



EAST-WEST CENTER

PROGRAM ON RESOURCES:
ENERGY AND MINERALS

CHINA ENERGY UPDATE

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Economic Development in China

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CHINA ENERGY UPDATE

This report is based on a variety of published and unpublished sources. The information is deemed reliable, but accuracy cannot be guaranteed. The briefing is intended to be an information source rather than an investment guide.

Editor's Note: With a primary focus on oil, gas, and petrochemicals, this issue of the newsletter features (1) a summary of China's energy scene in 1997 and early 1998; (2) a collection of information on China's oil and gas projects, petroleum market developments, foreign investment projects, and government policy changes during the period from January to April 1998; and (3) a centerpiece article analyzing China's recent petroleum organizational changes. Statistical appendix tables on China's energy production, trade, and consumption for the fourth quarter 1997 (including oil trade for the whole year) and the first quarter 1998 are presented at the end of the issue.

I. Commentary and Summary: 1997/1998¹

China is the world's second largest consumer of primary commercial energy after the United States and the third largest energy producer after the United States and Russia. On an average basis, however, China's primary energy consumption is about half of the world average and less than one-tenth of the US per capita consumption.

As a large developing country with a rapidly growing economy, China's overall demand for energy is huge, and the demand growth is strong. The country is striving to produce enough energy for its needs, but the shortage of indigenous energy and petroleum in particular is certain to grow, leading to a large requirement of energy imports in the future.

China is the largest oil producer and second largest oil consumer in Asia. In 1997, China produced 3.22 million barrels per day (b/d)

of crude oil (up 2.4% from the 1996 output level), making it the world's fifth largest oil producer after Saudi Arabia, the United States, Russia, and Iran when NGLs (natural gas liquids) are excluded.² The production included 2.9 million b/d of onshore output (up from 2.85 million b/d in 1996) and 324 thousand b/d (kb/d) from offshore. The onshore production in 1997 mainly came from CNPC, but CNSPC (China National Star Petroleum Corp.) also contributed 31 kb/d. The three largest oil fields in China (Daqing, Shengli, and Liaohe) had a combined output of just under 2 million b/d in 1997, and their production has been flat for most of the 1990s. The three fields accounted for about 62% of the country's total production in 1997, down from 74% in 1990. Production from Xinjiang Uigur Autonomous Region (including the Tarim Basin) reached 318 kb/d in 1997—an increase of 11% over the 1996 level and more than doubling the production level in 1990. Offshore production continued to rise in 1997 to reach 324 kb/d, up 8% from the 1996 level of 300 kb/d. From 1990 to 1997, the share of offshore oil in China's total crude production increased from 1% to 10%.

The total capacity of Chinese refineries exceeded 4.4 million b/d at the end of 1997. These refineries are estimated to have processed approximately 3.3 million b/d of crude oil during 1997, up from a little over 3 million b/d in 1996.

China consumes much of its own oil output but exports both crude and products at the same time. In 1997, China exported just under 400 kb/d of crude oil and over 150 kb/d of various products. In the meantime,

¹ This section was prepared by Kang Wu.

² If NGLs are included, Mexico and Venezuela produced more crude/NGLs than China did in 1997.

imports of oil are also on the rise. In 1997, China imported ⁷⁰⁹~~7090~~ kb/d of crude oil and 563 kb/d of petroleum products (including LPG), up 55% and 32%, respectively, from the 1996 levels. Fuel oil, diesel, and LPG constituted the majority of oil product imports during the past two years. On an overall basis, China imported a total of nearly 1.3 million b/d of crude oil and products combined and exported 551 kb/d in 1997. The net oil imports were 722 kb/d, up from 359 kb/d in 1996 and 219 kb/d in 1995.

In 1997, Japan continued to be the largest importer of Chinese crude, accounting for 53% of China's total crude exports, followed by South Korea (23%), the United States (12%), Indonesia (6%), North Korea (3%), and others. About 31% of China's non-LPG refined product exports went to Hong Kong, followed by Singapore (14%), South Korea (12%), Vietnam (10%), and Japan (7%).

Oman overtook Indonesia to be the largest crude exporter to China, accounting for 25% of China's crude imports in 1997, followed by Indonesia (19%), Yemen (11%), Angola (11%), Iran (8%), and Vietnam (4%). In comparison, Singapore provided 45% of China's non-LPG product imports, followed by South Korea (23%), Russia (13%), and Japan (11%). Among the sources of product imports, the increase from South Korea is notable. South Korea's product exports (excluding LPG) to China jumped from 52 kb/d in 1996 to 94 kb/d in 1997.

In 1997, China's petroleum product consumption (including direct use of crude oil in industrial sectors and for power generation) is estimated at 3.69 million b/d in 1997, 9.4% more than the 1996 consumption of 3.37 million b/d.

Affected by the Asian financial crisis and oil price declines in the international market, China's refineries have had a hard time selling their products at the high domestic prices regulated by the government, while demand has been weak so far in 1998. Low international prices have also boosted the smuggling activities in coastal areas. Our preliminary projections for 1998 are the following: China is expected to produce 3.1-3.3 million b/d of crude production, refine 3.3-3.5 million b/d of oil, import 1.2-1.4 million b/d of combined crude oil and products, and export 400-650 kb/d. Projected petroleum product consumption for 1998 will be 3.7-3.9 million b/d. The wide range of the projections is a reflection of uncertainties in the Chinese oil market.

Compared with the 1980s, the average annual growth rate of China's **natural gas** production has accelerated from a mere 0.7% to 4.8% during the 1990-97 period. As a result, China's gas output, which had increased from 14.3 billion cubic meters (m³) in 1980 to only 15.3 billion m³ in 1990, rose to 21.2 billion m³ in 1997.³ The government's target is to raise the natural gas production to 25 billion m³ in 2000 and 30 billion m³ by 2005.

China's gas market is still fragmented, and substantial investment is needed to link the producing fields and the market. At the present time, about 36% of the gas is used for fertilizer production, 21% as industrial fuels in the manufacturing sector, 11% in the residential sector, 29% in the mining sector (nearly all used in oil and gas fields), and less

³ We reported in the last issue that China's 1997 gas output was 24.5 billion m³.

Although this number was obtained from an official Chinese source, it appeared to be mistakenly high on a comparable basis.

than 1% for power generation. In other words, commercial gas supplied out of the oil and gas fields accounts for 71% of total gas produced in China.

China is the world's largest coal producer. According to the official statistics, China's raw coal production amounted to nearly 1.4 billion metric tons (tonnes) in 1996, more than doubling the output of 620 million tonnes in 1980. On a comparable basis, the raw coal production is estimated at 1.42 billion tonnes in 1997. China exported about 30 million tonnes (about the same as in 1996) and imported 1.9 million tonnes in 1997 (down 40% from the 1996 imports of 3.2 million tonnes). During the period 1980-1996, coal consumption in China increased at an average annual rate of 5.6% a year, faster than the average growth rate of 5.3% a year for the total primary commercial energy consumption during the same period. In 1997, however, China's coal consumption may have declined.

Coal has a vast variety of uses in China. Industrial sectors and the residential sector are the major users. Among the industrial sectors, coal is mainly used for power generation, nonmetal mineral products, smelting of ferrous metals, manufacturing of chemicals, coking, textiles, and papermaking. At the present time, coal accounts for more than 95% of thermal power production and 78% of total electricity generation in China. In the foreseeable future, coal-fired power plants will continue to provide the bulk of China's electricity production.

During the past two decades, residential coal use was increasing while its share was declining. Residential consumption increased from 115.7 million tonnes in 1980 to 167 million tonnes in 1990. It declined to 130.5 million tonnes in 1994 but then rose to

135.3 million tonnes in 1995. Its share in total coal consumption declined from 19% in 1980 to 15.8% in 1990, 10.2% in 1994, and 9.8% in 1995. The share of residential use in total coal consumption is estimated to have declined further in 1996 and 1997, because more urban residents are gaining access to natural gas, town gas, and LPG (liquefied petroleum gas).

The major problems facing the Chinese coal industry in 1997 and early 1998 have been overproduction, overstocking, increasing transportation congestion, deteriorating safety standards—especially for small mines—and declining profitability (in many cases rising losses) in early 1998. The government closed 14,000 small mines between May and December 1997 to crack down on illegal and unsafe coal producing activities. For 1998, China continues to face a weak coal market, and the producers have to cut output levels to ensure smooth coal sales.

China's electric power generating capacity is the second largest in the world, although per capita consumption remains very low. The country's installed capacity amounted to 217 gigawatts (GW) in 1995, over 230 GW in 1996, and about 250 GW at the end of 1997. Of the 217 GW of installed generating capacity in 1995, thermal power plants accounted for 163 GW or 75%, hydropower for 52 GW or 24%, and nuclear power for 2.1 GW or less than 1%.

Electricity generation is estimated to have reached 1,105 terawatt hours (TWh) in 1997, up 2.2% from the 1996 level of 1,081 TWh. Of the total in 1997, over 81% of China's electric power was generated by thermal plants, 17% by hydropower, and over 1% by nuclear power. During the period 1980-1996, the average annual

growth rate of gross electricity generation was 8.3%. The country has entered a period of transition since early 1997, in which electricity prices are being adjusted and the power supply system is being restructured, resulting in a large drop in the growth rate of electricity consumption and hence generation in 1997.

China's **hydroenergy** resources are estimated at 676 GW, and the exploitable resources amount to about 378 GW, which could generate an electric output of 1,923 TWh. At the end of 1995, China's installed hydropower capacity was 52.2 GW, accounting for 13.8% of the exploitable hydroenergy potential in the country. The output of hydroelectricity is estimated to have reached 188 TWh in 1997, about the same as the output of 1996. The Chinese government has vowed to continue building more hydropower plants in the country. At the end of 1994, construction began on the controversial but huge Yangtze River Three Gorges Project. In November 1997, the mighty Yangtze River was successfully blocked at the Three Gorges. By the end of 1997, China already spent more than 28 billion renminbi yuan (RMB¥) or US\$3.4 billion on the project. The total projected cost for the entire hydropower plant is approximately RMB¥240 billion (US\$29 billion), but the cost is expected to be recovered by 2012, only three years after completion of the entire plant. Upon completion in 2009, the Three Gorges Project will be the world's largest hydropower plant—with a capacity of 18.2 GW (nearly 85 TWh of gross power generation), consisting of 26 generators with 700 MW each—and the most expensive power project. The government plans to produce electricity from the first group of generators as early as 2003.

Until 1982, China did not elect to build any **nuclear power** plants, in spite of the country's long development of indigenous nuclear technology. Between 1982 and 1993, nuclear power construction proceeded rather slowly. The country's first nuclear power plant, at Qinshan in Zhejiang Province, with a capacity of 300 MW, completed grid connection in December 1991 and started commercial production in May 1993. One of the two 900-MW nuclear power units at Daya Bay, Guangdong Province, came on stream in August 1993, and commercial operation started in February 1994. In the same month, the second unit of equal size (900 MW) at Daya Bay also came on stream and started commercial operation in May 1994. Altogether China has an installed nuclear power capacity of 2,100 MW at the present time. All present plants use pressurized light water reactors (PWRs). Power generation from the nuclear plants was 14.0 TWh in 1994, 12.8 TWh in 1995, and 14.3 TWh in 1996. The output of nuclear power is estimated at 14.4 TWh in 1997.

China has both medium- and long-term plans to boost the country's nuclear power capacity. Over the coming years, four new plants with a total capacity of 6,570 MW are expected to be built; three of them are close to existing plants. Construction already started in June 1996 on the 1,200-MW Qinshan Phase II with two 600-MW PWRs. The expected commercial operational dates for the two generators are set for 2002 and 2003, respectively. The Qinshan Phase III features two 700-MW pressurized heavy water reactors, or PHWRs (CANDU-type). The Phase III construction began in early 1997 for this US\$3.4 billion Sino-Canadian joint venture project and is scheduled to be completed in 2003. In Guangdong, two PWRs with 985 MW each are planned to be

built at Ling'ao. The work began in July 1997 with the completion dates set for 2002 and 2003, respectively. Other than these three new plants, the site of the long-negotiated 2,000-MW plant in Liaoning Province has shifted to Jiangsu Province's Lianyungang. The plan calls for importing two Russian-built PWRs with 1,000 MW each to be installed in China. A formal contract was signed to seal the deal in late December 1997 during the visit of Russian First Deputy Prime Minister Boris Nemtsov. The completion date of the US\$3.5 billion project is set for 2004. A number of other provinces in China, including Shandong and Hunan, have a strong interest in building nuclear plants. Nuclear power is an expensive option for China, especially with imported equipment and technology. However, it is believed to be suitable for provinces such as Guangdong and Zhejiang, where the severe lack of energy sources would otherwise impede rapid economic growth.

The official target of the Chinese government is to increase its nuclear power capacity to 20 GW by 2010. However, beyond those listed above, sites and funds allocations for other plants have not yet been decided. Nuclear power in China began from a small base and will continue to account for only a small share of total installed capacity in China.

China's Ninth Five-Year Plan (1996-2000) calls for the country's installed capacity to increase to 290-300 GW by the end of 2000. To meet this target, 13-17 GW of new capacity will have to be added each year during the period 1998-2000. Also according to the Plan, electric power generation is targeted to reach 1,400 TWh in 2000. Judging from the pace of power construction during the past few years, huge investments

will be needed to reach the target. In the meantime, China's power producers still have a long way to go to improve the industry's efficiency, profitability, and reliability in order to stay competitive, should market reforms continue in China.

For the energy sector as a whole, the most important event in early 1998 is the ongoing reform of the governmental structure. Four energy-related ministries have been abolished or restructured during the latest round of organizational reform. The most notable is the abolishment of the ministries of coal, electric power, and chemical industry. While respective state bureaus have been established for coal and the chemical industry (along with regulatory functions of CNPC and Sinopec) under the enlarged State Economic and Trade Commission (SETC), the regulatory functions of the defunct Ministry of Power Industry and those under the State Power Company established in 1997 have been transferred to the SETC.

In addition to the above three ministries, the Ministry of Geology and Mineral Resources was reformed into the newly created Ministry of Land and Natural Resources. As for the State Power Company, it will be focussing solely on business operations rather than policymaking. So will the state oil companies, CNPC and Sinopec, which are being restructured into two integrated super companies along geographical lines.

While the full impacts of the above organizational change can be determined only long after the whole process is completed, our centerpiece article in this issue provides a preliminary assessment of the situation for the petroleum and petrochemical industry.

II. Oil and Gas Developments⁴

The following are selected important events in China's oil and gas industries from January to April 1998.

- ◆ (April 1998) BASF AG (Germany) awaits China's final approval as early as the end of 1998 or early 1999 for its biggest project with the state-owned Yangzi Petrochemical Corp. (YPC) and China Eastern United Petrochemical. An agreement was signed in 1996 for this US\$2.79 billion integrated petrochemical complex investment in east China. The proposal for this project was approved by the State Council in February 1997, and approval of the feasibility study is expected before early 1999. Holding a 50% stake for this joint venture, BASF will start the construction soon after the final approval and plans to bring the facilities on stream by 2003. Located in Nanjing, this petrochemical complex will feature a naphtha cracker with capacity of 600 thousand t/y of ethylene. Separately, BASF and US DuPont have a US\$900 million joint-venture project in the planning stage in Hainan Province. The joint venture will produce and market nylon intermediates in Asia. Also in the planning stage is another proposed joint venture in Shanghai, which involves BASF, ICI Polyurethanes, Nippon Polyurethane, and Chinese partners. Finally, at a cost of 300 million German marks, BASF also lunched a polystyrene joint venture with Yangzi Petrochemical

in Nanjing recently and has a 60 percent stake in that venture.

- ◆ (April 1998) At the end of April 1998, China sent the first of 2,000 engineers, who will work on the construction of a new 1,540 km (963 mile) oil pipeline, which will run from an oil field in southern Sudan to Sudan Port in the north. Competing with 30 other international oil companies, China won the bid for this construction in 1997. This new pipeline will have a pumping capacity of over 300 kb/d.
- ◆ (April 1998) CNPC (China National Petroleum Corp.) is expected to make a decision by the end of June 1998, whether or not to acquire an 80% stake in a central Thailand oil field for US\$299 million. The Sirikit oil field was previously owned by Shell, which decided to withdraw from the operations in March 1998. The field has a capacity of 21 kb/d and is worth \$392 million. CNPC is now studying the field. The tender is open also to other potential foreign investors.
- ◆ (April 1998) A vertical reorganization of the oil industry in China is under way to create two integrated industry giants, which will be among the world's top 500 companies. China National Petroleum Corp. (CNPC), China's biggest oil explorer, would be in charge of exploring and developing petroleum and natural gas in the northern and western parts of China. Sinopec, which dominates refining and is expected to merge with China Eastern United Petrochemical (Group) Co., would establish its operations in eastern and coastal areas. Each of these reorganized companies would generate more than \$9 billion in final sales. The

⁴ This section was prepared by Charlotte Cheng and Kang Wu.

reorganization is expected to be completed by the end of June 1998.

- ◆ (April 1998) TOTAL (France) signed an agreement with China to start a joint venture with an investment of US\$10 million for an LPG depot, which will have a capacity of 4 thousand m³. Located in Zhengjiang, Jiangsu Province, the joint venture is named Jiangsu Total LPG Co. Ltd. TOTAL will have an 89% stake in the joint venture, while the remaining 11% goes to the development company of the Dagang economic zone.
- ◆ (April 1998) CNPC recently signed an EOR (enhanced oil recovery) contract with America's Monde Group. The block, named Huzhuangji-Wenliu, is located in Zhongyuan oil field, Henan Province. Operational risks will be assumed by Monde, which will share profits with CNPC once the oil recovery rate reaches commercial levels.
- ◆ (April 1998) Sinopec's Fujian Refinery has recently brought on line a 70 thousand t/y polypropylene (PP) unit, which was designed by the Sinopec Beijing Chemical Engineering Corp. The PP facility cost RMB¥ (renminbi yuan) 530 million (US\$63.9 million) and is one of the major petrochemical units for this 80 kb/d refinery. A feasibility study is under way at the Fujian refinery for a projected 600 thousand t/y ethylene cracking plant with EXXON and Saudi Aramco. The ethylene plant is associated with the existing design for a further 160 kb/d of refining capacity, to be added to the original 80 kb/d.
- ◆ (April 1998) Progress has been made recently on a joint-venture company (US\$14.7 million investment) set up by Shell (with a 90% stake) and Qingdao Development Zone LPG Company in Qingdao, Shandong Province. The first stage of this LPG project included a 5 thousand tonne jetty and 3 spherical tanks, and was completed in August 1997. The second stage has also been finished, which includes 3 more spherical tanks. These extra tanks bring the total storage capacity to 6 thousand m³, thus providing facilities for 60 thousand tonnes of LPG yearly.
- ◆ (April 1998) On March 25, 1998, Xiamen Paktank Ltd. (XPC) started operating a new storage facility with 100 thousand m³ of capacity for petroleum products. With this additional capacity, the total storage capacity of XPC's terminal reaches 206 thousand m³ for petroleum products. A test cargo arrived on March 19, 1998. XPC plans to broaden its services in chemical storage and raise its storage capacity to 650 thousand m³. Previous negotiations with US Caltex for 2 LPG refrigerated tanks (35 thousand tonnes each) were shelved because of possible overbuilding of LPG storage in south China's coastal areas.
- ◆ (April 1998) Twenty offshore blocks (a total of 95,780 km²) have been offered by China National Offshore Oil Corp. (CNOOC). These blocks are located in the South Yellow Sea, East China Sea, Pearl River Mouth Basin, Qiongdongnan Basin, Yinggehai Basin, and Beibu Gulf Basin in the South China Sea. Bidding notices have been issued to 48 foreign oil companies since this round of bidding began in January 1998. The bidding will be closed in May. For the time being, 17 oil companies from the US, France, Italy, and the UK have acquired data packages

from CNOOC's Exploration and Development Research Center (EDRC). This is the first time that EDRC has been responsible for managing and delineating the acreage for bidding.

- ◆ (March 1998) Dow Chemical Company has a 50% stake in a chemical plant in Ningbo, China. Dow plans to buy the other 50%, which is owned by Zhejiang Chemical Factory, and Dow will then become the sole owner. Dow intends to make additional investments in this plant, to expand its product mix and increase its capacity.
- ◆ (March 1998) A key gas pipeline project, Pingji, is under construction by Sichuan Petroleum Administration. This 77 km pipeline will pass through 5 counties and cities and will cross 4 rivers in the western part of Sichuan, an area with very difficult hydrological and geological conditions.
- ◆ (March 1998) According to the terms of the agreement signed recently by Tianjin Petrochemical Co. (TPC) and Bohai Marketing Co. (BMC), during the year 1998, BMC will supply TPC with 6 kb/d of crude oil from the Bohai West field. This supply will be unloaded at Nanjiang wharf, separated, treated, and transferred to TPC's refining facilities.
- ◆ (March 1998) On February 24, 1998, Tianjin Caltex Lube Co. Ltd. (TCLC) began construction on a lube plant in a confined area in Tianjin harbor, with financial support from Caltex (USA). The equipment and facility installation is scheduled to be completed by February 1999, and production will start by July 1999. The products from this new plant

will be marketed mainly in north China, and a portion will be exported.

- ◆ (March 1998) CNOOC and Norway's STATOIL signed an agreement in Shenzhen on January 15, 1998, to jointly operate Nanhai East Company's Lufeng 22-1 offshore oil field. The field is located in Block 17/22 at the Pearl River Mouth basin, is 250 km southeast of Hong Kong, has an average water depth of 329 m, has officially been under development since 1996, and is expected to yield 60 kb/d of crude oil. On January 18 and 19, 1998, the first 550 thousand barrels of crude oil were loaded in Lufeng 22-1 and safely transported to Japan.
- ◆ (March 1998) The Nan 1-3 well, located in the Qaidam basin's Nanyishan region, has been producing at daily rates of 100-150 thousand m³ of natural gas and 126 barrels of crude. The well was drilled by the Nanyishan Natural Gas Company. The increase in production is attributed to the successful application of acidizing operations at the Nan 1-3 well, which in turn has raised overall oil and gas production in the Nanyishan region.
- ◆ (March 1998) On February 25, 1998, CNPC formally took control of the Caracoles field in Venezuela. The field was part of a US\$359 million bid CNPC won in 1997. With this 20-year operating contract, CNPC hopes to explore deeper in both Caracoles and Intercampo, and thus to increase production from 10 kb/d to 180 kb/d (80 kb/d from Caracoles and 100 kb/d from Intercampo) within five years. During 1998, 28 new wells are expected to be drilled (16 for Caracoles and 12 for Intercampo), and 70-75 old wells are also expected to be repaired.

Over the next two years, CNPC is expected to invest US\$300-400 million in both areas. Under these exploration and development actions conducted by CNPC, the proven reserves (currently 218 million barrels for Caracoles and 196 million barrels for Intercampo) should rise significantly. CNPC assumed formal control of operations at Caracoles in early March 1998 and at Intercampo in April 1998.

- ◆ (March 1998) By investing RMB¥600 million (US\$72 million), Jinzhou Petrochemical Corp. has recently completed a 28 kb/d residue catalytic cracking unit. This new unit is capable of 2.5% higher light product yield than fluid catalytic cracking, and it is expected to raise revenues by RMB¥20 million (US\$2.4 million) a year.
- ◆ (March 1998) Beijing, Shanghai, and Guangzhou have started to use unleaded gasoline under the Pilot unleaded gasoline programs. Similar actions will be promoted also in some other cities in China during 1998. The demand for MTBE and methanol in China will increase sharply, owing to the requirement for more unleaded gasoline. Currently China has 20 MTBE plants with a combined capacity of over 12 kb/d.
- ◆ (March 1998) On February 16, 1998, CNOOC and Shell signed a framework agreement preparing for the launch of the US\$4.5 billion joint-venture petrochemical complex in the Daya Bay Economic and Technological Development Zone, which is located in Huizhou, Guangdong Province. The State Planning Commission (renamed State Development Planning Commission

in March 1998) in early February 1998 approved the feasibility study for this giant Sino-foreign project, which will have high environmental-protection standards. The joint-venture complex will have capacities of 800 thousand t/y of ethylene, 560 thousand t/y of styrene monomer, 250 thousand t/y of epoxypropane, 320 thousand t/y of ethylene glycol, 240 thousand t/y of polypropylene, 300 thousand t/y of LLDPE/HDP, and 150 thousand t/y of LDP installations. The project will include public utility and auxiliary facilities as well. Altogether, the facilities are expected to produce 3 million tonnes of products per year. The four shareholders in China are Shell Nanhai Ltd. (50%), CNOOC (40%), Guangdong Investment and Development Co. (5%), and Foreign Investment Bureau Group Ltd. (5%). The facilities are expected to come on stream in 2003.

- ◆ (March 1998) An oil pipeline under construction will extend more than 2,500 km through the interior of China, from northwestern Xinjiang to Henan Province. In May 1997, a 428 km segment in central Xinjiang was completed. When the rest of the pipeline (more than 2,000 km), the line will reach Luoyang and have a further extension toward Sichuan Province. The feasibility of this pipeline is said to depend on the construction of another pipeline (3,000 km in length) from Karamay in Xinjiang to the central Asian republic of Kazakhstan. An agreement was reached on the latter pipeline in 1997, at an estimated cost of US\$2.3 billion. According to the agreement signed between CNPC and Kazakhstan, the construction of this international pipeline, which is expected to have a capacity of

500 kb/d, would be completed in eight years. Another oil and gas pipeline project, linking Siberia with northeast China, is currently on hold, because of the Asian financial crisis.

- ◆ (March 1998) Ningxia Refinery in Ningxia Hui Autonomous region in northwest China has recently put a PP production unit into operation. The construction cost of the unit was RMB¥160 million (US\$19.3 million), and the unit has a capacity of 10 thousand t/y.
- ◆ (March 1998) According to estimates of the Beijing Municipality Government, gas consumption in the capital is expected to reach 200 million m³ in 1998, 500 million m³ in 1999 and 700 million m³ in 2000. The number of households consuming natural gas is expected to reach 700 thousand by the end of 1998, compared with 550 thousand in late 1997. Beijing plans to raise this number to 1 million by 2000. Furthermore, Beijing also expects the natural gas consumption of the city to reach 3 billion m³ by the year 2010. The goal of the municipal government is to replace coal with gas as the fuel of the heating system in the third ring road area.
- ◆ (March 1998) Sinopec Maoming Petrochemical Corp (SMPC) has started up a terminal that can handle 30 thousand tonnes of refined products and 3 thousand tonnes of chemicals at the port of Shuidong. This new terminal will reduce SMPC's operating costs and is expected to be one of the largest processors of foreign crude in China in the early 21st century. SMPC currently operates a 250 thousand tonnage crude terminal, one of the largest port facilities owned by refineries in China. The annual handling capacity of the port is 17 million tonnes of crude, products, and chemicals. Also, SMPC is currently in the process of expanding its crude distillation production from 170 kb/d at present to 270 kb/d by 2000. With this expansion plan, SMPC will be able to handle 190 kb/d of Mideast sour crude.
- ◆ (February 1998) CNPC will push the reform of its enterprise ownership structure by listing six companies on the stock market in 1998. Three of the companies (Liaohe Jinma Oilfield, Jiangnan Drill Bit Factory, and Zhongyuan Oil and Gas Co.) are offering "A" shares, and two others (Jilin Hongyuan Co. and Qinghai Natural Gas Co.) are offering "B" shares. The sixth is a public stock company established in Hong Kong by CNPC, which holds a 54% share. This company will restructure Liaohe Lengjia Oilfield and then list it on the market.
- ◆ (February 1998) Guangzhou has prohibited the use of leaded gasoline since 1997, and has moved forward recently to put into service 30 LPG-fueled vehicles for one of the bus lines. After a three-month trial period, and if the results are good, the city will proceed with its plan to use LPG for all buses and taxis.
- ◆ (February 1998) An agreement has been reached recently between Shaanxi Huashan Chemical Group Co. and Changqing Petroleum Exploration Bureau of CNPC for the construction of an oil pipeline (238 km) to connect the town of Zhouhe (in Jingbian county) and Yan'an Refinery (in Huangling county). This line would include two

thermal pumping stations, three pressure stations, and seven satellite communications terminals. The volume of oil pumped initially will be nearly 11 kb/d. With proper pressure, however, the new pipeline can expand the volume to a maximum of over 22 kb/d.

- ◆ (February 1998) CNPC recently approved a development plan proposed by Apache China Petroleum Ltd. (ACP), to develop six platforms, and drill 42 wells in north China's Zhaodong block. This licensed area is the first official, foreign-development, onshore contract in China, and it was initially granted to USA Louisiana Exploitation Cooperation in 1992 through bilateral negotiation. ACP acquired the permission afterwards in 1993. Under ACP plans, the initial target production level is 20 kb/d, set for the beginning of the year 2000.
- ◆ (February 1998) Sinopec Shanghai Petrochemical Co. Ltd. (SPC) and BP propose to build a greenfield ethylene plant in Shanghai with a capacity of 600 thousand t/y. According to their plan, this project was to be analyzed in Beijing before March by China International Engineering Consulting Cooperation (CIECC), which has the authority to review such large-scale projects. Meanwhile, SPC is also launching its plans for expansions that include the revamping of downstream units (scheduled to be finished before July 1998) and ethylene capacity expansion from the present 300 thousand tonnes to 550 thousand tonnes at the end of 2000.
- ◆ (February 1998) The Sichuan Petroleum Administration (SPA) reached its target of producing 7.5 billion m³ of natural gas in 1997. In terms of oil-equivalent, SPA is therefore now the fifth largest onshore producer of hydrocarbons in China.
- ◆ (February 1998) On January 8, 1998, China United Coalbed Methane Co. Ltd. (CUCBM) signed a contract with Texaco to explore the vast coal bed methane (CBM) reserves in China. Under this agreement, Texaco will explore two blocks (a total of 2,663 km²), which are in the coal mining area of northern Anhui Province. It is estimated that, together, these two blocks can yield a minimum of 1.5 billion m³ yearly.
- ◆ (February 1998) In the beginning of 1998, Tianjin became the fourth city in China (following Beijing, Shanghai, and Guangzhou) to promote the use of unleaded gasoline. On January 1, 1998, the first stage of this plan was implemented, all gas stations in the central district of the city will sell only unleaded gasoline. The second stage of this plan is to extend this restriction to the city limits beginning June 1, 1998. The wholesale marketing of leaded gasoline in Tianjin is also restricted. The plan, which calls for switching from leaded to unleaded gasoline, is regarded as an important step for environmental protection in Tianjin.
- ◆ (February 1998) A joint-venture investment project in oil storage facilities has recently started in Tianjin to promote the city as a transfer center for jet fuel and other refined products on the northern coast of China. The joint venture partners are China Aviation Oil Supply Co. (CAOSC, 40%), Tianjin Port authority (20%), and Shell (40%). The storage facilities (14 oil depots in the city's Nanjiang pier area) will cost RMB¥220 million (US\$26.5 million) to

build and will have a total storage capacity of 163 thousand m^3 . Once completed, all these depots can be put into operation immediately, thanks to the existing terminals. The berths are owned by the port authority and can accommodate tankers ranging from 3 thousand tonnes to 50 thousand tonnes.

- ◆ (February 1998) CNPC Pipeline Bureau (PLB) is licensed to construct an oil pipeline network for Sudan. This pipeline grid totals 1,540 km and has a 300 kb/d capacity with a minimum 150 kb/d turnover. Besides this US\$295 contract, CNPC (PLB's mother company) is now developing an oil field in Sudan.
- ◆ (January 1998) The crude yield of Changqing's oil field surpassed the 60 kb/d target for the first time in 1997, when it reached 66 kb/d. The production was 55 kb/d in 1996 and 44 kb/d in 1995.
- ◆ (January 1998) Both the crude and the natural gas yields in the Liaohe oil field have topped the state's target. The volumes produced at the end of 1997 were slightly over 300 kb/d and 1.55 billion m^3 , respectively. In 1997, the oil field administration had a total turnover of RMB¥3.6 billion (US\$434 million) for CNPC and the state.
- ◆ (January 1998) The first stage of construction has been completed on the No.1 Natural Gas Purification Plant of Changqing Gasfield, in Jingbian County, northern Shannxi Province. The annual processing capacity is 1.8 billion m^3 per year, and a total of RMB¥300 million (US\$36 million) has been invested so far in this plant. When the second stage of construction is completed, the capacity

will reach 3 billion m^3 . Applying TPS control technology from Australia's Honeywell Co., the purification process of this plant is controlled by an automated system, which reduces the level of harmful substances in the gas to meet government standards. Five purification installations, each with 2 million m^3 of gas processing capacity daily, will also be constructed. Three have been completed under the first construction stage, and two are under way under the second stage.

- ◆ (January 1998) Since late 1997, the Datianchi gas structure has been tapped, and gas has been produced in three fields (Wubaiti, Longmen, and Shaping), which have estimated reserves of 100 billion m^3 . This large gas field is in east Sichuan Province and is expected to produce 3 billion m^3 of natural gas annually at a development cost of RMB¥2 billion (US\$241 million).
- ◆ (January 1998) On December 16, 1997, CNPC signed a contract with Global Oil Corporation of Australia (GOC) to cooperatively explore for petroleum resources in the Da'an and Miao-3 oil fields in Jilin Province. CNPC's intentions in pursuing this plan are to expand its foreign cooperation and to speed up the work of developing China's petroleum industry according to the Ninth Five-Year Plan (1996-2000).
- ◆ (January 1998) In December 1997, CNPC signed several production-sharing contracts with investors from Australia and Hong Kong, to develop oil-bearing structures in Jilin Province. The Da'an and Miao-3 blocks in southern Songliao Basin will be explored by Australia Global Oil Corp. Another three blocks

(Min-114, Qian-130, and Min-47, estimated to contain more than 60 million tonnes crude reserves), will be under development by Hong-Kong-based China Link Oil Co. Ltd.. All expenses related to pilot testing and development will be undertaken by these two companies, and the commercial yield will be shared with CNPC after startup.

III. Centerpiece Focus

Revitalizing China's Petroleum Industry through Reorganization: Will It Work?

by

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1. Introduction

For well over a decade, from the early 1980s up to the present, there has been a dichotomy in China's petroleum industry. Upstream exploration and production have largely been separated from downstream refining and petrochemical production and have been managed by different ministries or state companies. This dichotomy will soon end, as a result of the reform measures approved by the Ninth National People's Congress (NPC, China's parliament) in March 1998. These measures are part of a bigger plan that is being implemented, in an attempt to restructure and streamline the government.

As the implementation of the reform plan proceeds, the entire petroleum and chemical industry—including oil and gas exploration and production, downstream refining, and petrochemicals—is being restructured. These

changes will not be completed until after mid-1998.

The government's objective in this reorganization is to revitalize the petroleum and chemical industry and make it more efficient and competitive. Will the plan work? This centerpiece article offers a preliminary analysis of the question, based on a brief review of the overall changes being made in the government and changes affecting the petroleum industry in particular.

2. A Critical Overview of the Governmental Reforms at Large

During the Ninth NPC, the Chinese parliament approved many major governmental reform measures proposed by the State Council—China's cabinet. These reforms call for the number of government ministries and state commissions to be reduced from 40 to 29. The plan has been implemented gradually since March 1998 by the State Council. Besides the addition of three newly created ministries and one new state commission, 25 of the original 40 ministries and state commissions have been retained, and the remaining 15 have been removed from the State Council—that is, they no longer have cabinet-level status.

Most of the ministries related to industries and domestic trade have been "abolished." In practice, this means restructuring them and transferring them into several newly created "state bureaus," which include coal, chemicals, metals, machine-building, and domestic trade. Two ministerial-ranking councils, which supervised textiles and light industries, are also being reorganized into two state bureaus. The state bureaus are placed directly under the enlarged State Economic and Trade Commission (SETC),

which has earned the nickname "Little State Council."

Not all defunct industrial ministries are being reorganized into state bureaus. The Ministry of Power Industry, for example, was completely abolished, and its governmental functions have been transferred directly to the SETC. The Ministry of Electronics, on the other hand, was merged with the Ministry of Post and Communications and other agencies, to form the new Ministry of Information Industry. Other "abolished" ministries have been reorganized and merged into existing or newly created ministries and commissions. While the Ministry of Power Industry appears to be the only one that has disappeared entirely in the reforms, a new entity (the State Power Company) has already been established to perform the business functions that were previously carried out by the ministry.

For individual energy sectors, the most notable changes are the abolishment of the ministries of coal industry, chemical industry, and power industry. While respective bureaus have been set up for the coal and chemical industries (along with government functions of the other state oil companies) under the SETC, no corresponding bureau was formed for the defunct Ministry of Power Industry. The SETC has directly taken over the governmental functions of the defunct ministry as well as those of the State Power Company. For CNPC (China National Petroleum Corporation) and Sinopec (China National Petrochemical Corporation), details are discussed later. Another important organization that affects the petroleum business is the State Planning Commission, which has been renamed the State Development Planning Commission (SDPC). The SDPC will transfer some of its supervisory activities to the SETC while

strengthen its role for long-term economic development and planning.

In implementing the current organizational reforms, the government has at least four objectives. The first objective is to separate governmental functions from business operations. This is not an entirely new initiative, as the government has been trying to do this for over a decade. A second objective is to make the central government more efficient by trimming its overall size. A third objective is to consolidate the policy decisionmaking process by merging government functions and agencies that are closely related or similar to each other. Finally, the government intends to strengthen the rule of law in carrying out its policies.

If history is any guide, these changes may not offer an encouraging outlook for the current organizational reform, because the past performance of the Chinese government in trimming the bureaucracy has been mediocre. For instance, under former Premier Li Peng, the State Council abolished several ministries but created the same number of new ministries. Adding in the new cabinet agencies that were created, the total ministerial-ranking government organizations under the State Council were largely unchanged during the 1988-1998 period. Even in the current round of governmental reform, three subministerial-ranking agencies were promoted to ministerial rank one month after the reform package was approved by the NPC in March 1998, increasing the cabinet ministries, commissions, and agencies from 29 to 32. The newly upgraded agencies are the State Environmental Protection Administration (formerly the National Environmental Protection Agency), the General Customs Administration, and the State Council Legislative Office (formerly the State Legislative Affairs Bureau). While

the legitimate reasons behind the promotion of the above agencies should not be ignored, the overall result indicates that it would be premature at this time to judge whether the government will stick to its original blueprint for change or whether further changes are forthcoming.

A more serious question that should be asked is whether the latest reforms, even if they are implemented according to the original blueprint, represent merely a reshuffling and amalgamation of existing organizations or the creation of a new system that will be more efficient. The answer is not so clear, as nearly all of the abolished ministries and agencies are not really gone. They have mainly been reorganized and repackaged into different—albeit fewer and therefore larger—ministries and state commissions. This is a process of centralization rather than decentralization. Moreover, the individual “state bureaus” previously functioned as ministries but no longer have ministerial-level decisionmaking power. As a result, they may end up adding yet another layer of bureaucracy for important industrial policies that need to be made.

Various corporations at the national level could face a new lineup of hurdles. The government has clearly pledged to separate governmental functions from the corporations’ business operations through the current reforms. Yet the state corporations now have to deal with not only a state bureau that is lower-ranking than before, but also with the higher-ranking SETC and SDPC before requests for investment in large projects finally reach the State Council for its approval. This structure may ultimately prolong the gestation period of investment approvals.

As far as individual state enterprises are concerned, the ongoing changes offer a mixed blessing. On the one hand, these enterprises may have more freedom in resource allocation and business decisionmaking. On the other hand, however, many debt-ridden corporations may lose the state-funding support (including guaranteed bank lending) that previously enabled them to survive. Although the bankruptcy of inefficient state enterprises would improve the Chinese economy in the long term, the mission of reforming the state sector can hardly be accomplished merely through a reorganization of the bureaucracy. Instead, it will be a painful process in which major policy shifts, steadfast political will, and continuous support from the public will be required.

A further discussion of China’s reform in the state enterprises outside the energy sector would be beyond the scope of this short article. However, it is worth noting when it comes to salvaging and revitalizing the Chinese state sector, that the top leaders often have South Korea (to a lesser extent Japan and Taiwan) in mind. Judging by what it did in its experimental reforms of the state sector before 1998, the Chinese government appears to favor conglomerates as one of the important means of reforming its inefficient state enterprises. But the deep troubles now facing South Korea’s chaebol should send the Chinese government a warning that even super corporations are not immune to business failure.

The Chinese government should therefore make greater efforts to establish well-functioning markets, to reform its banks into efficient and independent financial institutions, and to create a healthy economic structure where large and super-large, medium, and small businesses can coexist

and flourish. To achieve all of this, privatization of a substantial part of the state's assets will be necessary at a certain point. It remains to be seen how far the current government is willing to go, once the privatization issue has to be firmly dealt with.

3. Reorganization and Integration of the Petroleum Industry

Prior to the current governmental reform, the basic dichotomy of China's petroleum and petrochemical industry worked in the following way. In the upstream sector, CNPC, formerly the Ministry of Petroleum Industry, was responsible for onshore oil exploration and production (E&P) as well as E&P activities in the shallow water areas. Upstream offshore operations were mainly handled by China National Offshore Oil Corporation (CNOOC), which is very well organized and has over a decade of experience gained from cooperation and joint operations with foreign oil companies. While CNPC and CNOOC dominated the onshore and offshore upstream industry, they did not have a total monopoly. The Ministry of Geology and Mineral Resources (MGMR) also conducted limited exploration activities, both onshore and offshore. However, for many years before 1997, MGMR in most cases turned the fields it discovered (mainly onshore) over to CNPC for development. At the end of 1996, the MGMR branches that conducted this work were separated from the ministry and were turned into China's third upstream state oil company, called China National Star Petroleum Corporation (CNSPC). Once established, CNSPC started to engage not only in exploration but also in development and production activities in areas specified by the government. It has also taken steps to expand in other areas of the oil business and to become a new force in the industry both at home and abroad.

In the downstream refining sector, the principal state refiner was Sinopec, established in 1983. Sinopec initially owned more than 90% of China's refining capacity. That share declined to around 80% in 1997, while refineries owned by CNPC, local governments, and the now-defunct Ministry of Chemical Industry (MOCI) had been growing vigorously. In September 1997, two Sinopec refineries were separated from the state company to form a new petrochemical conglomerate with three other non-Sinopec petrochemical companies in east China's Jiangsu Province. The new conglomerate, named China East United Petrochemical Co. Ltd. (Ceupec), comprises the Jinling and Yangzi refineries of Sinopec, Nanjing Chemical Group Co., Yizheng Chemical Fiber Co., and Jiangsu Petroleum Group Co. It has total assets of some US\$6.5 billion. After several months of preparation and the formal inauguration in November 1997, Ceupec became independent from all its previous affiliations, including Sinopec. As a result, the share of Sinopec in the China's total refining capacity declined further in early 1998.

As for petrochemicals, Sinopec played an important role in production of chemical feedstocks (such as olefins and aromatics), chemical fibers, and chemical fertilizer. Production of finished chemicals was the major domain of the former MOCI, which was dismantled in March 1998.

In addition to the above producing companies, China has three state oil trading companies, which are largely unaffected by the current reform. The three companies are Sinochem (China National Chemical Import & Export Corp.), Unipet (United International Petroleum and Chemicals Corporation, a 50/50 joint venture between Sinopec and Sinochem), and Chinaoil (China

National United Oil Corporation, a 50/50 joint venture between CNPC and Sinochem).

The current restructuring program for the petroleum industry resulted from a months-old debate prior to the recent NPC. Several alternative plans for how the state oil companies should be organized were discussed and compared. Now the plan is being finalized and implemented. Here are the key features of the reforms:

(1) Leadership Change at Sinopec and CNPC

Former Sinopec President Sheng Huaren was appointed in March 1998 as Chairman of the enlarged and powerful SETC. Former CNPC President Zhou Yongkang is now Minister of the newly created Ministry of Land and Natural Resources, which was formed by combining MGMR and several former state bureaus. Sheng was succeeded at Sinopec by Ceupac President Li Yizhong, who is also the former Executive Vice President of Sinopec. Ma Fucui, former CNPC Vice President and Director of the CNPC Daqing Petroleum Administration, took over the position of CNPC president from Zhou.

(2) Formation of Two Super Companies

CNPC and Sinopec are being substantially restructured and reorganized into two integrated state oil companies through reassignment of their production subsidiaries along geographical lines. Initially, it was proposed that the two companies be named the Northern Petroleum Corporation, which would be CNPC-based, and the Southern Petroleum Corporation, which would be Sinopec-based. Now the final decision is to have the two companies named the CNPC Group and the Sinopec Group. According to current plans, the CNPC Group will take

over most of Sinopec's existing refineries and petrochemical facilities in northeast, northwest, and southwest China while retaining its own oil and gas fields such as Daqing, Liaohe, Xinjiang, Tarim, and Sichuan in the same regions. Similarly, the Sinopec Group will take over many of CNPC's oil fields in north, east, and central south China, while retaining most of its own refineries and petrochemical plants in these regions. When the reorganization is finished, some oil fields, refineries, and petrochemical firms may not be strictly divided along the broad geographical line, as intense fighting over their supervision continues between the Sinopec and CNPC groups. In other words, each of the two newly organized state oil conglomerates may still have some fields and refineries in the other's geographical area.

(3) Profiles of the CNPC Group and the Sinopec Group after the Restructuring

Both of China's budding conglomerates will have become vertically integrated oil companies as a result of the reorganization. The CNPC Group will still tilt more toward upstream E&P activities, however, and the Sinopec Group toward refineries and petrochemicals. Because the division of the two companies is along geographical lines, all nearby oil businesses, upstream and downstream alike, will most likely be placed under the same state company in their respective areas. When the restructuring is completed during the second half of 1998, the Sinopec Group is expected to account for approximately 60% of China's total refining capacity and around 30% of the onshore crude production capacity. The CNPC Group is likely to possess roughly 40% of the country's refining capacity and as much as 69% of the onshore crude production capacity. The remaining 1% of onshore crude production capacity goes to

CNSPC. According to the government guidelines, the two super companies will also manage provincial companies and operate retail gas stations within their geographical boundaries. It is unclear whether all provincial companies and retail gas stations will be placed under the new CNPC and Sinopec groups.

(4) CNOOC, CNSPC, and the State Oil Trading Companies

The stable part of the organizational change for petroleum production is CNOOC and CNSPC, which will remain intact. Together, CNOOC and CNSPC account for about 11% of China's current annual production, of which the share of CNSPC is tiny (about 1% of the national total). In addition to CNOOC and CNSPC, all three state oil trading companies (Sinochem, Unipet, and Chinaoil) will continue to operate, although their representation is likely to change following the restructuring of CNPC and Sinopec. Incidentally, Sinochem's president Zheng Dunxun has retired to take up a position as the chairman of the board of Sinochem Hong Kong. His Sinochem position has been filled by Liu Deshu, former president of China National Machinery Import & Export Corporation.

(5) Demise of the MOCI and MGMR

The demise of the MOCI finally came as a result of the 1998 reform, exactly 20 years after its creation in 1978. Its governmental functions, along with those of CNPC and Sinopec, have been transferred to the newly established State Bureau of Petroleum and Chemical Industry under the SETC. Any refineries or olefin plants associated with the former MOCI will be placed under either the CNPC Group or the Sinopec Group, depending on the location of these refineries.

Fertilizer plants and other chemical enterprises under the former MOCI will be reorganized into several super large fertilizer and chemical groups. As mentioned earlier, MGMR was a minor player in China's oil industry, and its exploration functions were divided off in late 1996 when CNSPC was established. MGMR has now been reorganized into the new Ministry of Land and Natural Resources and thus disappears from the petroleum sector's organizational structure.

(6) Re-merging of Ceupet with Sinopec

Life for the newly established Ceupet as an independent group appears to have been short. As part of the reforms, Ceupet is being merged back into the Sinopec Group. As mentioned above, Li Yizhong, the head of Ceupet, is now the Sinopec Group President.

It is obvious that vertical integration and elimination of unnecessary internal competition between the upstream and downstream sectors are two important reasons why China has chosen to reform the structures of CNPC and Sinopec. More importantly, the reforms are aimed at revitalizing China's petroleum and petrochemical industry. Some Chinese leaders also intend to create two giant state companies that can be placed on the list of the Fortune 500 companies.

The reorganization and integration of CNPC and Sinopec are expected to be complete in July at the earliest, but it will not be surprising if there are delays. After the reorganization is complete, China will have five parallel state oil companies: the CNPC Group, the Sinopec Group, CNOOC, CNSPC, and three state trading companies: Sinochem, Unipet, and Chinaoil.

4. Revitalization of China's Petroleum Industry: Will It Work?

Since the government's intention is to revitalize China's petroleum and petrochemical industry, the success or failure of the current organizational reforms can only be determined by the future of the industry. While nobody can accurately predict what will happen in the future, some assessments can still be made on the reform measures. To do this, two important questions need to be asked and answered.

The first question to ask is whether efficiency can be improved through the current reorganization. For many years, the Chinese oil and petrochemical enterprises had been plagued by the upstream and downstream division in a largely price-distorted system. Upstream and downstream companies fought not only for state funding but also for price setting of crude oil, products, and petrochemicals. One party's gain in the battle at high government levels was often another party's loss. In the end the government had to be responsible for all policy-related losses. The government now wishes to eliminate the internal competition for price setting and reduce policy-related losses by combining the upstream operations with downstream refining and petrochemical production in the latest reform. On the positive side, this issue is indeed addressed by the current round of organizational reforms, and efficiency could be improved to a certain extent. Now there will be more incentives for oil producers to ship their crudes and for refiners to sell their chemical feedstocks to nearby companies that are in the same business group. However, the potential efficiency improvement is limited by the fact that two super state companies, i.e. the CNPC Group and Sinopec Group, still exist side by side. Trading between the

two groups is unavoidable. As long as oil prices are still fixed by the government and the bulk of project capital funding comes from the state, the rivalry between the CNPC Group and the Sinopec Group will continue. A larger factor is state enterprises themselves. Until the state enterprises become more accountable for their use of state capital and are allowed to lay off unneeded employees, any efficiency improvement will be rather limited.

The second question that must be asked is whether the current reorganization will promote free market competition in the petroleum and petrochemical sector. The government may argue that the purpose of creating two super corporations is to allow them to compete with each other. Unfortunately, this is not free market competition! Ever since the Chinese government started to reform its economy two decades ago, one of the central lines it has been pursuing is to increase the competition among state enterprises. Clearly, this has neither revitalized the state sector nor substantially improved the environment for free market competition. For the past two decades, it has been the private, agricultural, and service sectors, and not the state industrial sector, that have significantly contributed to China's ongoing transition from a planned economy to a market economy. As long as the state enterprises, including those in the oil sector, remain in the hands of the state and dominate the economy, it is hard to make them truly competitive, unless the government adopts a hands-off policy by allowing failed state companies to become bankrupt or be privatized. If privatization and independence of state enterprises are not among the possible courses of action, it would be more efficient to create a single state petroleum and petrochemical corporation, rather than

two parallel ones. The experience of other countries, including Saudi Arabia, Venezuela, and Trinidad and Tobago, suggests that the coexistence of multiple state companies in the same field does not work very well.

Another concern is the huge size imbalances between the CNPC Group, the Sinopec Group, CNOOC, and CNSPC! Will the current petroleum industry reorganization be transitional? Will the next step be to have CNSPC become part of the super conglomerates? Will Sinochem, Unipet, and Chinaoil be merged or reorganized? These are all unanswered questions facing the policy decisionmakers in the petroleum and petrochemical industry. Even between the giant CNPC and Sinopec groups, how state funding for their respective investments and how oil prices are set for the cross-trading between the CNPC Group and the Sinopec Group are also crucial to smooth operations of the new system.

Our preliminary analysis appears to be convincing enough. The preliminary conclusion is that the recent organizational changes will have only limited impacts for improving production efficiency and promoting free market competition, if the changes are not accompanied by reforms in the state enterprises. Obviously, the largest obstacle for revitalizing China's petroleum and petrochemical industry is the state enterprises themselves. Under these circumstances, two options are worth considering. Either could help to achieve the target of industry revitalization, depending on how state enterprises in China may be reformed.

Option I: If the Chinese government can take brave measures to privatize the state enterprises, then the best way to revitalize

the petroleum and petrochemical industry is a complete breakup of the state oil company system and decentralization of all decisionmaking power, with the government retaining only its regulatory functions. Under this option, individual petroleum and petrochemical enterprises should become independent, be privately (or locally) owned, and be free to merge with other enterprises. No doubt this option is not very realistic, because it is very unlikely that the government can go this far.

Option II: If full privatization of state enterprises in the petroleum sector is not on the government's agenda at all, the government should instead form a single state corporation to integrate all existing enterprises. Subsidiaries could then be created under the umbrella of a single state corporation and along functional lines such as E&P, downstream, and retailing. This would be the first step under this option. The second step would be to identify key areas in which state control of the business is vital to national interests. In other areas, the government should sell the state assets and allow private investment into the business. Finally, the government should gradually open the entire industry to private and foreign investment, while retaining control of the single state corporation and its key subsidiaries. The single state corporation and its subsidiaries should openly compete with private companies—but not with any state company—in a transparent market where demand, supply, and prices are freely determined by market forces. Even if regulations are needed, the state, local, and private companies should be subject to the same set of rules.

The key to the second option is that the government should form one state petroleum company—defined as a national company

that is directly placed under the SETC or the State Council—but limit its scope to only core petroleum-sector business. Nonessential business could be locally owned or open to private and foreign investment. As for the creation of subsidiaries along functional lines, the recent reorganization of the Venezuelan oil industry offers a good model.

If the government is unable to pursue either of these options and persists with the plan to form two super state oil corporations, it should reform the state enterprises in the petroleum sector, spin off or merge noncore business, reform the price system, and create an open market environment for free competition. Doing so will pay off in the long term to revitalize China's petroleum industry and its state enterprises.

Will the structural change itself significantly affect the way foreign companies do business in China's oil industry? The answer is probably no. However, for joint-venture projects that are under negotiation or pending government approval, some delays may occur because of the organizational and personnel changes. Over a longer period of time, foreign investors could end up having more choices among potential joint-venture partners. On the less positive side, foreign investors may also face an additional layer of bureaucracy at the SETC, in addition to the state oil companies and SDPC, in pursuing large petroleum investment projects in China.

5. Concluding Remarks

The Chinese government has certain objectives to achieve in reforming the structure of its petroleum and petrochemical industry. To some extent, the reforms may reduce the internal rivalry of the previous organizations, and they have some potential to improve the efficiency of the new state oil companies. The changes, however, do not directly address the fundamental issues facing the petroleum industry and have not completely ruled out the internal competition between two large state oil companies that is likely to be uneconomical and is hardly market-driven. The fundamental issues range from the reform of state enterprises and liberalization of oil prices, to opening of oil business and markets and independent financial accountability of the state oil companies. If the government continues its current policies of fixing oil prices, regulating the oil business, and allocating capital through the state, the achievements of the current reorganization are expected to be very limited. If the government starts to address the fundamental issues while continuously reforming the structure of the industry, it could accomplish much more in improving industry efficiency, promoting free market competition, and finally revitalizing the entire industry.

Statistical Appendix

Table 1a
China: Major Economic Indicators
Cumulative Value of January - December 1997

Indicator	Unit	Value	Percentage change over the same period in 1996 /1
GDP	Rmb billion	7,477.2	8.8
Industrial Value-Added /2	Rmb billion	2,047.6	10.9
Retail Sales of Consumer Goods	Rmb billion	2,720.0	10.7
Foreign Trade	US\$ billion	325.1	12.1
Exports	US\$ billion	182.7	20.9
Imports	US\$ billion	142.4	2.5
Consumer Price Index	Same Period Last Year=100	102.8	102.8

1. All in real terms except for foreign trade.
2. At the level of *Xiang* (District) and above.

Table 1b
China: Major Economic Indicators
Cumulative Value of January - March 1998

Indicator	Unit	Value	Percentage change over the same period in 1997 /1
GDP	Rmb billion	1,589.9	7.2
Industrial Value-Added /2	Rmb billion	442.1	8.2
Retail Sales of Consumer Goods	Rmb billion	713.6	6.9
Foreign Trade	US\$ billion	69.8	8.2
Exports	US\$ billion	40.2	13.2
Imports	US\$ billion	29.6	2.7
Consumer Price Index	Same Period Last Year=100	100.3	100.3

1. All in real terms except for foreign trade.

2. Including state enterprises and those non-state ones with sales of over Rmb 5 million.

Table 2a
China: Primary Energy Balance
Fourth Quarter 1997 Balance: Original Units (Final)

	Unit	Production	Export	Import	Apparent Consumption
Petroleum					
Oct	kt	13,655	1,870	5,090	16,875
Nov	kt	13,117	2,350	5,580	16,347
Dec	kt	13,260	2,260	7,650	18,650
IVQ	kt	40,032	6,480	18,320	51,872
Crude Oil					
Oct	kt	13,655	1,460	3,020	
Nov	kt	13,117	1,750	3,460	
Dec	kt	13,260	1,560	4,900	
IVQ	kt	40,032	4,770	11,380	
Products					
Oct	kt		410	2,070	
Nov	kt		600	2,120	
Dec	kt		700	2,750	
IVQ	kt		1,710	6,940	
Natural Gas					
Oct	mn cm	2,115	0	0	2,115
Nov	mn cm	1,945	0	0	1,945
Dec	mn cm	2,293	0	0	2,293
IVQ	mn cm	6,353	0	0	6,353
Coal					
Oct	kt	113,621	2,790	270	111,101
Nov	kt	115,869	2,920	180	113,129
Dec	kt	122,195	3,640	200	118,755
IVQ	kt	351,684	9,350	650	342,984
Hydroelectricity					
Oct	GWh	17,236	0	0	17,236
Nov	GWh	14,122	0	0	14,122
Dec	GWh	13,850	0	0	13,850
IVQ	GWh	45,208	0	0	45,208
Nuclear Power					
Oct	GWh	1,451	0	0	1,451
Nov	GWh	1,275	0	0	1,275
Dec	GWh	863	0	0	863
IVQ	GWh	3,589	0	0	3,589

kt=thousand tonnes; mn cm=million cubic meters.

Table 2a, Continued
China: Primary Energy Balance
Fourth Quarter 1997 Balance: Standard Units (Final)

	Unit	Production	Export	Import	Apparent Consumption
Petroleum					
Oct	kboe/d	3,216	440	1,199	3,974
Nov	kboe/d	3,192	572	1,358	3,978
Dec	kboe/d	3,123	532	1,801	4,392
IVQ	kboe/d	3,176	514	1,454	4,116
Crude Oil					
Oct	kboe/d	3,216	344	711	
Nov	kboe/d	3,192	426	842	
Dec	kboe/d	3,123	367	1,154	
IVQ	kboe/d	3,176	378	903	
Products					
Oct	kboe/d		97	487	
Nov	kboe/d		146	516	
Dec	kboe/d		165	648	
IVQ	kboe/d		136	551	
Natural Gas					
Oct	kboe/d	464	0	0	464
Nov	kboe/d	441	0	0	441
Dec	kboe/d	503	0	0	503
IVQ	kboe/d	469	0	0	469
Coal					
Oct	kboe/d	13,378	329	32	13,081
Nov	kboe/d	14,097	355	22	13,764
Dec	kboe/d	14,387	429	24	13,982
IVQ	kboe/d	13,953	371	26	13,608
Hydroelectricity					
Oct	kboe/d	349	0	0	349
Nov	kboe/d	296	0	0	296
Dec	kboe/d	281	0	0	281
IVQ	kboe/d	309	0	0	309
Nuclear Power					
Oct	kboe/d	29	0	0	29
Nov	kboe/d	27	0	0	27
Dec	kboe/d	17	0	0	17
IVQ	kboe/d	24	0	0	24
Total					
Oct	kboe/d	17,436	769	1,230	17,897
Nov	kboe/d	18,052	927	1,380	18,505
Dec	kboe/d	18,311	961	1,825	19,175
IVQ	kboe/d	17,739	876	1,461	18,324

kboe/d=thousand barrels of oil equivalent per day (based on heat content).

Table 2b
China: Primary Energy Balance
First Quarter 1998 Balance: Original Units (Preliminary)

	Unit	Production	Export	Import	Apparent Consumption
Petroleum					
Jan	kt	13,800	1,890	2,460	14,370
Feb	kt	12,149	1,410	4,650	15,389
Mar	kt	13,463	880	5,230	17,813
IQ	kt	39,412	4,180	12,340	47,572
Crude Oil					
Jan	kt	13,800	1,570	1,520	
Feb	kt	12,149	1,010	3,420	
Mar	kt	13,463	640	3,110	
IQ	kt	39,412	3,220	8,050	
Products					
Jan	kt		320	940	
Feb	kt		400	1,230	
Mar	kt		240	2,120	
IQ	kt		960	4,290	
Natural Gas					
Jan	mn cm	1,907	0	0	1,907
Feb	mn cm	1,821	0	0	1,821
Mar	mn cm	1,963	0	0	1,963
IQ	mn cm	5,691	0	0	5,691
Coal					
Jan	kt	89,649	1,250	80	88,479
Feb	kt	64,956	1,180	40	63,816
Mar	kt	112,210	3,040	60	109,230
IQ	kt	266,815	5,470	180	261,525
Hydroelectricity					
Jan	GWh	11,761	0	0	11,761
Feb	GWh	10,432	0	0	10,432
Mar	GWh	15,098	0	0	15,098
IQ	GWh	37,291	0	0	37,291
Nuclear Power					
Jan	GWh	851	0	0	851
Feb	GWh	707	0	0	707
Mar	GWh	1,061	0	0	1,061
IQ	GWh	2,619	0	0	2,619

kt=thousand tonnes; mn cm=million cubic meters.

Table 2b, Continued
China: Primary Energy Balance
First Quarter 1998 Balance: Standard Units (Preliminary)

	Unit	Production	Export	Import	Apparent Consumption
Petroleum					
Jan	kboe/d	3,250	445	579	3,384
Feb	kboe/d	3,167	368	1,212	4,012
Mar	kboe/d	3,170	207	1,232	4,195
IQ	kboe/d	3,196	340	1,006	3,862
Crude Oil					
Jan	kboe/d	3,250	370	358	
Feb	kboe/d	3,167	263	892	
Mar	kboe/d	3,170	151	732	
IQ	kboe/d	3,197	261	653	
Products					
Jan	kboe/d		75	221	
Feb	kboe/d		104	321	
Mar	kboe/d		57	499	
IQ	kboe/d		78	348	
Natural Gas					
Jan	kboe/d	418	0	0	418
Feb	kboe/d	442	0	0	442
Mar	kboe/d	430	0	0	430
IQ	kboe/d	430	0	0	430
Coal					
Jan	kboe/d	10,555	147	9	10,418
Feb	kboe/d	8,467	154	5	8,319
Mar	kboe/d	13,212	358	7	12,861
IQ	kboe/d	10,821	222	7	10,606
Hydroelectricity					
Jan	kboe/d	238	0	0	238
Feb	kboe/d	234	0	0	234
Mar	kboe/d	306	0	0	306
IQ	kboe/d	260	0	0	260
Nuclear Power					
Jan	kboe/d	17	0	0	17
Feb	kboe/d	16	0	0	16
Mar	kboe/d	21	0	0	21
IQ	kboe/d	18	0	0	18
Total					
Jan	kboe/d	14,479	592	589	14,475
Feb	kboe/d	12,327	521	1,218	13,023
Mar	kboe/d	17,140	565	1,239	17,813
IQ	kboe/d	14,464	553	1,006	14,917

kboe/d=thousand barrels of oil equivalent per day (based on heat content).

Table 3a
China: Value of Energy Trade
Fourth Quarter 1997: '000 US\$ (Final)

	Export	Import	Balance
Petroleum			
Oct	266,526	719,861	(453,335)
Nov	341,799	782,855	(441,056)
Dec	131,242	1,098,201	(966,959)
IVQ	739,567	2,600,917	(1,861,350)
Crude Oil			
Oct	183,723	431,125	(247,402)
Nov	225,835	502,595	(276,760)
Dec	206,260	720,639	(514,379)
IVQ	615,818	1,654,359	(1,038,541)
Products			
Oct	82,803	288,736	(205,933)
Nov	115,964	280,260	(164,296)
Dec	143,352	377,562	(234,210)
IVQ	342,119	946,558	(604,439)
Coal			
Oct	101,709	1,791	99,918
Nov	99,432	14,612	84,820
Dec	131,242	11,011	120,231
IVQ	332,383	27,414	304,969
Hydroelectricity			
Oct	0	0	0
Nov	0	0	0
Dec	0	0	0
IVQ	0	0	0
Total Energy			
Oct	368,235	721,652	(353,417)
Nov	441,231	797,467	(356,236)
Dec	262,484	1,109,212	(846,728)
IVQ	1,071,950	2,628,331	(1,556,381)

Table 3b
China: Value of Energy Trade
First Quarter 1998: '000 US\$ (Final)

	Export	Import	Balance
Petroleum			
Jan	268,221	363,816	(95,595)
Feb	197,031	632,436	(435,405)
Mar	131,242	675,967	(544,725)
IQ	596,494	1,672,219	(1,075,725)
Crude Oil			
Jan	206,023	220,913	(14,890)
Feb	121,139	473,127	(351,988)
Mar	78,834	423,803	(344,969)
IQ	405,996	1,117,843	(711,847)
Products			
Jan	62,198	142,903	(80,705)
Feb	75,892	159,309	(83,417)
Mar	44,948	252,164	(207,216)
IQ	183,038	554,376	(371,338)
Coal			
Jan	49,034	4,439	44,595
Feb	45,188	1,790	43,398
Mar	101,918	2,545	99,373
IQ	196,140	8,774	187,366
Hydroelectricity			
Jan	0	0	0
Feb	0	0	0
Mar	0	0	0
IQ	0	0	0
Total Energy			
Jan	317,255	368,255	(51,000)
Feb	242,219	634,226	(392,007)
Mar	233,160	678,512	(445,352)
IQ	792,634	1,680,993	(888,359)

Table 4
China: Crude Oil Exports by Destination
Fourth Quarter 1997

Destination	tonnes	b/d
Japan	3,033,912	240,734
South Korea	770,684	61,152
U.S.	521,155	41,353
North Korea	117,209	9,300
Australia	85,429	6,779
Singapore	79,912	6,341
Indonesia	76,899	6,102
Philippines	63,155	5,011
Russia	21,326	1,692
Total	4,769,681	378,464

Note: A standard conversion factor is used for numbers expressed in b/d.

Table 5
China: Product Exports by Destination
Fourth Quarter 1997

Destination	tonnes	b/d
Hong Kong	605,402	48,037
Singapore	216,173	17,153
Korea Rep	204,173	16,201
Japan	105,855	8,399
Panama	79,724	6,326
Vietnam	72,641	5,764
Indonesia	56,404	4,476
Taiwan	49,855	3,956
Russia	45,883	3,641
North Korea	36,109	2,865
Saudi Arabia	30,117	2,390
St. Vincent & Grenadin	20,396	1,618
Malaysia	18,938	1,503
Cyprus	13,188	1,046
Liberia	13,118	1,041
Macau	12,652	1,004
Thailand	11,967	950
U.S.	9,919	787
Bahamas	9,258	735
Germany	8,538	677
France	7,914	628
Switzerland	7,586	602
Others	68,676	5,449
Total	1,704,488	135,247

Note: A standard conversion factor is used for numbers expressed in b/d.

Table 6
China: Crude Oil Imports by Sources
Fourth Quarter 1997

Source	tonnes	b/d
Oman	2,653,780	210,572
Indonesia	1,681,455	133,420
Yemen	1,411,306	111,984
Iran	1,166,982	92,597
Angola	909,735	72,186
Norway	662,316	52,553
Saudi Arabia	444,825	35,296
Argentina	439,723	34,891
Vietnam	421,663	33,458
U.S.	284,327	22,561
Russia	260,191	20,646
Iraq	239,010	18,965
Egypt	208,059	16,509
Australia	166,976	13,249
Congo	82,870	6,576
Papua New Guinea	81,210	6,444
Qatar	80,752	6,407
Others	188,848	14,985
Total	11,384,029	903,298

Note: A standard conversion factor is used for numbers expressed in b/d.

Table 7
China: Product Imports by Sources
Fourth Quarter 1997

Source	tonnes	b/d
Singapore	2,514,535	199,523
Korea Rep	1,795,033	142,432
Japan	997,560	79,154
Russia	796,893	63,232
North Korea	176,025	13,967
Malaysia	155,169	12,312
Indonesia	124,281	9,861
Philippines	66,937	5,311
Hong Kong	52,774	4,188
Saudi Arabia	38,240	3,034
Iran	38,159	3,028
Kuwait	36,079	2,863
Vietnam	16,183	1,284
U.S.	15,970	1,267
Others	118,525	9,405
Total	6,942,364	550,862

Note: A standard conversion factor is used for numbers expressed in b/d.

Table 8
China: Crude Exports by Destination
(1997 Total)

Source	tonnes	b/d
Japan	10,471,116	209,422
South Korea	4,530,379	90,608
U.S.	2,309,794	46,196
Indonesia	1,106,808	22,136
North Korea	506,147	10,123
Singapore	400,473	8,009
Philippines	312,423	6,248
Australia	170,413	3,408
Russia	21,326	427
Total	19,828,880	396,578

Note: A standard conversion factor is used for numbers expressed in b/d.

Table 9
China: Product Exports by Destination
 (1997 Total)

Source	tonnes	b/d
Hong Kong	1,703,748	34,075
Singapore	758,478	15,170
South Korea	642,166	12,843
Vietnam	536,893	10,738
Japan	397,049	7,941
Taiwan	211,428	4,229
Panama	188,882	3,778
Russia	127,095	2,542
North Korea	109,600	2,192
Indonesia	76,880	1,538
U.S.	73,655	1,473
Saudi Arabia	60,327	1,207
Thailand	52,336	1,047
Australia	49,114	982
Macau	45,186	904
India	43,630	873
St. Vincent & Grenadin	39,906	798
Germany Fr	35,209	704
Iran	34,536	691
Malaysia	32,222	644
Liberia	32,145	643
Philippines	30,380	608
Cyprus	26,508	530
Switzerland	25,427	509
Burma	22,116	442
France	21,685	434
Canada	15,051	301
U.K.	14,392	288
Bahamas	13,734	275
Greece	12,597	252
Others	123,940	2,479
Total	5,556,317	111,126

Note: A standard conversion factor is used for numbers expressed in b/d.

Table 10
China: Crude Imports by Sources
(1997 Total)

Source	tonnes	b/d
Oman	9,033,023	180,660
Indonesia	6,587,083	131,742
Yemen	4,055,011	81,100
Angola	3,836,639	76,733
Iran	2,756,718	55,134
Vietnam	1,499,143	29,983
Argentina	1,108,515	22,170
Norway	987,052	19,741
Congo	979,956	19,599
U.S.	753,659	15,073
Saudi Arabia	499,908	9,998
Russia	475,257	9,505
Gabon	376,860	7,537
Australia	325,486	6,510
Papua New Guinea	323,736	6,475
Egypt	286,514	5,730
Iraq	239,010	4,780
Malaysia	230,296	4,606
Eq Guinea	204,919	4,098
Guinea	151,877	3,038
Others	760,831	15,217
Total	35,471,495	709,430

Note: A standard conversion factor is used for numbers expressed in b/d.

incorrect table

Table 11
China: Product Imports by Sources
(1997 Total)

Source	tonnes	b/d
Singapore	2,345,483	46,910
South Korea	1,186,833	23,737
Russia	690,812	13,816
Japan	574,889	11,498
U.S.	73,889	1,478
India	61,964	1,239
Philippines	61,373	1,227
Indonesia	59,617	1,192
Kuwait	44,193	884
North Korea	41,601	832
Taiwan	35,639	713
U.A.E.	31,444	629
Hong Kong	14,656	293
Malaysia	11,057	221
Others	19,897	398
Total	5,253,347	105,067

Note: A standard conversion factor is used for numbers expressed in b/d.

Table 12
China: Crude Oil Exports by Destination
First Quarter 1998

Destination	tonnes	b/d
Japan	1,388,463	112,620
South Korea	943,623	76,538
Indonesia	427,526	34,677
Singapore	227,970	18,491
U.S.	93,581	7,590
Australia	82,522	6,693
North Korea	53,000	4,299
Total	3,216,684	255,237

Note: A standard conversion factor is used for numbers expressed in b/d.

Table 13
China: Product Exports by Destination
First Quarter 1998

Destination	tonnes	b/d
Hong Kong	287,953	23,356
Singapore	162,906	13,213
South Korea	137,358	11,141
Japan	82,671	6,706
Vietnam	81,099	6,578
Taiwan	61,453	4,984
Panama	28,431	2,306
North Korea	25,190	2,043
St. Vincent & Grenadines	10,599	860
Russia	9,186	745
Macau	8,638	701
Cyprus	8,149	661
Liberia	7,569	614
Thailand	5,009	406
U.S.	4,964	403
Australia	4,784	388
Burma	4,393	356
Germany	4,391	356
France	2,834	230
Switzerland	2,652	215
Malta	2,042	166
Canada	1,871	152
Italy	1,848	150
Belize	1,786	145
Austria	1,622	132
Others	15,574	1,263
Total	964,972	78,270

Note: A standard conversion factor is used for numbers expressed in b/d.

Table 14
China: Crude Oil Imports by Sources
1st Quarter 1998

Source	tonnes	b/d
Yemen	1,387,883	112,573
Oman	1,250,206	101,406
Iran	1,147,208	93,051
Angola	846,712	68,678
Indonesia	634,940	51,501
Saudi Arabia	389,278	31,575
Argentina	358,860	29,108
Vietnam	333,867	27,080
U.S.	297,867	24,160
Eq. Guinea	243,204	19,727
Canada	162,822	13,207
Malaysia	157,121	12,744
Libya	138,383	11,224
U.A.E.	134,453	10,906
Nigeria	123,238	9,996
Congo	119,111	9,661
Kazakhstan	101,587	8,240
Egypt	82,205	6,668
Kuwait	71,607	5,808
Norway	54,825	4,447
Russia	18,649	1,513
Others	0	0
Total	8,054,027	653,271

Note: A standard conversion factor is used for numbers expressed in b/d.

Table 15
China: Product Imports by Sources
1st Quarter 1998

Source	tonnes	b/d
Singapore	1,841,070	149,331
South Korea	1,475,273	119,661
Japan	389,388	31,584
Russia	168,359	13,656
Indonesia	108,975	8,839
Malaysia	107,609	8,728
U.S.	61,044	4,951
Bahrian	38,499	3,123
Kuwait	38,395	3,114
New Zealand	24,153	1,959
Taiwan	9,512	772
Others	31,176	2,529
Total	4,293,453	348,247

Note: A standard conversion factor is used for numbers expressed in b/d.

Table 16a
Energy Indicators of the Fourth Quarter: 1997 Versus 1996

	IVQ 1996	IVQ 1997	% Change
Total Energy Exports ('000 US\$)	1,648,925	1,071,950	-35.0
Total Energy Imports ('000 US\$)	1,902,200	2,628,331	+38.2
Primary Energy Consumption (kboe/d)	18,309	18,324	+0.1
Apparent Oil Consumption (kb/d)	3,433	4,116	+19.9
Crude Oil Exports (kb/d)	509	375	-26.4
Crude Oil Imports (kb/d)	551	895	+62.6
Products Exports (kb/d)	129	135	+4.1
Products* Imports (kb/d)	367	545	+48.8

**Excluding LPG.*

Table 16b
Energy Indicators of the First Quarter: 1998 Versus 1997

	IQ 1997	IQ 1998	% Change
Total Energy Exports ('000 US\$)	1,096,454	792,634	-27.7
Total Energy Imports ('000 US\$)	2,198,840	1,680,993	-23.6
Primary Energy Consumption (kboe/d)	16,996	14,917	-12.2
Apparent Oil Consumption (kb/d)	3,799	3,862	+1.7
Crude Oil Exports (kb/d)	303	261	-13.9
Crude Oil Imports (kb/d)	590	653	+10.6
Products Exports (kb/d)	94	78	-17.2
Products* Imports (kb/d)	399	348	-12.8

**Excluding LPG.*

Table 17
China: Summary of Oil Balance, Monthly Data, 1996-1997
('000 b/d)

	Crude /1			Products /2		Apparent Consumption	
	Production	Export	Import	Export	Import	QTY	Change (%) /3
Jan-96	3,121	306	339	38	193	3,310	19.4
Feb-96	3,174	214	365	68	224	3,481	24.9
Mar-96	3,058	386	476	71	283	3,359	6.6
Apr-96	3,007	332	506	54	221	3,348	12.1
May-96	3,169	398	478	121	380	3,509	11.8
Jun-96	3,213	407	495	54	356	3,602	12.6
Jul-96	3,181	391	367	57	405	3,506	8.1
Aug-96	3,111	558	443	118	341	3,219	3.4
Sep-96	3,140	331	336	29	280	3,396	-2.8
Oct-96	3,172	622	643	73	337	3,457	7.8
Nov-96	3,210	343	516	68	299	3,614	8.4
Dec-96	3,132	558	492	245	462	3,282	-0.7
Total	3,140	405	455	83	316	3,423	8.8
Jan-97	3,233	200	370	59	252	3,596	8.6
Feb-97	3,238	516	628	81	433	3,702	6.4
Mar-97	3,245	214	777	141	516	4,182	24.5
Apr-97	3,267	623	638	78	367	3,571	6.6
May-97	3,225	506	424	71	466	3,538	0.8
Jun-97	3,251	433	659	234	633	3,877	7.6
Jul-97	3,233	287	775	87	436	4,069	16.1
Aug-97	3,201	365	805	87	410	3,964	23.1
Sep-97	3,220	501	720	92	406	3,753	10.5
Oct-97	3,216	344	711	97	487	3,974	14.9
Nov-97	3,192	426	842	146	516	3,978	10.1
Dec-97	3,123	367	1,154	165	648	4,392	33.8
Total	3,220	397	709	111	464	3,885	13.5

1. Monthly crude production figures may not be exactly the same as in previous issues owing to some adjustments.

2. Exclude LPG.

3. Monthly and annual percentage changes over the same period in previous year.