

# COUNTRY ANALYSIS BRIEFS

## China

Last Updated: August 2006

### Background

***The People's Republic of China (China) is the world's most populous country and the second largest energy consumer behind the United States. Rising oil demand and imports have made China a significant factor in world oil markets.***

China is the world's most populous country and has a rapidly growing economy. China's real gross domestic product (GDP) is estimated to have grown at 9.9 percent in 2005, down slightly from the 2004 rate of 10.1 percent. Economic forecasts remain strong for China, with real GDP expected to increase 9.9 percent in 2006. Inflows of foreign direct investment (FDI) into China totaled \$86.1 billion in 2005, a new record and roughly double the level of 2001. China's merchandise trade surplus soared to \$102 billion in 2005, its largest surplus ever and roughly three times larger than the 2004 figure.



Together with strong economic growth, China's demand for energy is surging rapidly. EIA forecasts that China's oil consumption will increase by almost half a million barrels per day in 2006, or 38 percent of the total growth in world oil demand. China is the world's third-largest net importer of oil behind the United States and Japan, an important factor in world oil markets.

Economic development has proceeded unevenly in China, with urban coastal areas experiencing more rapid economic development than in other parts of the country. As strong growth continues unabated, the Chinese government has taken measures to cool the economy. In August 2006, the central bank raised interest rates by 0.27 percent to bring lending rates to 6.12 percent, the second rate increase in four months. The central bank also raised the reserve requirement for commercial banks by 0.5 percent in June and July 2006, bringing the requirement to 8.5 percent. These moves serve to take money out of the money supply to help ward off possible economic overheating.

Breaking with previous policy, China delinked its currency, the renminbi, from the U.S. dollar in July 2005, resulting in an initial devaluation of 2.1 percent. The renminbi now floats within a very narrow 0.3 percent band against a basket of currencies from the country's major trading partners. Since the devaluation, the renminbi has remained well within the narrow band and has appreciated about 1.4 percent against the U.S. dollar as of mid-July 2006.

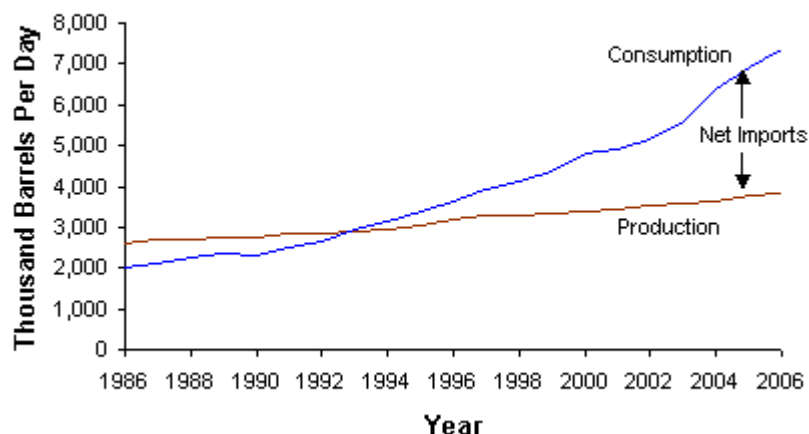
With China's entry into the World Trade Organization (WTO) in November 2001, the Chinese government made a number of specific commitments to trade and investment liberalization which, if fully implemented, will substantially open the Chinese economy to foreign firms. In the energy sector, this will mean the lifting or sharp reduction of tariffs associated with imports of some classes of capital goods, and the eventual opening to foreign competition of some areas such as retail sales of petroleum products.

## Oil

**China is the world's second-largest consumer of oil behind the United States, and the third-largest net importer of oil after the U.S. and Japan. China also produces a significant amount of oil and contains sizeable proven oil reserves.**

According to *Oil & Gas Journal (OGJ)*, China had 18.3 billion barrels of proven oil reserves as of January 2006, flat from the previous year. EIA estimates that China will produce 3.8 million barrels per day (Mmbbl/d) of oil in 2006, slightly higher than the previous year. Of this, 96 percent is expected to be crude oil. EIA estimates that China will consume 7.4 Mmbbl/d of oil in 2006, representing nearly a half million barrels per day increase from 2005. For 2006, EIA data forecasts that China's increase in oil demand will represent 38 percent of the world total increase in demand.

**China's Oil Production and Consumption, 1986-2006\***



Source: EIA *International Petroleum*

\*2006 is Jan-Aug only

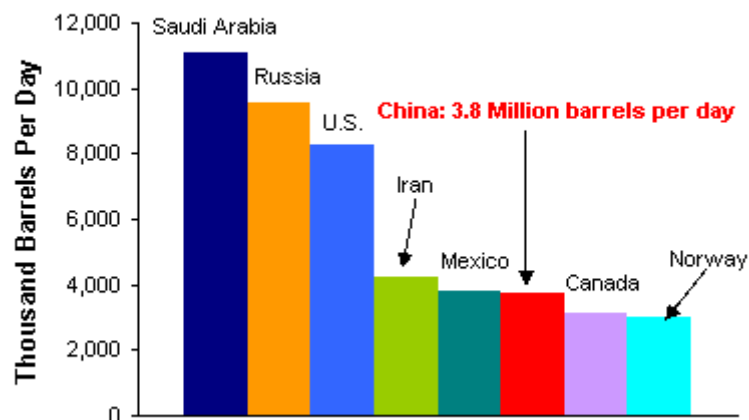
### Sector Organization

China's petroleum industry has undergone major changes over the last decade. In 1998, the Chinese government reorganized most state owned oil and gas assets into two vertically integrated firms: the China National Petroleum Corporation (CNPC) and the China Petroleum and Chemical Corporation (Sinopec). Each of these companies operates a range of local subsidiaries. The other major state sector firm is the China National Offshore Oil Corporation (CNOOC), which handles offshore exploration and production and accounts for roughly 15 percent of China's domestic crude oil production. CNPC, Sinopec, and CNOOC all carried out initial public offerings (IPOs) of stock between 2000 and 2002. However, the government maintains a majority stake in each through state-owned holding companies bearing the same name.

In general, CNPC and its affiliates tend to dominate in the north and west, Sinopec companies in the south, and CNOOC in offshore regions. Historically, CNPC has focused mainly on oil and gas exploration and production while Sinopec had been engaged in downstream activities such as refining and distribution. This pattern still somewhat exists, however restructuring during the 1990s helped to reduce this trend. CNPC and Sinopec operate virtually all of China's oil refineries and the domestic pipeline network.

The intention of the restructuring and IPOs was to make these state-owned firms more like vertically integrated international oil companies (IOCs) elsewhere. In connection with this process, the firms have been spinning off or eliminating many unprofitable ancillary activities. In early 2000, CNPC separated out most of its high quality assets into a subsidiary called PetroChina, and carried out its IPO of a minority 15 percent interest on both the Hong Kong and New York stock exchanges in April 2000. Sinopec also offered a 15 percent stake in its operations in its October 2000 IPO on the Hong Kong and New York stock exchanges. In February 2001, CNOOC held its IPO of a 27.5 percent stake after an earlier attempt in September 1999 was cancelled. In all of these stock offerings, only minority stakes were sold and the IPOs did not offer foreign companies a major voice in corporate governance.

### Top World Oil Producers, 2005



Source: EIA, *International Petroleum Monthly*

As a net oil importer since 1993, China's petroleum industry is focused on meeting domestic demand. Retail prices for petroleum products are regulated, with variations based on location and the type of consumer. The Chinese government maintains domestic price ceilings on finished petroleum products which, despite several decisions to increase domestic prices over the last couple years, have not kept pace with price increases in international markets. The Chinese government provides refiners with subsidies to ease the gulf between low domestic rates and high international oil prices. The eventual goal is to eliminate subsidized prices, but given the dependency of vulnerable segments of the Chinese population on cheap fuels, particularly in agriculture, it will likely take at least several years to accomplish this goal.

### Exploration and Production

**China's largest oil producing fields are mature and production has peaked, leading oil exploration activities to focus on developing largely untapped reserves in the western interior provinces and offshore fields.**

Roughly 85 percent of Chinese oil production capacity is located onshore. China's largest oil producing field, CNPC's Daqing field in northeastern China, accounts for more than 900,000 bbl/d, or one quarter of China's total crude oil production. Daqing is a mature oil field, and production levels have been reduced since 2004 while CNPC works to extend the life of the field. In April 2004, Chinese authorities announced several new oil discoveries in the existing Shengli field in northeastern China. These finds helped make Shengli, which is operated by Sinopec, the country's second-largest oil producing field, supplying more than 500,000 bbl/d according to OGJ's most recent estimate. CNOOC also produces more than 500,000 bbl/d from its offshore oil fields in the Bohai Bay and South China Sea.

Major Chinese Oil Fields by Production, January 2006	
Field	Production (bbl/d)
<b>China National Petroleum Corporation (CNPC)/PetroChina</b>	
Daqing	929,268
Liaohe	256,991
Xinjiang	222,524
Changqing	162,422
<b>China Petroleum and Chemical Corporation (Sinopec)</b>	
Shengli	535,531
Sinopec Star	78,567
Zhongyuan	67,092
<b>China National Offshore Oil Corporation (CNOOC)</b>	
Total offshore	519,108
Source: <i>Oil &amp; Gas Journal</i>	

Many foreign companies have been contracted to undertake oil exploration and production activities in China. According to Chinese law, however, China's national oil companies are entitled to take a majority (51 percent) stake in any commercial discovery, although they can choose to take a minority stake if they wish. The national oil companies can also take over field operations once the contracted firm has recovered its development costs. In offshore zones, CNOOC reserves the right to take over operations at any new discoveries, although certain shallow water locations such as the Zhao Dong field in the Bohai Bay are exempt. The Chinese government typically mandates a royalty fee of 12.5 percent for foreign companies involved in the oil sector, although discounts have been offered for development and exploration in more remote onshore areas, such as the western provinces of Qinghai and Xinjiang.

Recent oil exploration efforts have centered on developing onshore oil and natural gas fields in the western provinces of Xinjiang, Sichuan, Gansu, and Inner Mongolia as well as offshore fields in the Bohai Bay, Pearl River Delta, and South China Sea. In July 2006, PetroChina announced that it would open nine blocks in the Tarim basin in northwestern China's Xinjiang Uygur Autonomous Region for foreign companies to explore. The nine blocks cover more than 42,000 square miles and according to CNPC hold an estimated 43.9 billion barrels of potential oil reserves. Despite the lure of large potential reserves, previous bidding rounds in the Tarim basin received a tepid response from foreign companies, because potential bidders thought that its remote location and difficult geological structures would make exploration and development difficult.

Recently, offshore oil exploration in China has been the greater focus of the oil majors. CNOOC has initiated several Production Sharing Contracts (PSCs) with international oil companies for exploration and development in the Bohai Bay region. ConocoPhillips holds the largest acreage in the area, with total discovered reserves estimated at 732 million barrels. ConocoPhillips has a 49 percent stake in the Bozhong 11/05 block and has produced 30,000 bbl/d of crude oil from its Peng Lai 19-3 field since 2002, which it expects will eventually produce 140,000 bbl/d. Other companies involved in oil exploration and production activities in the Bohai Bay region are Kerr-McGee, Apache, Chevron, and Royal Dutch Shell. Some independent analysts estimate that the Bohai Bay area holds more than 1.5 billion barrels of recoverable oil reserves.

CNOOC holds a 51 percent stake in the CACT Operators Group, which includes Eni and Chevron that produces 110,000 bbl/d from five offshore fields in the South China Sea. Several other oil exploration and production projects are underway in the South China Sea and Pearl River Delta area. Husky Energy, Devon Energy, and Kerr-McGee established a joint venture with CNOOC in December 2005 for deepwater oil and gas exploration in the South China Sea. CNOOC officials have announced that deepwater exploration is a major priority for the offshore oil company. CNOOC is also involved in exploration activities in the East China Sea, although territorial disputes with its neighbors have so far limited large-scale development of fields in the region.

#### *Overseas Acquisitions*

***Much attention has been given to China's national oil companies investing in oil exploration and production assets overseas. However, so far these acquisitions have contributed relatively little to China's oil imports.***

With China's expectation of growing future dependence on oil imports, the country has been acquiring interests in exploration and production abroad. CNPC has acquired exploration and production interests in 21 countries spanning four continents. During 2005, CNPC announced its intentions to invest a further \$18 billion in foreign oil and gas assets between 2005 and 2020. In Sudan, CNPC has invested more than \$8 billion in the country's oil sector, including investments in a 900-mile pipeline to the Red Sea. In October 2005, CNPC finalized the purchase of PetroKazakhstan, whose assets include 11 oil fields and licenses to seven exploration blocks. In December 2005, this purchase was complemented by the completion of the 600-mile Sino-Kazakh oil pipeline that will deliver 200,000 bbl/d of crude oil to China by the end of 2006. In 2005, some of CNPC's other overseas investments included purchasing Encana's oil and gas assets in Ecuador and PetroCanada's oil and gas assets in Syria.

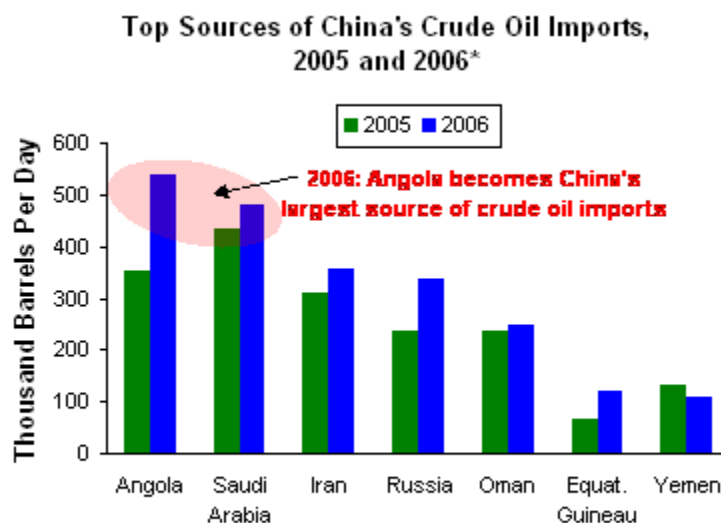
Sinopec has also looked overseas for oil exploration and production opportunities. In June 2006, Sinopec acquired a 97 percent stake in Udmurtneft, a mid-sized unit of BP's Russia vehicle TNK-BP, for \$3.5 billion. Udmurtneft produces 120,000 bbl/d of crude oil and holds 1 billion barrels of proven reserves in Russia. In October 2004 Sinopec signed a Memorandum of Understanding (MOU) with the Iranian government to acquire a 51 percent stake in the large Yadavaran oil field, which industry reports suggest could produce 300,000 bbl/d. Both China and Iran are still considering the possible \$70 billion deal, which would reportedly also include a commitment by China to import liquefied natural gas (LNG) from Iran. Sinopec has also acquired a 40 percent stake in Synenco Energy's \$4.5 billion Northern Lights oil sands project in Canada. The company expects the project to produce a total of 100,000 bbl/d of synthetic crude oil in 2010 when

commercial operations are scheduled to begin.

CNOOC is also working to expand its international oil production and exploration assets. In August 2005, CNOOC withdrew its \$18.5 billion bid to acquire Unocal after facing scrutiny from U.S. politicians. In 2005, CNOOC purchased Repsol-YPF's oil field interests in Indonesia, making CNOOC the largest operator in the offshore Indonesian oil sector. In January 2006, CNOOC acquired a 45 percent stake in an oil and gas field in the Niger Delta for \$2.3 billion. CNOOC has also reached smaller deals for exploration and development rights in Equatorial Guinea and Kenya, among other countries.

Taken together, these activities represent only a sample of the patchwork of international partnerships and acquisitions that Chinese oil and gas firms have made in recent years. While Chinese purchase of oil and gas assets abroad has received much attention, their total contribution to Chinese oil imports in mid-2005 was less than 300,000 bbl/d, or 8.5 percent of total oil imports at that time. It is not clear if new Chinese investment in oil exploration and production assets overseas during the last year has increased this percentage.

Angola surpassed Saudi Arabia as China's largest source of crude oil imports in February 2006. According to one industry report, in May 2006 China imported 750,000 bbl/d of crude oil from Angola, a 70 percent increase from the same month in 2005. According to the same report, between January and May 2006 China received 46 percent of its crude oil imports from the Middle East and 32 percent from Africa, while its neighbors in the Asia-Pacific region only supplied 5 percent of China's imports.



Source: FACTS, Inc. *China Oil and Gas Monthly*  
\*2006 data is January through June only

### Pipelines and Shipping

**China inaugurated its first transnational oil pipeline in May 2006 when it began receiving Kazakh and Russian oil from a pipeline originating in Kazakhstan.**

Given the soaring demand for oil and petroleum products in China, the country is firmly committed to improving its oil and gas transport infrastructure.

#### Domestic Pipelines

China has a large expanse of domestic oil pipelines, although the large national oil companies are working to establish a more integrated and complete oil pipeline network to better satisfy growing demand. CNPC's PetroChina currently owns and operates more than 6,000 miles of crude oil pipelines and more than 1,200 miles of refined product pipelines, with plans to build several new systems in the coming years. In 2005, less than half of the crude oil transported domestically by CNPC traveled via pipeline, while the rest typically traveled by rail. Among other plans, in January 2006 PetroChina received government approval for two trans-China pipelines. One will start from Lanzhou, in northwest China's Gansu province, with a capacity of 160,000 bbl/d and the second will begin at Jinzhou, in the northeastern Liaoning province, with a capacity of 80,000 bbl/d. Both pipelines will converge in Zhengzhou in central Henan province with a total projected cost of \$1.5

billion. PetroChina also hopes to begin operations in August 2006 at a new, 1,200-mile pipeline bringing 400,000 bbl/d of crude oil from Urumqi in the Xinjiang Uygur Autonomous Region in the west to Lanzhou.

Sinopec, China's largest oil refiner, is also actively expanding its pipeline network. In June 2006, the company announced plans to construct a 140-mile crude pipeline connecting its storage terminals at Tianjin's Nanjiang port with its petrochemical complex in Beijing. In October 2004, Sinopec began constructing a 600-mile crude oil pipeline that will eventually connect Yizheng with Changling. The first phase of the project, which connects Yizheng and Jiujiang, began operations in May 2006. Once completed, the final pipeline is expected to supply 540,000 bbl/d of oil to Sinopec's five refineries along the Yangtze River. It will also link up with Sinopec's pipeline network in northeastern China.

#### *Transnational Pipelines*

In July 2006, China began receiving crude oil imports from its first transnational oil pipeline. The new pipeline spans 620 miles, connecting Atasu in northern [Kazakhstan](#) with Alashankou in the Xinjiang Uygur Autonomous Region. The pipeline was developed by the Sino-Kazakh Pipeline Company, a 50:50 joint venture between CNPC and Kazakhstan's KazTransOil. The project has an initial capacity to transport 200,000 bbl/d of crude oil, with plans to double the capacity by 2010. Half of the imported oil comes from Kazakhstan and half from Russia.

Russia's Far East may also one day be a source for Chinese crude oil imports. Russian state-owned oil giant Transneft began construction in April 2006 on a pipeline that will reportedly span 2,500 miles from the Russian city of Taishet to the Pacific Coast (see [Russia Country Analysis Brief](#)). According to Transneft officials, the first 1500-mile stretch is expected to be completed in 2008 and reach Skovorodino, which is only 30 miles from the Chinese border. The second stretch of the Eastern Siberia-Pacific Ocean (ESPO) pipeline will presumably reach the Pacific Coast on Russian soil, although no final decision on end-points has been made. Likely candidates are Perevoznaya or Nakhodka, and Russian officials say they favor a route that would allow oil shipments to both China and Japan. Once completed, the project is expected to carry 1.6 million bbl/d of crude oil. News reports suggest that the first phase of the ESPO to Skovorodino will include a spur to Daqing, carrying as much as 600,000 bbl/d to one of China's major downstream oil centers. Russia's Eastern Siberia region has 7 billion barrels of proved oil reserves, with one exploration company in the area reporting that it contains 75 billion barrels of potential reserves.

In April 2006, China's National Development and Reform Commission (NDRC) reportedly approved a feasibility study to construct a new crude oil pipeline from Myanmar to China. As Myanmar does not produce significant amounts of crude oil, the pipeline is envisioned as an alternative transport route for crude from the Middle East and Africa that would bypass the choke point of the [Strait of Malacca](#). Contradictory news reports have suggested that Chinese planners do not consider the Myanmar-China route economically attractive and so far have no plans to build such a pipeline.

#### *Shipping*

According to official data, Chinese-owned ships carried only 9 percent of the crude oil the country imported in 2005. For its overall market size, China's tanker fleet is relatively small, with 18 very large crude carriers (VLCCs), most of which are older than other countries' fleets. Chinese planners reportedly want to expand the country's tanker fleet in hopes of ensuring security of supply.

#### *Downstream/Refining*

According to *OGJ*, China had 6.2 Mmbbl/d of crude oil refining capacity as of January 2006. Sinopec and CNPC are the two dominant players in China's oil refining sector. The expansive sector is undergoing modernization and consolidation, with dozens of small refineries shut down in recent years and larger refineries expanding and upgrading their existing facilities. Domestic price regulations for finished petroleum products have hurt Chinese refiners because of the large difference between current high international oil prices and low domestic rates. According to the BP Statistical Review of World Energy, refinery utilization in China increased from 67 percent in 1998 to 94 percent in 2004. As China seeks to bring additional refining facilities online to meet growing demand for finished petroleum products, BP forecasts that the country will increase refining capacity by 1.8 Mmbbl/d between 2004 and 2008, a 32 percent increase in total capacity.

***Recent attention has been given to building new facilities and upgrading existing plants so they can process heavier and more sour grades of crude oil from Middle Eastern countries.***

<b>Major Chinese Oil Refineries</b>	
<b>Refinery</b>	<b>Capacity (bbl/d)</b>
<b>China National Petroleum Corporation (CNPC)/PetroChina</b>	
Dalian	410,000
Lanzhou	250,000
Fushu	200,000
Heilongjiang	160,000 and 120,000
Liaoyang	200,000
<b>Total CNPC/PetroChina: 2,415,000</b>	
<b>China Petroleum and Chemical Corporation (Sinopec)</b>	
Zhenhai	403,000
Ningbo	320,000
Maoming	270,000
Nanjing	270,000
Guangzhou	260,000
Shanghai	226,000 and 176,000
Zibo	210,000
<b>Total Sinopec: 3,095,000</b>	
<b>West Pacific Petrochemical Corporation</b>	
Dalian	160,000
<b>Total China: 6,246,000</b>	
Source: OGI; FACTS, Inc. <i>China Oil and Gas Monthly</i>	

China's national oil companies are currently planning or building several new refineries and upgrading existing plants. In July 2006, PetroChina completed the expansion of its Dalian refining center, raising the plant's capacity from 210,000 bbl/d to 410,000 bbl/d, making it the largest refinery in China. Also in July 2006, Sinopec completed the construction of a new 160,000-bbl/d refinery at Hainan. The unit is expected to begin commercial operations by year-end 2006, and will be capable of producing diesel and gasoline that meets Euro III standards. In May 2006, Sinopec finished an upgrade at its Guangzhou refinery, increasing the system's capacity from 154,000 bbl/d to 260,000 bbl/d and adding additional petrochemical units.

In April 2006, the NDRC approved a joint PetroChina/Kuwait Petroleum Corporation (KPC) grassroots refinery at Nansha in the coastal city of Guangzhou. The project is anticipated to cost \$5 billion and have a final capacity of 300,000 bbl/d. In August 2005, CNPC began building a 200,000-bbl/d refinery in the city of Dushanzi, located in the Xinjiang Uygur Autonomous Region. The facility is scheduled to be completed by 2007, with a co-located 1 million tons per year (Mmt/y) ethylene cracker to come onstream in 2008. In July 2005, Sinopec reached an agreement with ExxonMobil and Saudi Aramco to expand the capacity at its Quongang refinery in Fujian from 80,000 bbl/d to 240,000 bbl/d. CNOOC, which has historically focused on offshore exploration and development, has recently moved into downstream sector. In December 2005, CNOOC and Royal Dutch Shell began construction on a joint \$4.3 billion refining and petrochemical complex at Huizhou in Guangdong province. Expected to be complete in 2008, the site will have a 240,000-bbl/d crude oil refinery as well as a 2.3 Mmt/y petrochemical facility.

A major issue for the Chinese downstream sector is the lack of adequate refining capacity suitable for heavier Middle Eastern crude oil, which makes up a large share of Chinese crude imports. Several existing refineries are being upgraded to handle heavier and more sour grades of crude oil. With consumption of petroleum products rising so rapidly, some interest is being rekindled in the construction of more modern greenfield refineries.

#### *Strategic Petroleum Reserve*

In China's tenth 5-Year Plan (2000-2005), Chinese officials raised the possibility of building a national strategic petroleum reserve (SPR). The first of these facilities, located in Zhenhai, is expected to be complete by August 2006 and have the capacity to store 32 million barrels

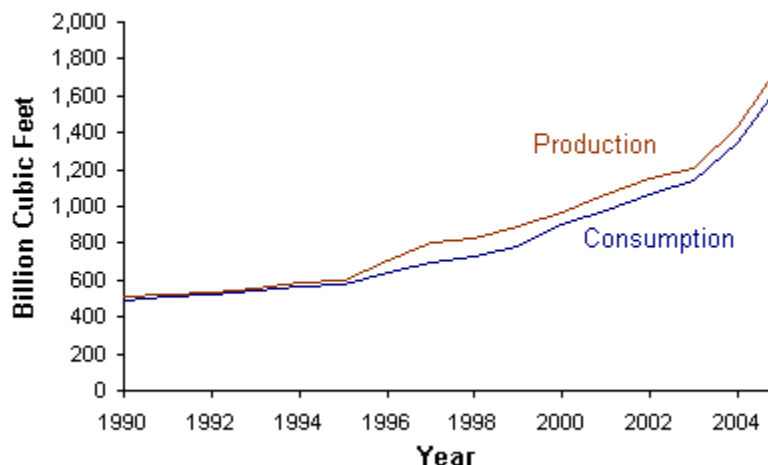
(Mmbbl) of oil. The NDRC has selected three other sites to have strategic oil reserves: Dalian (20 Mmbbl), Huangdao (25 Mmbbl), and Daishan (25 Mmbbl). There have been contradictory news reports regarding the overall capacity of the total SPR network, the anticipated storage tank filling rate, and numerous other project details. Chinese officials have variously indicated that the SPR system will eventually hold oil stockpiles covering 30 and 90 days supply.

## Natural Gas

**In 2004, natural gas accounted for only 3 percent of China's energy consumption. However, natural gas production and consumption is expected to rise in the coming years.**

Historically, natural gas has not been a major fuel in China, but its share in the country's energy mix is increasing. *Oil & Gas Journal (OGJ)* estimates that China's domestic proven reserves of natural gas stood at 53.3 trillion cubic feet (Tcf) as of January 2006. Other sources have put reserves much higher. Cedigaz estimates that China held 83 Tcf of proved natural gas reserves as of January 2006. EIA figures show that China consumed 1.3 Tcf of natural gas in 2004, almost doubling the level of natural gas consumption from five years prior. In 2004, natural gas accounted for only around 3 percent of total energy consumption in China, although this figure is expected to rise in the coming years. Until recently, natural gas was used primarily as a feedstock in chemical fertilizer production and an energy source at oil and gas fields.

**China's Natural Gas Production and Consumption, 1990-2005**



Source: 1990-2004: EIA; 2005: FACTS, Inc *China Oil and Gas Monthly*

### Sector Organization

As with oil, the natural gas sector is dominated by the three large state-owned oil and gas holding companies: CNPC, Sinopec, and CNOOC. CNPC operates primarily through its chief subsidiary PetroChina, and all three companies operate numerous local subsidiaries. CNPC is by a considerable margin the country's largest natural gas player in terms of production and reserves. CNPC data shows that the company produced 1.3 Tcf of natural gas in 2005, a 28 percent year-over-year increase. Sinopec reports that in 2005 the company produced a total of 222 Bcf of natural gas, a 7 percent increase from the previous year. And finally, CNOOC operating data shows that the company produced 142 Bcf of natural gas in 2005, a 7 percent increase from 2004.

One major hurdle for natural gas projects in China is the lack of a unified regulatory system. Currently, natural gas prices are governed by a patchwork of local regulations. The Chinese government is in the process of drafting a new legal framework for the natural gas sector, but the process has been slow, and there are still considerable uncertainties regarding price regulation and taxation issues dealing with natural gas sales.

### Exploration and Production

The country's largest reserves of natural gas are located in western and north-central China. Several recent discoveries of natural gas, if successfully developed, promise to significantly increase China's natural gas production in the coming years. In July 2006, Sinopec officials revealed that the company had uncovered three new natural gas fields in northeast China holding an estimated 2.1 Tcf of recoverable reserves. In April 2006, Sinopec confirmed a much larger



discovery at the Puguang natural gas field in the southwestern province of Sichuan. The Puguang field holds proven recoverable reserves of 8.9 Tcf, according to an official reserves assessment by China's State Ministry of Land and Resources. The company expects that commercial operations at the field will begin in 2008, initially producing about 140 Bcf per year, rising to 280 Bcf by 2010. In another significant move, PetroChina announced at the end of 2005 that it had discovered an additional 3.5 Tcf of recoverable natural gas reserves at the existing Daqing oil and gas field in northeast China's Heilongjiang province.

The discovery of the Puguang natural gas field makes it one of the largest natural gas fields in China. The largest find to date is the Sulige field in the Ordos basin in the Inner Mongolia Autonomous Region, with proven recoverable reserves of 18.9 Tcf. In March 2006, PetroChina and Total signed a PSC to jointly develop the South Sulige block. Another large natural gas field, the Kela-2 field in the Tarim basin, holds proven reserves of 8.9 Tcf. PetroChina declared that it expects to produce 85 Bcf from the Kela-2 field in 2006, eventually raising output to more than 700 Bcf annually in 2010 to supply the company's West-East natural gas pipeline. CNPC, which includes PetroChina, reported that at the end of 2005, the company held total proven recoverable natural gas reserves of 81.6 Tcf.

In June 2006, CNOOC and Husky Energy announced a new natural gas discovery with estimated possible reserves of 6 Tcf in the South China Sea. CNOOC representatives emphasized that the discovery still needs to be verified and accurately assessed, but if it materializes the find would be China's first deepwater natural gas discovery.

### **Pipelines**

China has a fragmented system of different pipelines and distribution networks. Until recently, much of China's natural gas consumption was limited to local natural gas producing regions. For example, Sichuan province in the southwest, which holds a large percentage of China's proved reserves, has China's most sophisticated natural gas distribution network. In the past, this local network only had limited connectivity to outside regions. As natural gas demand has grown in recent years, complemented by new natural gas discoveries, China has undertaken an effort to increase its natural gas transport infrastructure and improve the connections between networks. This is especially true since many of China's largest natural gas fields lay in remote basins in the western part of the country and must be piped to eastern population centers.

On the heels of its large Puguang natural gas discovery, Sinopec is looking to build a cross-country natural gas pipeline originating in Sichuan province. News reports indicate that the company originally planned for a route traveling to Jinan in Shandong province, but that the NDRC has encouraged that the pipeline extend to Shanghai instead. Sinopec is studying different options, and it has not announced a formal decision. Shanghai already receives piped natural gas from PetroChina's West-East Gas Pipeline and other regional lines, but independent analysts believe Sinopec may choose to build the planned pipeline to Shanghai because of growing demand.

PetroChina's West-East natural gas pipeline, which began operations in January 2005, represents CNPC's main natural gas backbone. The 2,500-mile pipeline originates in the Xinjiang region in the west, with the main branch line ending in Shanghai. The West-East pipeline has a capacity of 1.2 Bcf/d and contains numerous regional spurs along the main route, which has improved the interconnectedness of China's natural gas transport network.

### ***Transnational Pipelines***

In addition to expanding upon the domestic pipeline infrastructure, China is looking to establish transnational natural gas pipelines with several neighboring countries. In February 2005, Kazakhstan's state-owned KazMunaiGas (KMG) was reportedly conducting a feasibility study of a natural gas pipeline to China in partnership with CNPC. If such a pipeline were built, KMG officials have said that it could be operational by as early as 2009 and also supply natural gas from Turkmenistan and Uzbekistan.

Another proposed international pipeline project would link the Russian natural gas grid in Siberia to China, and possibly South Korea, via a pipeline from the Kovykta natural gas fields near Irkutsk. The cost of the project has been estimated at \$12 billion with a total planned capacity of 2.9 Bcf/d, of which China would consume 1.9 Bcf/d and Kogas, South Korea's main natural gas company, would consume 1 Bcf/d. Both CNPC and Kogas signed letters of intent for the project in November 2003, although several independent analysts have expressed doubts that the project will come to fruition. During talks between Russian President Putin and Hu Jintao in April 2006,

the two leaders reportedly agreed to move ahead with the proposed Kovykta pipeline by 2011, although as of July 2006, no formal decision has been made on whether or not to proceed with the project.

### Liquefied Natural Gas

With natural gas use on the rise in China, and uncertainties surrounding the potential of piped Russian natural gas, LNG has increasingly been considered by Chinese companies. In a joint venture with BP and local firms, CNOOC built China's first LNG import terminal in Guangdong province, which received its first 60,000 ton shipment of LNG in May 2006. The facility has a capacity to handle 3.7 million tons per year (Mmt/y) of LNG, with a planned second phase that would double capacity in the future. CNOOC awarded a 25-year, 3.3 Mmt/y LNG supply agreement to Australia's Northwest Shelf consortium to supply the new import terminal. CNOOC is currently building another LNG import terminal in Fujian province, which is scheduled to be complete in 2007 and have a capacity of 3 Mmt/y. The Fujian project will receive LNG from BP's Tangguh consortium in Indonesia.

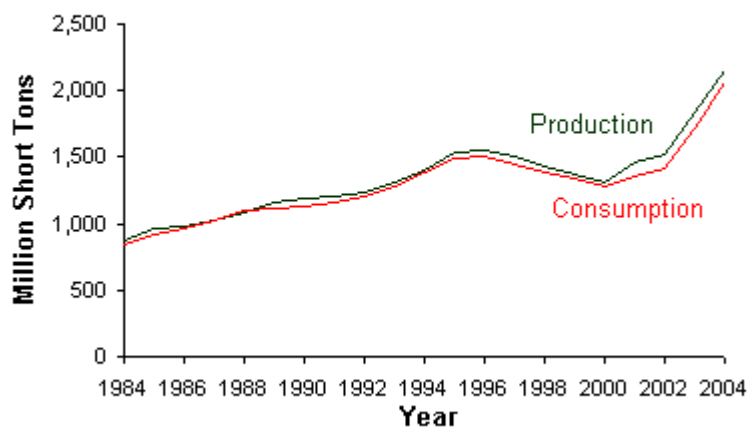
As many as a dozen other LNG terminals are either planned or proposed. CNPC, Sinopec, and CNOOC are all considering new LNG facilities, but recent LNG price increases have delayed some plans while the companies try to negotiate long-term LNG supply agreements. Planned or proposed LNG projects not yet under construction include: CNOOC projects at Ningbo in Zhejiang province, Qingdao in Shandong province, and Shanghai; CNPC/PetroChina projects at Tangshan in Hebei Province, Jiangsu Province, and Dalian in Liaoning Province; and Sinopec projects in Shandong and an island off the southeastern city of Zuhai.

### Coal

***China is the largest producer and consumer of coal in the world, and many of China's large coal reserves have yet to be developed.***

Coal makes up 69 percent of China's total primary energy consumption, and China is both the largest consumer and producer of coal in the world. China holds an estimated 126.2 billion short tons of recoverable coal reserves, the third-largest in the world behind the United States and Russia. Northern China, especially Shanxi Province, contains most of China's easily accessible coal and virtually all of the large state-owned mines. Coal from southern mines tends to be higher in sulfur and ash, and therefore unsuitable for many applications. In 2004, China consumed 2.1 billion short tons of coal, representing more than one third of the world total and a 46 percent increase since 2002. Coal consumption has been on the rise in China over the last five years, reversing the decline seen from 1997 to 2000.

**China's Coal Production and Consumption, 1984-2004**



Source: EIA International Energy Annual

China's coal industry has traditionally been spread out among large state-owned coal mines, local state-owned coal mines, and thousands of town and village coal mines. In February 2006, the NDRC revealed a plan to restructure China's coal sector and reduce the fragmentation in the industry, with the goal of establishing five to six giant conglomerates in China's main coal-producing provinces and closing down all small coal mines by 2015. Under the NDRC's directives, the Chinese government would look to aggregate the coal industry into large state-owned holding companies and seek to raise capital through international stock offerings, much

like the creation of CNPC and Sinopec. The model for this vision is the state-owned Shenhua Group, which is China's largest coal company by production and the parent company of Hong Kong-listed Shenhua Energy Corporation.

A number of factors are driving this trend. China has tens of thousands of small local coal mines where inefficient management, insufficient investment, outdated equipment, and poor safety records prevent the full utilization of coal resources. The goal of consolidating the industry is to raise total coal output, attract greater investment and new coal technologies, and improve the safety and environmental record of coal mines. According to one industry report, at the end of 2005 China had 28,000 coal mines, of which 2,000 were state-owned. Independent analysts estimate that over the past several years China has closed down between 20,000 and 50,000 small coal mines.

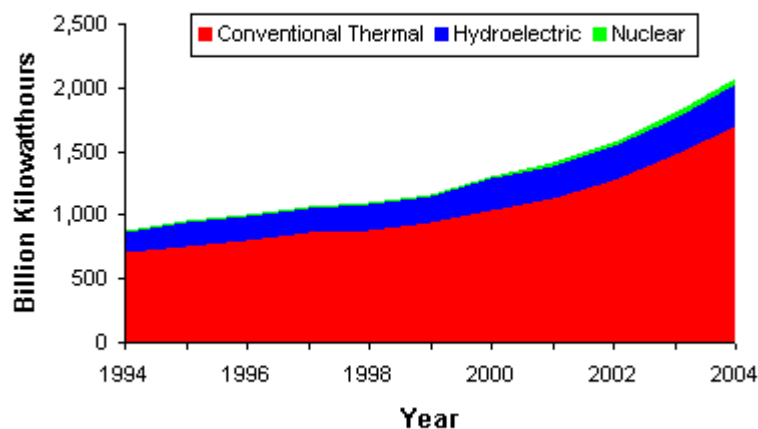
In contrast to the past, China is becoming increasingly open to foreign investment in the coal sector, particularly in an effort to modernize existing large-scale mines and introduce new technologies into China's coal industry. The China National Coal Import and Export Corporation is the primary Chinese partner for foreign investors in the coal sector. Areas of interest in foreign investment concentrate on new technologies with efficiency and environmental benefits, including coal liquefaction, coal bed methane production, and slurry pipeline transportation projects. The Chinese government is actively promoting the development of a large coal-to-liquids industry. A Shenhua Group subsidiary is scheduled to complete construction of the country's first coal-to-liquids plant in mid-2007. The facility will be located in the Inner Mongolia Autonomous Region and have an initial capacity of approximately 60,000 bbl/d of diesel.

## Electricity

***China's electricity generation continues to be dominated by fossil fuel sources, particularly coal. The Chinese government has made the expansion of natural gas-fired power plants a priority.***

In 2004, China had total installed electricity generating capacity of 391.4 gigawatts (GW), 74 percent of which came from conventional thermal sources. In 2004, China generated 2,080 billion kilowatt-hours (Bkwh) and consumed 1,927 Bkwh of electricity. Since 2000, both electricity generation and consumption have increased by 60 percent.

**Electricity Generation in China by Type, 1994-2004**



Source: EIA International Energy Annual

## Sector Organization

In 2002, the Chinese government dismantled the monopoly State Power Corporation (SPC) into separate generation, transmission, and services units. Since the reform, China's electricity generation sector is dominated by five state-owned holding companies, namely China Huaneng Group, China Datang Group, China Huadian, Guodian Power, and China Power Investment. These five holding companies manage more than 80 percent of China's generating capacity. Much of the remainder is operated by independent power producers (IPPs), often in partnership with the privately-listed arms of the state-owned companies. Deregulation and other reforms have opened the electricity sector to foreign investment, although this has so far been limited.

During the 2002 reforms, SPC divested all of its electricity transmission and distribution assets into two new companies, the Southern Power Company and the State Power Grid Company. The government aims to merge SPC's 12 regional grids into three large power grid networks, namely a northern and northwestern grid operated by State Power Grid Company and a southern grid operated by the Southern Power Company. Chinese officials hope to achieve an integrated national electricity grid by 2020. Also in 2002, the State Electricity Regulatory Commission (SERC) was established, which is responsible for the overall regulation of the electricity sector.

According to one industry study conducted at the end of 2005, over 120 GW of generating capacity is currently under construction in China. Rapid growth in electricity demand has spurred significant amounts of investment in new power stations. Although much of the new investment has been earmarked to alleviate electricity supply shortages, some independent analysts forecast the possibility of oversupply as an assortment of new projects are scheduled to come online between 2007 and 2009. To ward off a possible supply glut, Chinese government officials have made an effort to approve new projects at a steady and measured rate.

### Conventional Thermal

Conventional thermal sources are expected to remain the dominant fuel for electricity generation in the coming years, with many power projects under construction or planned that will use coal or natural gas. As with coal mining, the Chinese government is looking to shut down or modernize many small and inefficient power plants in favor of medium-sized (300 to 600 MW) and large (1000 MW and up) units. China's eleventh five-year plan, covering the period 2005-2010, calls for the country to increase the share of natural gas and other cleaner technologies into the country's energy mix.

There are several examples of China's effort to bring new natural gas-fired power stations online. In July 2006, Huaneng Power International, which is China's largest listed electricity generation company, started operations at a new natural gas-fired power plant in Shanghai. The facility has a capacity of 1,200 MW, making it China's largest natural gas-fired power station. Construction is also underway at the 2,000-MW Huizhou power plant near Shenzhen that will use 560,000 metric tons of LNG per year from the new Guangdong terminal. Also in Guangdong, at least six other 300-MW natural gas-fired units are planned or under construction, and 1.8 GW of other existing coal and oil-fired power plants are being converted to run on natural gas. The first natural-gas fired plant in Beijing started operations in July 2006. The new unit has a capacity of 150 MW, and several companies are working to open additional larger natural gas-fired generators in Beijing before the 2008 summer Olympics.

Although many analysts forecast that natural gas will see the greatest percentage rise in installed electricity generation capacity over the next decade, coal is expected to show the largest increase in absolute terms. In the first half of 2006, the continued uncertainty over future Russian natural gas supplies and the rising costs of planned LNG imports may push China even more toward coal for its future energy needs. China has vast coal reserves, much of which have yet to be developed, and coal projects tend to be much cheaper than natural gas or other sources.

### Hydroelectric

***China is currently building the Three Gorges Dam hydroelectric facility, which, when completed in 2009, will be the largest hydroelectric project in the world.***

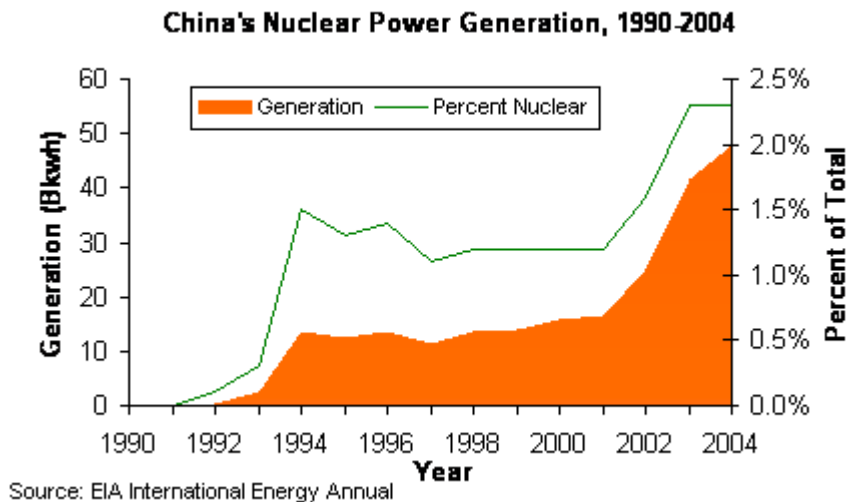
In 2004, China was the world's second-largest producer of hydroelectric power behind Canada. In the same year, China generated 328 billion kilowatthours of electricity from hydroelectric sources, representing 15.8 percent of its total generation. This figure is likely to increase given the number of large-scale hydroelectric projects planned or under construction in China. The largest power project under construction is the Three Gorges Dam, which will include 26 separate 700-MW generators, for a total of 18.2 GW. When completed, it will be the largest hydroelectric dam in the world. The Three Gorges project already has several units in operation, but the project is not expected to be fully completed until 2009.

Another large hydropower project involves a series of dams on the upper portion of the Yellow River. Shaanxi, Qinghai, and Gansu provinces have joined to create the Yellow River Hydroelectric Development Corporation, with plans for the eventual construction of 25 generating stations with a combined installed capacity of 15.8 GW.

### Nuclear

China is also actively promoting nuclear power as a clean and efficient source of electricity generation. Although it makes up only a small fraction of China's installed generating capacity, many of the major developments taking place in the Chinese electricity sector recently involve

nuclear power. EIA and independent sources forecast that China will add between 15 and 30 GW of new nuclear energy capacity by 2020, but even with this expansion, nuclear power will only represent between 2.5 and 4.5 percent of total installed generating capacity.

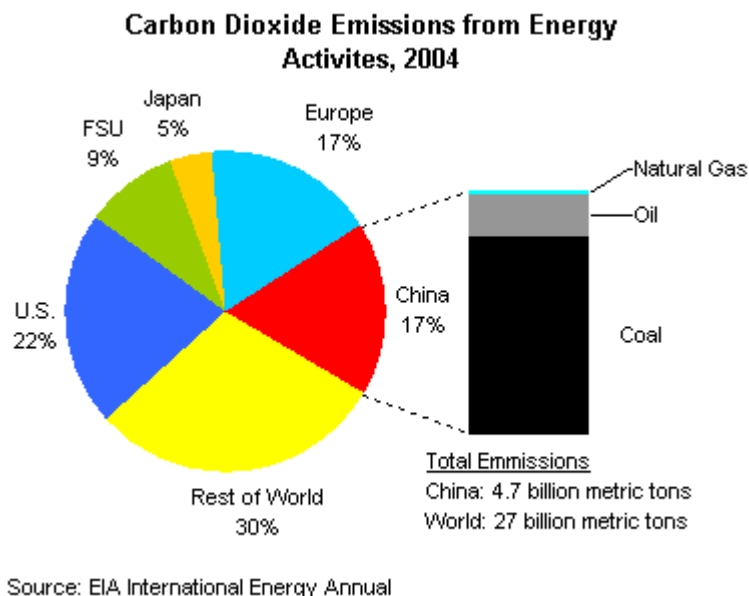


As of mid-2006, China had eight new nuclear power plants under construction, the biggest of which is a 6-GW nuclear complex at Yangjiang in Guangdong province, set to begin commercial operation in 2010.

## Environment

**China is the world's second-largest source of carbon dioxide emissions.**

China's rapid economic growth over the last two decades has also brought with it several energy-related environmental problems. Environmental pollution from fossil fuel combustion is damaging human health, air and water quality, agriculture, and ultimately the economy. Many of China's cities are among the most polluted in the world. China is the world's second-largest source of carbon dioxide emissions behind the United States. EIA forecasts predict that China will experience the largest growth in carbon dioxide emissions between now and the year 2030 (for more information, please see the [International Energy Outlook 2006, Table A10](#)).



China is a non-Annex I country under the United Nations Framework Convention on Climate

Change, meaning that it is not bound to any GHG emissions reduction targets set under the Kyoto Protocol. The Chinese government has taken several steps to improve environmental conditions in the country. Chief among these is the new Law on Renewable Energy, which took effect on January 1, 2006. The new law seeks to promote cleaner energy technologies, with a stated goal of increasing the use of renewable energy to 10 percent of the country's electricity consumption by 2010 (up from roughly 3 percent in 2003).

## Profile

### Country Overview

<b>President</b>	Hu Jintao (since March 2003)
<b>Premier</b>	Wen Jibao (since March 2003)
<b>Location</b>	Eastern Asia, bordering the East China Sea, Korea Bay, Yellow Sea, and South China Sea, between North Korea and Vietnam
<b>Independence</b>	221 BC (unification under the Qin or Ch'in Dynasty); 1 January 1912 (Manchu Dynasty replaced by a Republic); 1 October 1949 (People's Republic established)
<b>Population (2005E)</b>	1,306,313,812
<b>Languages</b>	Standard Chinese or Mandarin (Putonghua, based on the Beijing dialect), Yue (Cantonese), Wu (Shanghaiese), Minbei (Fuzhou), Minnan (Hokkien-Taiwanese), Xiang, Gan, Hakka dialects, minority languages (see Ethnic groups entry)
<b>Religion</b>	Daoist (Taoist), Buddhist, Muslim 1%-2%, Christian 3%-4% note: officially atheist (2002 est.)
<b>Ethnic Group(s)</b>	Han Chinese 91.9%, Zhuang, Uygur, Hui, Yi, Tibetan, Miao, Manchu, Mongol, Buyi, Korean, and other nationalities 8.1%

### Economic Overview

<b>Exchange Rate (August 8, 2006)</b>	1 Chinese Yuan Renmimbi = 0.125 USD
<b>Inflation Rate (2004E, 2005E, 2006F)</b>	3.9%, 1.8%, 2.2%
<b>Gross Domestic Product (2005E)</b>	\$2.23 trillion
<b>Real GDP Growth Rate (2004E, 2005E, 2006F)</b>	10.1%, 9.9%, 9.9%
<b>Unemployment Rate (2005E)</b>	4.2%
<b>External Debt (2005E)</b>	\$252.8 billion
<b>Exports (2005E)</b>	\$779.7 billion
<b>Exports - Commodities</b>	machinery and equipment, plastics, optical and medical equipment, iron and steel
<b>Exports - Partners (2004E)</b>	US 22.8%, Hong Kong 16.2%, Japan 12.4%, South Korea 4.4%, Germany 4%
<b>Imports (2005E)</b>	\$649.7 billion
<b>Imports - Commodities</b>	machinery and equipment, oil and mineral fuels, plastics, optical and medical equipment, organic chemicals, iron and steel
<b>Imports - Partners (2004E)</b>	Japan 16.1%, Taiwan 10.9%, South Korea 10.4%, US 7.7%, Hong Kong 7.4%, Germany 5.4%
<b>Current Account Balance (2005E)</b>	\$160.8 billion

### Energy Overview

<b>Proven Oil Reserves (January 1, 2006E)</b>	18.3 billion barrels
<b>Oil Production (2006E)</b>	3,806.2 thousand barrels per day, of which 96% was crude oil.
<b>Oil Consumption (2005E)</b>	6,899.6 thousand barrels per day
<b>Crude Oil Distillation Capacity (2006E)</b>	6,246 thousand barrels per day

<b>Proven Natural Gas Reserves (January 1, 2006E)</b>	53.3 trillion cubic feet
<b>Natural Gas Production (2004E)</b>	1.4 trillion cubic feet
<b>Natural Gas Consumption (2004E)</b>	1,350.5 billion cubic feet
<b>Recoverable Coal Reserves (2003E)</b>	126,214.7 million short tons
<b>Coal Production (2004E)</b>	2,156.4 million short tons
<b>Coal Consumption (2004E)</b>	2,062.4 million short tons
<b>Electricity Installed Capacity (2004E)</b>	391.4 gigawatts
<b>Electricity Production (2004E)</b>	2,079.7 billion kilowatt hours
<b>Electricity Consumption (2004E)</b>	1,927 billion kilowatt hours
<b>Total Energy Consumption (2004E)</b>	59.6 quadrillion Btus*, of which Coal (69%), Oil (22%), Hydroelectricity (6%), Natural Gas (3%), Nuclear (1%), Other Renewables (0%)
<b>Total Per Capita Energy Consumption (2003E)</b>	34.9 million Btus
<b>Energy Intensity (2004E)</b>	9,080.4 Btu per \$2000-PPP**

## Environmental Overview

<b>Energy-Related Carbon Dioxide Emissions (2003E)</b>	3,541 million metric tons, of which Coal (81%), Oil (17%), Natural Gas (2%)
<b>Per-Capita, Energy-Related Carbon Dioxide Emissions (2003E)</b>	2.7 metric tons
<b>Carbon Dioxide Intensity (2004E)</b>	0.7 Metric tons per thousand \$2000-PPP**
<b>Environmental Issues</b>	air pollution (sulfur dioxide particulates) from reliance on coal produces acid rain; water shortages, particularly in the north; water pollution from untreated wastes; deforestation; estimated loss of one-fifth of agricultural land since 1949 to soil erosion and economic development; desertification; trade in endangered species
<b>Major Environmental Agreements</b>	party to: Antarctic-Environmental Protocol, Antarctic Treaty, Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Hazardous Wastes, Law of the Sea, Marine Dumping, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands, Whaling signed, but not ratified: none of the selected agreements

## Oil and Gas Industry

<b>Organization</b>	China's oil and gas industry is dominated by three state-owned holding companies: the China National Petroleum Corporation (CNPC); the China Petroleum and Chemical Corporation (Sinopec); and the China National Offshore Oil Corporation (CNOOC).
<b>Major Oil/Gas Ports</b>	Shanghai, Zhanjiang, Zhuhai, Guangzhou, Xiamen (Amoy), Hangzhou, Qingdao, Dalian, Tianjin
<b>Foreign Company Involvement</b>	Agip, Apache, BP, ChevronTexaco, ConocoPhillips, Eni, ExxonMobil, Husky Energy, Kerr-McGee, Mitsubishi, Royal Dutch Shell, Saudi Aramco, Total
<b>Major Oil Fields (production, bbl/d)</b>	Daqing (929,268), Shengli (535,531), Liaohe (256,991), Xinjiang (222,524), Changqing (162,422)
<b>Major Natural Gas Basins</b>	Tarim (Xinjiang), Sichuan, Ordos (Shaanxi, Inner Mongolia)
<b>Major Refineries (capacity, bbl/d)</b>	Zhenhai (403,000), Ningbo (320,000), Maoming (270,000), Nanjing (270,000), Lanzhou (250,000), Shanghai (226,000 and 176,000), Dalian (210,000 and 160,000), Fushu

(200,000), Beijing (170,000), Heilongjiang (160,000 and 120,000), Guangzhou (154,000), Liaoyang (150,000)

\* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.  
\*\*GDP figures from OECD estimates based on purchasing power parity (PPP) exchange rates.

## Links

### EIA Links

[International Energy Outlook 2006 \(IEO2006\)](#)  
[IEO2006 – Liquefied Natural Gas: Market Developments in China](#)  
[August 2006 Short-Term Energy Outlook \(STEO\)](#)

### U.S. Government

[CIA World Factbook - China](#)  
[Lawrence Berkeley National Laboratory \(LBNL\) - China Energy Group](#)  
[National Renewable Energy Laboratory \(NREL\) - China](#)  
[U.S. State Department Consular Information Sheet - China Programs](#)  
[U.S. State Department Background Notes on China](#)  
[U.S. Embassy, Beijing](#)  
[U.S. Census Bureau – U.S. Trade Balance With China](#)  
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### Associations and Institutions

[Asian Development Bank \(ADB\) – China page](#)  
[The World Bank](#)  
[The International Monetary Fund – China page](#)  
[The United Nations \(UN\) in China](#)  
[The World Trade Organization \(WTO\) – China page](#)  
[The World Health Organization \(WHO\) – China page](#)  
[Association of Southeast Asian Nations \(ASEAN\) Plus Three](#)  
[Asia-Pacific Economic Forum \(APEC\) – China page](#)

### Foreign Government Agencies

[National Bureau of Statistics of China](#)  
[National Development and Reform Commission \(NDRC\)](#)  
[China's Ministry of Commerce](#)  
[China's](#)  
[China's Ministry of Land and Resources](#)

### Non-Governmental Organizations

[The China Sustainable Energy Program \(CSEP\)](#)  
[National Bureau of Asian Research \(NBR\) – Asian Energy Security Program](#)

### Oil and Natural Gas

[China National Petroleum Corporation \(CNPC\)](#)  
[China Petrochemical Corporation \(Sinopec\)](#)  
[China National Offshore Oil Corporation \(CNOOC\)](#)  
[ExxonMobil – China](#)  
[Shell – China](#)

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Petroleum Intelligence Weekly  
Petroleum Review  
Platts Commodity News  
Reuters  
Rigzone  
U.S. Commerce Department  
U.S. Energy Information Administration  
Wall Street Journal  
World Gas Intelligence  
Xinhua News Agency

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