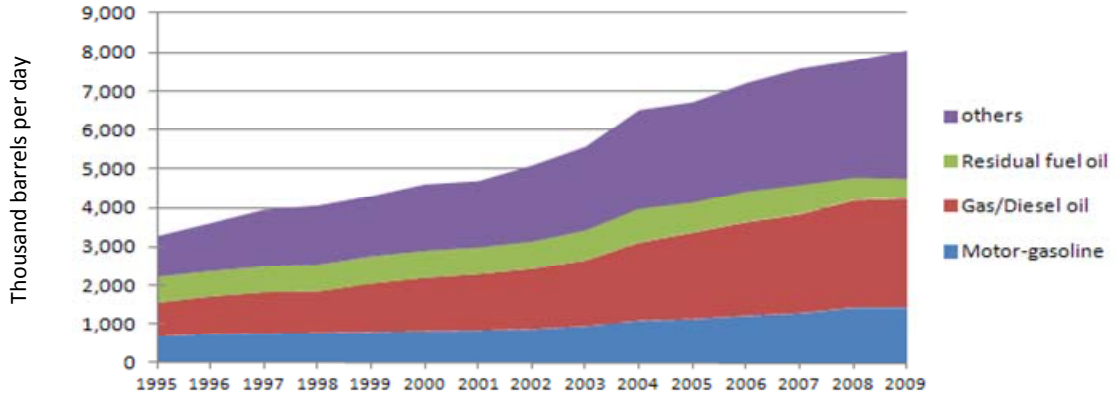
China's total oil demand in 2009 averaged around 8 mb/d (385 Mt). It has been rising rapidly from 4.6 mb/d (225 Mt) in 2000, increasing by a compound average growth rate of 6.7%. Overall demand is expected to continue along this gradual increasing trend. Under the assumptions of the New Policy Scenario (NPS) in the IEA's *World Energy Outlook* (*WEO*) 2011, China's primary oil demand would rise to 12.2 mb/d in 2020 and almost 15 mb/d in 2035.

Oil Demand in 2009 (kb/d)	
LPG and Ethane	683
Naphtha	841
Gasoline	1,487
Kerosene	323
Gas/Diesel	2,819
Residual Fuels	542
Other Products	1,368
Total Products	**8,063**

Source: IEA Statistics

According to IEA statistics, the transportation sector accounted for over 40% of oil demand in 2010, with motor gasoline, gas/diesel oil being the main transportation fuels. Further oil demand growth will be the result of increases in the use of these fuels. According to the NPS of the WEO 2011, the oil use will grow ever more concentrated in the transportation sector, representing 65% of total oil demand in 2035.

Oil Consumption, by Product



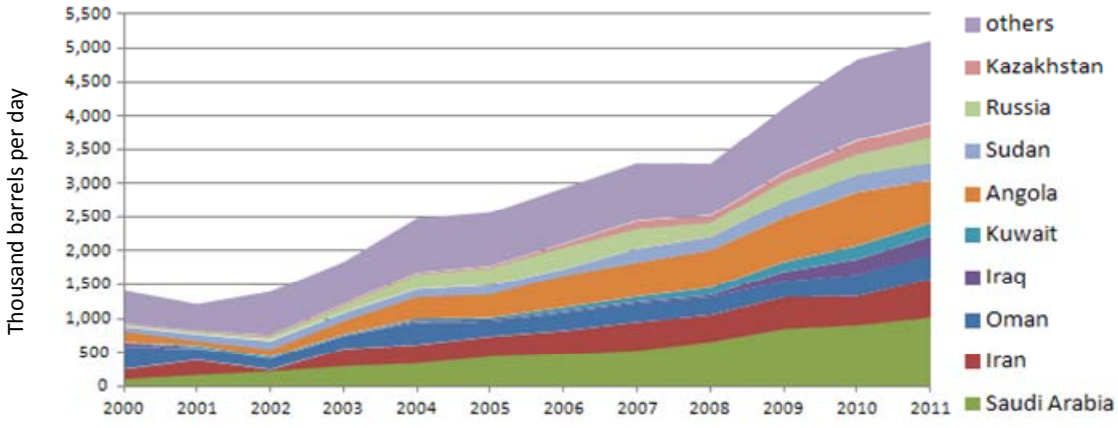
Source: Calculated by the IEA based on China Energy Statistical Yearbook 2010, National Bureau of Statistics of China, China Statistics Press

Imports/exports and import dependency

With sustained demand growth, China's oil imports have surged. The country has been a net oil importer since 1993 and a net crude oil importer since 1996. According to data from the General Administration of Customs of China, in 2010, China imported 4.7 mb/d (236 Mt) of crude oil, accounting for around 53.8% of total demand. *China, Oil, Gas and Petrochemicals* (*China OGP*) reported that China imported over 5 mb/d in 2011.

Concerning crude import sources, according to *China OGP*, China is highly dependent on the Middle East, which accounted for more than 50% of the total crude oil imports in 2011, followed by Africa (around 24%). By country, Saudi Arabia (20% of the total) was the biggest import source of crude oil in 2011, followed by Angola (12%), Iran (11%), Oman (7%), Russia (7%), Sudan (5%) and Iraq (5%).

Crude Oil Imports by Source



Source: China Oil, Gas and Petrochemicals

According to *China OGP*, China exported around 50.6 kb/d (about 2.5 Mt) of crude oil, accounting for around 1.2% of the total production, in 2011. The key export market is Asia; by country, Japan was the largest importing country (around 48%), followed by North Korea (21%), Republic of Korea (13%), the USA (10%) and Thailand (3%). In addition, China exported around 0.5 mb/d of oil products (about 26 Mt) in 2011, while the country imported around 0.8 mb/d of oil products (about 41 Mt).

Oil Company Operations

The Chinese oil market is dominated by four major National Oil Companies (NOC): China National Petroleum Corporation (CNPC); China Petroleum and Chemical Corporation (Sinopec); China National Off shore Oil Corporation (CNOOC); and China National Chemicals Import and Export Corporation (Sinochem). Each company is profiled below.

CNPC

CNPC, established in 1988 as a large NOC, is a comprehensive energy company that has integrated a broad range of upstream and downstream oil and gas businesses. The company also manages technical services for oil and gas development projects, including logistics and manufacturing. In 2010, CNPC's domestic crude oil production was about 2.1 mb/d (105 Mt/year) and its overseas production was 1.5 mb/d (76 Mt/year), of which the company's equity share was 0.7 mb/d (36 Mt/year). As for natural gas, CNPC produced 72.5 bcm domestically and 13.7 bcm overseas, of which its equity share was 10.4 bcm. CNPC also produced 86 Mt of oil products. PetroChina is the internationally listed subsidiary of CNPC.

Sinopec

Sinopec is another major NOC, like CNPC established in the 1980s from the assets of the former Ministry of Petroleum Industry. The company has an integrated system covering oil production, refining and sales. The petrochemical business is also a core activity, including maintaining a comprehensive retail network. Sinopec's subsidiary, the China Petroleum and Chemical Corporation, went through initial public offerings by listing the stocks in global stock exchange markets. In 2010, Sinopec produced 1.2 mb/d (61 Mt/year) of crude oil, of which 0.85 mb/d (42.6 Mt/year) were from domestic production, and 12.5 bcm of natural gas. Its refining throughput was 213 Mt in 2010.

CNOOC

CNOOC is the third-largest oil company in China and was established to exploit China's off shore oil and gas resources. In 2010, CNOOC crude oil production stood at around 1 mb/d (49.6 Mt/year), of which 80% were from domestic fields. It also produced 15.4 bcm of natural gas, of which around 66% were from domestic fields.

Sinochem

Sinochem is a large NOC that produces oil, fertiliser and chemical products, and is also involved in the trade and sales of these products. Its activity extends to overseas oil exploration, production and refining, including oil storage services. Its oil equivalent production stood at around 48.6 kb/d in 2010.

Price mechanism

The allowable prices ranges of oil products are set by the National Development and Reform Commission's Price Bureau. China's oil price reforms aim to move gradually towards more market-oriented prices, with the final goal of price formation through competitive markets. Since the oil market in China is not yet fully competitive, and the ability of society to bear high oil prices remains relatively weak, the government considers that it is still necessary for oil product prices to be regulated by the government. In 1998, China established a mechanism for domestic oil prices to follow the international market. According to this, crude oil prices could be negotiated based on both supply and demand with reference to the prices of a basket of international market reference prices and on the quality of crude. Oil products prices could be set based on international crude oil prices, and taking into consideration processing costs, taxes and appropriate profit margins.

2.2 Oil Supply Infrastructure

Refining

Over the past five years, China's oil refining industry has vigorously promoted large-scale reorganisation and integration of refineries. China's total refinery capacity increased from about 7 mb/d (325 Mt/year) in 2005 to around 12 mb/d (580 Mt/year) in 2010. There are 21 large scale refineries, with total refinery capacity of around 5.7 mb/d (270 Mt/year), accounting for 47% of the total capacity. These refineries are located in three areas namely in Yangtze River Delta, Pearl River Delta and Bohai Rim.

Refined product output kept increasing. In 2010, China's crude oil input reached about 8.5 mb/d, increased by around 2.7 mb/d compared to 2005. Product output of gasoline, diesel and kerosene reached around 1.6 mb/d, 3.1 mb/d and 0.4 mb/d in 2010, respectively.

Ports and Pipelines

China's oil pipelines have been rapidly expanding until 2010. About 7,000 kilometres of crude oil pipelines have been built since 2005. Those pipelines run mainly in the northeast, the northwest and the coastal area. The total length of crude oil pipelines has reached around 20,000 kilometres. 70% of China's domestically produced crude oil is transported through the pipelines.

The China-Russia spur of the East Siberian oil pipeline (ESPO; 300 kb/d or 15 Mt/year) became operational in 2010. In the same year, the second phase of the China-Kazakhstan oil pipeline (to boost the total transport capacity to 400 kb/d or 20 Mt/year) and the China-Myanmar oil pipeline (around 440 kb/d or 22 Mt/year) started construction.

Construction of regional oil product pipelines is also under way. By the end of 2010, China has built about 18,000 kilometres of refined product pipelines, which transported around 20% of the total oil products. Regional pipelines have been constructed mainly in the northwest, the southwest and the Pearl River Delta. Further construction will be carried out taking into consideration location of refineries and regional demand.

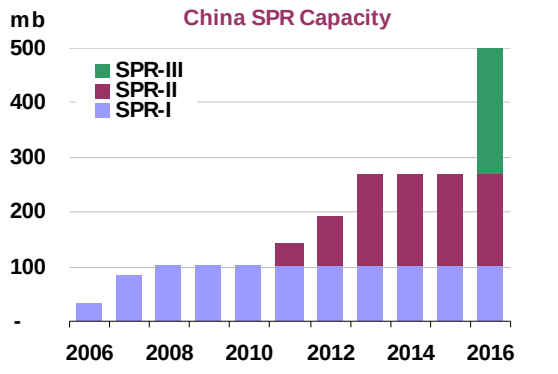
As China has a long coastline, there are around 60 operating oil ports. According to *China OGP*, around 60% of China's crude and oil product imports arrived at five main port areas in 2011: Ningbo, Quingdao, Hangzou, Dalian and Zhanjiang. China's NOCs have invested in expansion of oil terminals and refined oil product berths.

Storage capacity

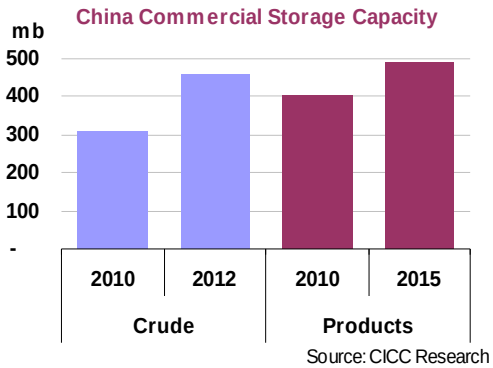
By the end of 2011, China has reportedly held a storage capacity of around 140 mb as a part of its Strategic Petroleum Reserves (SPR) plans. The officially confirmed SPR capacity includes four storage facilities with capacity of 103 mb in the first phase of its SPR were completed to be filled with crude oil by April 2009. As for the second phase with a total capacity of 206.9 mb[1], two storage sites (with 18.9 mb capacity each) were, according to press reports, completed in the second half of 2011. According to remarks made by NEA officials, China aims to boost total SPR capacity to approximately 500 mb by 2020 (see the section "2.4 Stocks" for further information).

While building the SPR, the Chinese government has also encouraged domestic oil companies to increase commercial reserves. According to China International Capital Corporation (CICC), estimated crude oil commercial storage capacity stood at around 310 mb in 2010 and planned projects suggested that it could increase by a further 150 mb by the end of 2012. Refined product storage capacity was estimated at around 400 mb in 2010, and is seen rising to almost 500 mb in 2015. However, it is hard to judge what is included in these press reports of commercial storage capacity, and figures from official sources are considerably more conservative; the National Energy Administration stated in its *Report on China's Energy Development for 2011*, that capacity of commercial oil reserve has reached 26.5 mcm (around 167 mb) by 2010. According to CNPC, the total commercial storage capacity in China reached 34.95 mcm (some 220 mb) by the end of 2011.

Although there is much ambiguity surrounding SPR plans and commercial storage expansions, perhaps in part because of an unclear distinction between them, China is demonstrating a strong capability to expand its petroleum storage.



Source: calculated based on news reports



[1] The original plan of the Administration for the second phase was 169 mb. However, according to *Report on Domestic and Overseas Oil & Gas Industry Development in 2011* (issued by CNPC Research Institute of Economics & Technology in January 2012), the total capacity of the second phase amounts to 206.9 mb.

Oil Infrastructure Map

2.3 Decision-making Structure for Oil Emergencies

The State Council, comprised of the Premier, Vice-Premiers, State councillors and ministers, is a decision-maker and has the authority to order releases from the SPR. The National Development and Reform Commission (NDRC), the National Energy Administration (NEA) and the Ministry of Finance cooperate on implementation of orders from the State Council. The National Oil Reserve Center (NORC) is a core body and responsible for SPR construction and oil procurement. The NORC is overseen by the National Oil Reserve Office of the NEA. Major NOCs, such as CNPC, Sinopec and Sinochem, serve as contractors for operations of strategic oil reserves.

While building the SPR, China is considering placing a minimum stockholding obligation on industry, creating a comprehensive national reserve system –the National Petroleum Reserve (NPR). This is expected to be composed of government stocks and obligatory industry stocks, and will include both crude oil and products. The NEA is reported to consider public subsidies to support industry stockholding requirements.

The NEA has presented some recommendations on the new draft Energy Law (umbrella law) that (by the end of 2011) is under consideration by the State Council and relevant government agencies. The legislation governing the National Petroleum Reserve (NPR), also in draft, will be a separate law, with detailed rules and regulations to be issued in accordance with it by line ministries.

2.4 Stocks

Stockholding Structure

In order to prevent and mitigate damage caused by oil supply disruptions, China has been steadily moving forward with the building of an oil stock reserve system since 2001. In 2001, China's Tenth Five-Year Plan (2001-2005) called for the establishment of a national strategic oil stockholding system to improve China's energy security. In 2003, the Chinese government announced to construct four stockpiling facilities (National Oil Reserve (NOR) bases) in the first phase of its SPR plan. China has completed the first phase of its SPR plan in the coastal area, and has begun construction of its second phase, which comprises of eight storage facilities. These facilities are expected to be completed in 2012 and 2013. A third phase reportedly would boost total SPR capacity to approximately 500mb by 2020. Although crude oil is considered to be stored under these SPR plans, China also reportedly has a plan to set up a refined oil reserve in 2012.

First phase of SPR plan (SPR-I)

Under the SPR-I, four storage facilities were built between 2004 and 2008. The storage sites (Zhenhai, Zhoushan, Huangdao and Dalian) have a total capacity of 16.4 mcm (103.2 mb). According to the NEA's *Report on China's Energy Development for 2011*, these bases have been filled with crude oil by the end of 2010. They are located near refining centres on the east coast.

Chinese Strategic Petroleum Reserve Sites
(million barrels)

Phase	Operator	Location	Capacity	Status	Completion
1	Sinopec	Zhenhai, Zhejiang	32.7	Filled	3Q06
	Sinochem	Zhoushan, Zhejiang	31.4	Filled	4Q07
	Sinopec	Huangdao, Shandong	20.1	Filled	4Q07
	CNPC	Dalian, Liaoning	18.9	Filled	4Q08
	Phase 1		**103.2**		**2008**
2	CNPC	Dushanzi, Xinjiang	18.9	Completed and ready to be filled	3Q11
	CNPC	Lanzhou, Gansu	18.9	Completed and ready to be filled	4Q11
	CNPC	Jinzhou, Liaoning	18.9	Under construction	
	CNOOC	Huizhou, Guangdong	31.4	Planning	
	CNPC	Jintan, Jiangsu	15.7	Under construction	
	Sinopec	Zhanjiang, Guangdong	44.0	Planning	
	CNPC	Shanshan, Xinjiang	39.0	Under construction	
	Sinopec	Tianjin	20.1	Under construction	2012
	Phase 2		**206.9**		**2013**
	Phase 3		**189.9**		**2020**
Total	**Total SPR**		**500.0**		

Source: calculated based on news reports

Second phase of SPR plan (SPR-II)

The Chinese government has begun to construct the SPR-II, which is expected to comprise eight storage facilities with a total capacity of 32.9 mcm (206.9 mb)[2]. The construction of those sites is to be completed by 2013. Among them, the Dushanzi and Lanzhou sites (both with 18.9 mb capacity) were completed in the second half of 2011 and Tianjin (22.0 mb) is reportedly set to be completed in 2012. The complete list of locations has not been officially disclosed, although the other four potential facilities are believed to be underground, located inland near refinery centres and important pipelines, or to be expansions of existing storage sites. Filling of the SPR-II facilities may start as they are completed, depending on crude oil price levels.

Third phase of SPR plan (SPR-III)

For the SPR-III, China aims to construct a total capacity of over 180 mb to boost total SPR capacity to approximately 500 mb by 2020. Although there is no public information on a detailed plan for this Phase, news sources reported that some facilities of the SPR-III were already being planned.

[2] The original plan of the Administration for the second phase was 169 mb. However, according to *Report on Domestic and Overseas Oil & Gas Industry Development in 2011* (issued by CNPC Research Institute of Economics & Technology in January 2012), the total capacity of the second phase amounts to 206.9 mb.

Stock Drawdown and Timeframe

When oil market supply is subject to significant changes or unforeseen incidents, the NEA will propose to the State Council its plan for releasing the emergency oil reserves. After the State Council approval, the NEA will carry out the approved actions in cooperation with other stakeholders like the NDRC, related ministries and the NOCs.

3. Other Measures

Other than utilising the SPR, China has not yet prepared alternative measures for short-term oil crisis management, such as demand restraint and fuel-switching measures. However, the government has proposed longer term policies and measures to develop a more stable and energy-efficient economy. These policies and measures focus on areas such as energy efficiency and energy diversification. According to renewable energy development targets in China's "12th Five Year Plan" (which covers 2011 to 2015), which were revised in October 2011, the targets for hydropower have risen from 250 GW to 260 GW of constructions starts by 2015, total wind power installed capacity from 90 GW to 100 GW, and total solar power installed capacity from 5 GW to 10GW.

4. Natural Gas

4.1 Market Features and Key Issues

Gas production and reserves

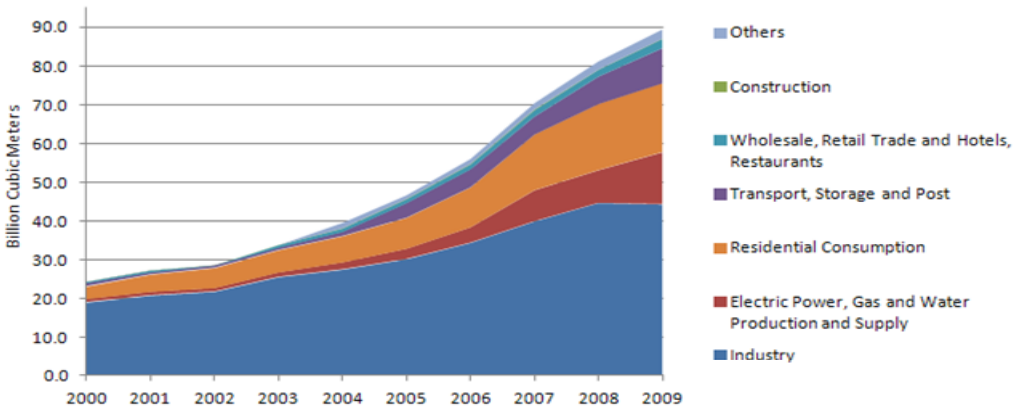
China's natural gas production has surged from 27.2 bcm in 2000 to 96.8 bcm in 2010 and an estimated 103 bcm in 2011, with a compound average growth rate of about 14%. According to the latest evaluation of the country on oil and gas resources, China's natural gas reserve is estimated to have reached 56 trillion cm; recoverable gas reserves have reached 22 tcm. It is mainly distributed in nine basins like Tarim, Sichuan, Ordos and Qaidam, accounting for around 84% of the total recoverable resources.

As for unconventional natural gas, China's coalbed methane prospective reserve (at depths of less than two thousand meters) amounted to 36.8 tcm, and recoverable reserve reached 10.9 tcm. Regarding shale gas, which seems a potentially vast resource, shale gas resources (GIP) is estimated at 134.4 tcm and technically recoverable reserves at 25.1 tcm. The first shale gas well has been drilled in the Weiyuan gas field (Sichuan basin) in 2010.

Gas demand

With the development of natural gas pipeline networks, China's demand for natural gas has rapidly increased from 24.5 bcm (67 mcm/d) in 2000 to around 130 bcm (356 mcm/d) in 2011. According to China Energy Statistical Yearbook 2010, National Bureau of Statistics of China, in 2009, the industry sector[3] represented about 50% of the country's total gas consumption, followed by the residential sector (around 20%) and the sector of electric power, gas and water (about 15%). The residential sector and the sector of electric power, gas and water have experienced a rapid growth of consumption with a compound annual growth rate of around 21% and 36.5% respectively during the period from 2000 to 2009.

Natural Gas Consumption, by Sector



Source: Calculated by the IEA based on China Energy Statistical Yearbook 2010, National Bureau of Statistics of China, China Statistics Press

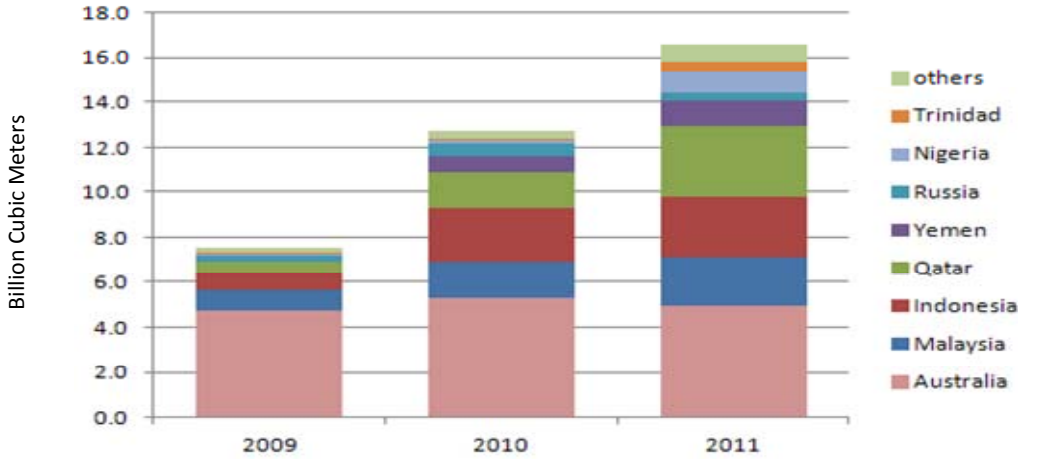
[3] In this chapter the industry sector excludes the electric power, gas and water sectors, although in China Energy Statistic Yearbooks includes them.

Overall demand is expected to continue along an increasing trend although at a lower growth rate. In the New Policy Scenario of the IEA WEO 2011, China's primary gas demand will rise on average by 6.1% to over 500 bcm in 2035. The gas use will grow more concentrated in the power generation and heat plants, representing around 37% of total primary gas demand in 2035.

Gas Import dependency

China became a net natural gas importer in 2007. Since then, China's gas imports have gradually increased. In 2010, China imported about 17 bcm of natural gas: about 12.7 bcm in the form of LNG and 4.4 bcm through a pipeline from Turkmenistan. This accounted for around 16% of total gas consumption in China in 2010.

LNG Imports, by Source



Source: Calculated based on news reports

In 2011, imports are estimated to have increased to around 31 bcm, versus a total demand of 130 bcm. China's LNG imports have increased to around 16.6 bcm, 31% higher than 2010. Almost 30% of the total LNG imports came from Australia, while Qatar, Indonesia and Malaysia accounted for some 19%, 16% and 13% of the total LNG imports, respectively.

Gas Company Operations

The China's upstream natural gas sector is mainly dominated by CNPC, Sinopec and CNOOC. CNPC is the largest natural gas producer and supplier among them. According to CNPC, in 2009, its natural gas reserves and output accounted for around 80% of the total. It also operated around 90% of the total gas pipelines of the country. As for gas distribution, distribution companies are owned and managed by local governments, while most natural gas is delivered to some major industrial users directly by producers. Over the past years, the three NOCs have been investing in the downstream sector to get a foothold in the residential sector.

Gas Price

China's natural gas price is determined mainly based on production costs, which is relatively low compared to other alternative energy sources. The government started a reform in December 2011 in Guangdong and Guangxi. The city gate gas price will be linked to fuel oil and LPG prices (Shanghai imported prices). This aims at liberalising the upstream prices, in order to promote in particular future unconventional gas production. In a first stage, prices will be changed annually before moving to quarterly changes. The pace of the reform is still unknown. In the long term, the natural gas price is expected to be formed through market competition, where the government will only supervise monopoly prices like pipeline transportation prices and urban gas distribution fees.

4.2 Natural gas supply infrastructure

Pipelines and Ports

By the end of 2010, the total length of China's domestic natural gas pipelines have reached 40,000 km. The first natural gas pipeline to bring Turkmen gas to China came online end-2009; this pipeline is estimated to reach a capacity of 30 bcm by June 2012.

In 2010, the east section of the Second phase of West-East Gas Pipeline, the Sichuan-East China Gas Pipeline, the Shibuya Cullinan double Pipeline, the Jiangdu-Rudong Pipeline and the Shaanxi-Beijing Gas Pipeline III have been put into operation. In addition, the construction of the China-Myanmar Gas Pipeline has officially been started. This pipeline will have a capacity of 12 bcm.

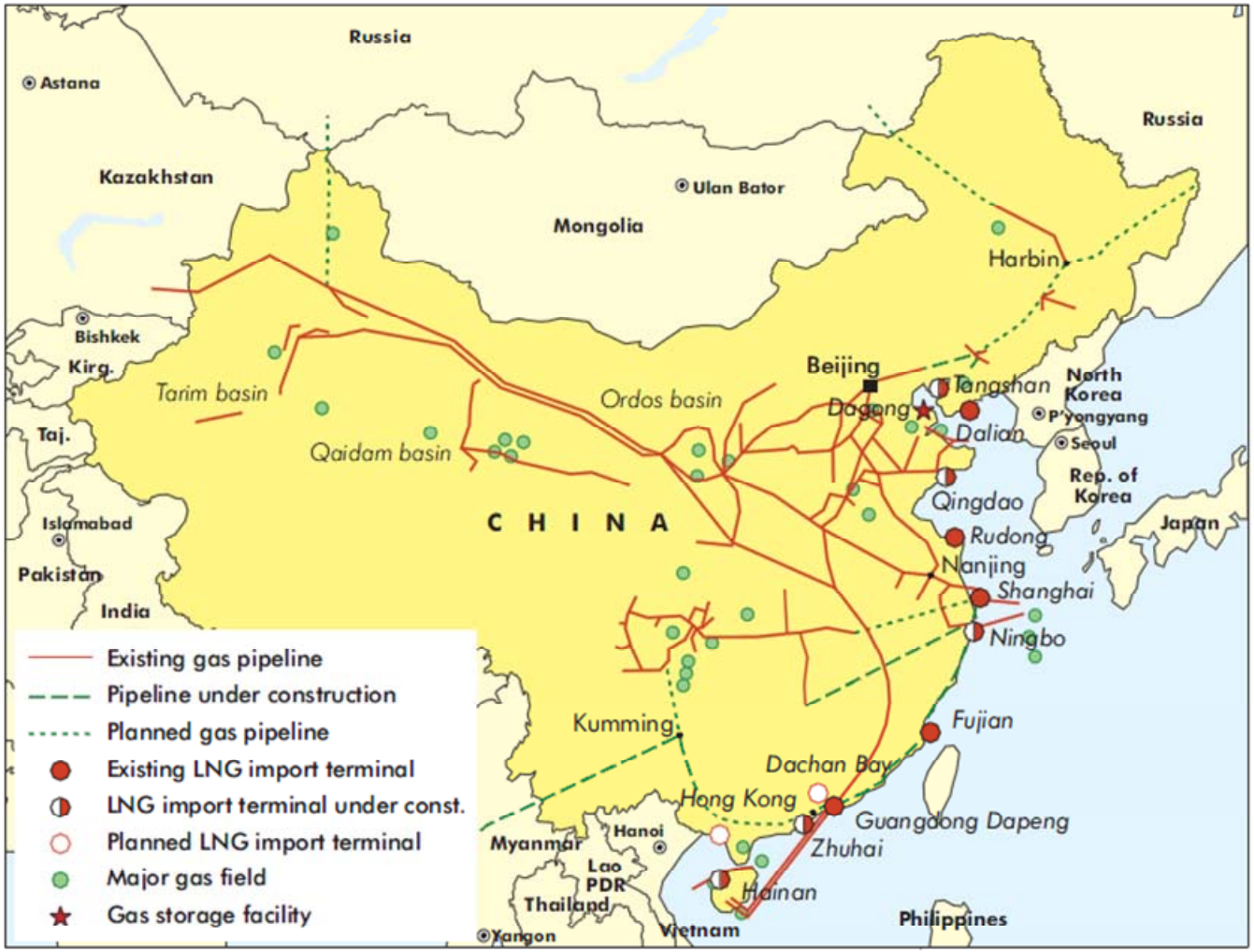
As China has formed national and regional gas pipeline networks, the total capacity of the main pipeline network has exceeded 100 bcm a year. Regional gas pipeline networks have been formed in the southwest, the Bohai Rim, Yangtze River Delta, the central South, and the northwest.

China is expanding not only its pipeline capacity but also its LNG regasification capacity. The country started importing LNG in 2006 and has now five LNG terminals in operation with a total regasification capacity of around 29 bcm. Six LNG terminals are reported to be under construction/expansion, which would increase China's total LNG regasification capacity from around 29 bcm to over 50 bcm in a few years.

Storage

In order to prevent a repeat of the gas shortage crisis in the winter of 2009, the Chinese government promoted construction of gas stock facilities in 2010. Three gas stock facilities have been built with a total working capacity of 1.4 bcm (one facility in Dagang), and ten gas storage facilities, including in the Huabei oil field and the Liao He oil field, with a total storage capacity of 24 bcm, are under planning/construction.

Natural Gas Infrastructure Map



4.3 Emergency Policy for Natural Gas

Since China had not been a net importer until 2006 and its consumption of natural gas had been quite limited compared to other fossil fuels, an emergency policy for natural gas disruption had not been highly prioritised. However, in addition to gradually increasing natural gas demand, after a gas shortage in the winter of 2009, the NDRC and the NEA have started formulating a response plan in cooperation with oil and gas companies in 2010. The key elements of this plan are to further promote domestic natural gas production, to construct gas storage facilities, as well as to accelerate construction of LNG terminals and interregional gas pipelines in order to strengthen supply of gas imports.

Since this plan is not made public, detailed information of this plan is not available. However, the government is considered to enhance its readiness and preparedness for gas supply disruptions as natural gas in becoming an important energy source.

INTERNATIONAL ENERGY AGENCY

The International Energy Agency (IEA), an autonomous agency, was established in November 1974. Its primary mandate was – and is – two-fold: to promote energy security amongst its member countries through collective response to physical disruptions in oil supply, and provide authoritative research and analysis on ways to ensure reliable, affordable and clean energy for its 28 member countries and beyond. The IEA carries out a comprehensive programme of energy co-operation among its member countries, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports. The Agency's aims include the following objectives:

- Secure member countries' access to reliable and ample supplies of all forms of energy; in particular, through maintaining effective emergency response capabilities in case of oil supply disruptions.
- Promote sustainable energy policies that spur economic growth and environmental protection in a global context – particularly in terms of reducing greenhouse-gas emissions that contribute to climate change.
- Improve transparency of international markets through collection and analysis of energy data.
- Support global collaboration on energy technology to secure future energy supplies and mitigate their environmental impact, including through improved energy efficiency and development and deployment of low-carbon technologies.
- Find solutions to global energy challenges through engagement and dialogue with non-member countries, industry, international organisations and other stakeholders.

IEA member countries:

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The European Commission also participates in the work of the IEA.

International Energy Agency

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