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# INTERNATIONAL TRADE DEVELOPMENTS

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## Energy Use in China: Trends in Oil Demand and Imports

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*Since 1994 China has been the second largest consumer of energy, lagging behind only the United States. In 2002 it surpassed Japan to also become the second largest consumer of oil, and by 2003 accounted for 7.6 percent of total world oil use and 12.1 percent of world energy use. As China becomes an increasingly important player in world energy markets, its behavior has the potential to impact world energy prices. This article provides an overview of energy use in China, with specific attention to trends in Chinese oil production and consumption.*

### Overview of the Chinese Economy and Energy Sector

In 2003, China was the second largest economy in the world, after the United States, on a purchasing power parity basis.<sup>2</sup> China has experienced real GDP growth of over 7 percent for each of the last 5 years,<sup>3</sup> growing an impressive 9.1 percent in 2003 and 9.7 percent at an annualized rate in the first quarter of 2004.<sup>4</sup> Figure 1 demonstrates the growing share of GDP that has been accounted for by the energy-intensive industry sector, reaching 51.1 percent of GDP in 2002, while services have remained stable at roughly 33 percent and agriculture has seen its share decline to 15.4 percent, from over 25 percent in 1990.

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<sup>2</sup> Central Intelligence Agency, "China," *CIA World Factbook*, found at Internet address <http://www.cia.gov/cia/publications/factbook/geos/ch.html>, retrieved on July 2, 2004.

<sup>3</sup> World Bank, "World Development Indicators Online," found at Internet address <http://devdata.worldbank.org/dataonline>, retrieved on July 7, 2004.

<sup>4</sup> National Bureau of Statistics of China, "Statistical Communiqué of the People's Republic of China on National Economic and Social Development in 2003," Feb. 26, 2004, *China Economic News*, Supplement No. 3, Apr. 5, 2004; and External Services Division, Economic Daily, "Major Index of China's National Economy for the First Quarter 2004," *China Economic News*, No. 18, series 1218, May 17, 2004.

These trends are expected to continue, as the agricultural sector grew only 2.5 percent in 2003, while industry grew 17.7 percent.<sup>5</sup> Industrial production is concentrated along the coastal regions, with urban areas in Southeast China experiencing more rapid development than other areas of the country.

In 2003, China consumed 1178.3 million tons of oil equivalent (t.o.e.),<sup>6</sup> a 13.8 percent increase from 2002 and accounting for 12.1 percent of the world total, whereas the United States, the largest energy consumer in the world, used 2297.8 million t.o.e., accounting for 23.6 percent of total world energy consumption. The Russian Federation, the third largest energy consumer, used 670.8 million tons in the same year. Whereas China's energy consumption increased steadily in the early 1990s, it decreased from 1998 to 2000, rose again in 2001 and surpassed its 1997 value in 2002.<sup>7</sup>

After climbing during the first half of the 1990s, per capita energy consumption in China has remained relatively stable since 1996, at around 900 kilograms

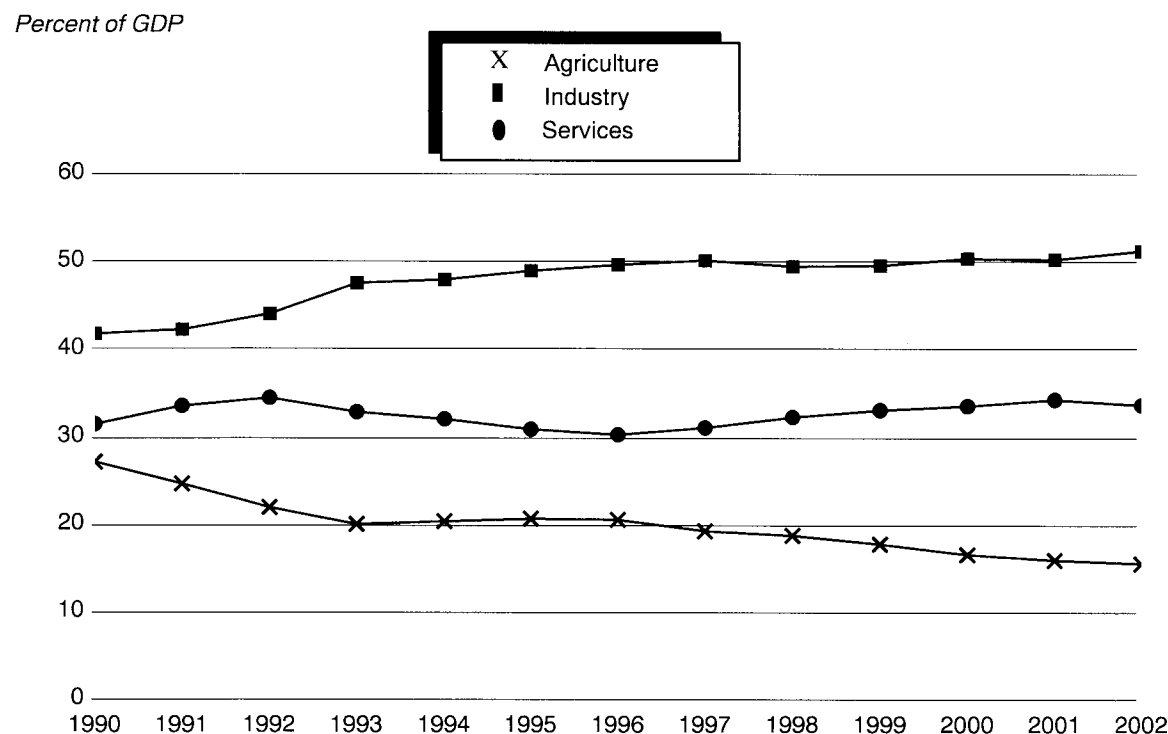
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<sup>5</sup> U.S. Department of State telegram, "China 2003 Macro Overview and 2004 Forecast," message reference No. 461, prepared by U.S. Embassy, Beijing, Mar. 22, 2004.

<sup>6</sup> The Statistics Division of the United Nations Secretariat defines one ton of oil as equivalent to 1.0 x 10 to the power of 7 kcal, that is, 10 million kilocalories.

<sup>7</sup> British Petroleum (BP), "Statistical Review of World Energy 2004," found at Internet address <http://www.bp.com/sectiongenericarticle.do?categoryId=2012411&contentId=2018340>, retrieved on July 7, 2004.

**Figure 1**  
**Components of China's GDP**



Source: World Bank, "World Development Indicators data online," found at <http://devdata.worldbank.org/dataonline>, retrieved July 7, 2004.

(kg) of oil equivalent per year. In 2001 (the latest year data are available), the United States consumed 7,996 kg of oil equivalent per capita.<sup>8</sup> Growing GDP and rising development standards could contribute to increased per capita energy consumption in China.

Chinese demand for energy has been increasing rapidly, but obstacles such as a limited rate of exploration for new discoveries, inadequate infrastructure, and government control of the sector, including price setting, have led to widespread energy shortages. Blackouts have become increasingly common and hold the potential to limit expansion of industrial output.<sup>9</sup> The Chinese State Council has demanded increased spending to address blackouts, but until June 2004 kept a tight grip on prices.<sup>10</sup> Artificially low prices set by

the government kept energy demand high, but government officials were concerned that raising prices could interfere with farming and capital construction.<sup>11</sup> Chinese officials estimate an 11-percent increase in electricity consumption in 2004 over 2003, and indicated that areas will continue to be subject to staggered blackouts and electricity rationing.<sup>12</sup>

Coal is China's primary energy source, providing over 70 percent of the total energy used throughout the 1990s and, with 799.7 million t.o.e., accounted for 68 percent of energy consumption in 2003. Oil ranked second, accounting for 23 percent of energy consumption. Hydroelectricity made up 5.5 percent of energy consumption and natural gas comprised 2.5 percent. Nuclear power accounted for less than 1 percent of total energy consumed within China.<sup>13</sup>

<sup>8</sup> World Bank, "World Development Indicators Online," found at Internet address <http://devdata.worldbank.org/dataonline>, retrieved on July 7, 2004.

<sup>9</sup> Central Intelligence Agency, "China," *CIA World Factbook*, found at Internet address <http://www.cia.gov/cia/publications/factbook/geos/ch.html>, retrieved on July 2, 2004.

<sup>10</sup> *China Watch*, "Economic Summary," vol. 7, No. 4. April 2004.

<sup>11</sup> Xin, Li, "Shortage of diesel oil unlikely to be alleviated in the short term," *China Economic News*, No. 24, series 1224, June 28, 2004, p. 3.

<sup>12</sup> Wen, Yi, "Most serious electricity shortage in years," *China Economic News*, No. 24, series 1224, June 28, 2004, p. 2.

<sup>13</sup> BP, "World Energy 2004."

Although absolute levels of coal use have been increasing (with the exception of the 1998-2000 period), coal's contribution to the total amount of energy used has been declining, while consumption of energy derived from oil and hydro-power has increased.<sup>14</sup> Coal will likely continue to be important in China, as the International Energy Agency projects that 34.4 percent of the world's coal mining investment over the next 20 years will be in China.<sup>15</sup> However, investment in other forms of energy is expected to grow as well. Government concerns regarding the environmental consequences of extensive coal use may accelerate this transition.<sup>16</sup>

China has placed an increased emphasis on hydro-power; when the Three Gorges project on the Yangtze River is completed in 2009 it will be the world's largest capacity power plant, at more than 18,000 megawatt-electric (MWe), which is 18 gigawatts (GW). Already, with just 7 of its 26 turbines operating, it is the largest hydroelectric power plant in China, with a capacity of 4,970 MWe.<sup>17</sup> Planning for other hydro-power projects is underway.

Production capacity for other types of energy is also likely to increase, with plans to build four new nuclear-power stations by 2020.<sup>18</sup> Nuclear power currently accounts for 1.6 percent of energy capacity, but the government hopes to expand this figure to 4 percent.<sup>19</sup> Plans are also underway to construct a pipeline to transport natural gas from the Tarim gasfield in the northwest to Shanghai on the eastern coast.<sup>20</sup> Additionally, continued infrastructure improvements may allow the southern inland areas to use forms of energy other than the nearby coal, increasing demand for a wider variety of energy sources. With

oilfields throughout Northeast China, the Tarim basin in the northwest, and extensive offshore drilling, there is also significant potential for an increase in oil production to help meet the rising demand for energy.

## Domestic Oil Production and Import Sources

In 1998 the Chinese government reorganized a variety of state owned oil assets into two vertically organized, regional firms: The China National Petroleum Corporation (CNPC) in the north and west and the China Petrochemical Corporation (Sinopec) in the south. Oil production in China is dominated by these firms on land and by the China National Offshore Oil Corporation (CNOOC) for all offshore exploration and production. Offshore energy sources account for more than 10 percent of China's domestic crude oil production.<sup>21</sup>

China produced 3396 barrels<sup>22</sup> daily (b/d) in 2003, making it the sixth largest producer of oil worldwide. Oil consumption in 2003 registered at 5379 thousand b/d.<sup>23</sup> As shown in Figure 2, oil consumption in China has outpaced production since 1993, causing China to become a net importer of oil. Over the last 10 years, consumption has grown more rapidly than production, and the amount of oil imported has increased every year. China imported 91.1 million tons of crude oil in 2003 and 47.8 million tons in the first 4 months of 2004, representing a 58 percent year-on-year increase in oil imports.<sup>24</sup> In 2003, 36 percent of China's oil consumption was imported.<sup>25</sup>

Oil imports come primarily from the Middle East (40 percent) and the Asia-Pacific region (30 percent). Other significant sources of oil include West Africa (12 percent), the Former Soviet Union (9 percent), and East and Southern Africa (5 percent).<sup>26</sup> Although a net importer, China exports 424 of the 3396 thousand b/d that it produces, roughly 12 percent of production; 21 percent of those exports go to Japan.<sup>27</sup> China has made efforts to diversify its suppliers of oil and its corpora-

<sup>14</sup> BP, "World Energy 2004."

<sup>15</sup> International Energy Agency, "World Energy Investment Outlook 2003," found at Internet address <http://www.worldenergyoutlook.org/pubs/gio2003.asp>, retrieved on July 8, 2004.

<sup>16</sup> Economist Intelligence Unit, "China: Industry Wire: Forecast, Energy and Electricity forecast," *EIU Viewswire*, Apr. 1, 2004, found at Internet address <http://www.viewswire.com>, retrieved on June 16, 2004.

<sup>17</sup> Fossil Energy International, "An Energy Overview of the People's Republic of China," found at Internet address <http://www.fe.doe.gov/international/chinover.html>, retrieved on June 7, 2004.

<sup>18</sup> Economist Intelligence Unit, "China: Industry Wire: Forecast, Energy and Electricity forecast," *EIU Viewswire*, Apr. 1, 2004, found at Internet address <http://www.viewswire.com>, retrieved on June 16, 2004.

<sup>19</sup> U.S. Department of State telegram, "McMonigle - Zhang Bilateral Meeting," message reference No. 124, prepared by U.S. Embassy, Beijing, June 21, 2004.

<sup>20</sup> Energy Information Administration, "China Country Analysis Brief," found at Internet address <http://www.eia.doe.gov/emeu/cabs/china.html>, retrieved on June 7, 2004.

<sup>21</sup> Energy Information Administration, "China Country Analysis Brief," found at Internet address <http://www.eia.doe.gov/emeu/cabs/china.html>, retrieved on June 7, 2004.

<sup>22</sup> A barrel of crude oil is roughly 42 gallons of oil. Once refined, it expands to just over 44 gallons.

<sup>23</sup> BP, "World Energy 2004."

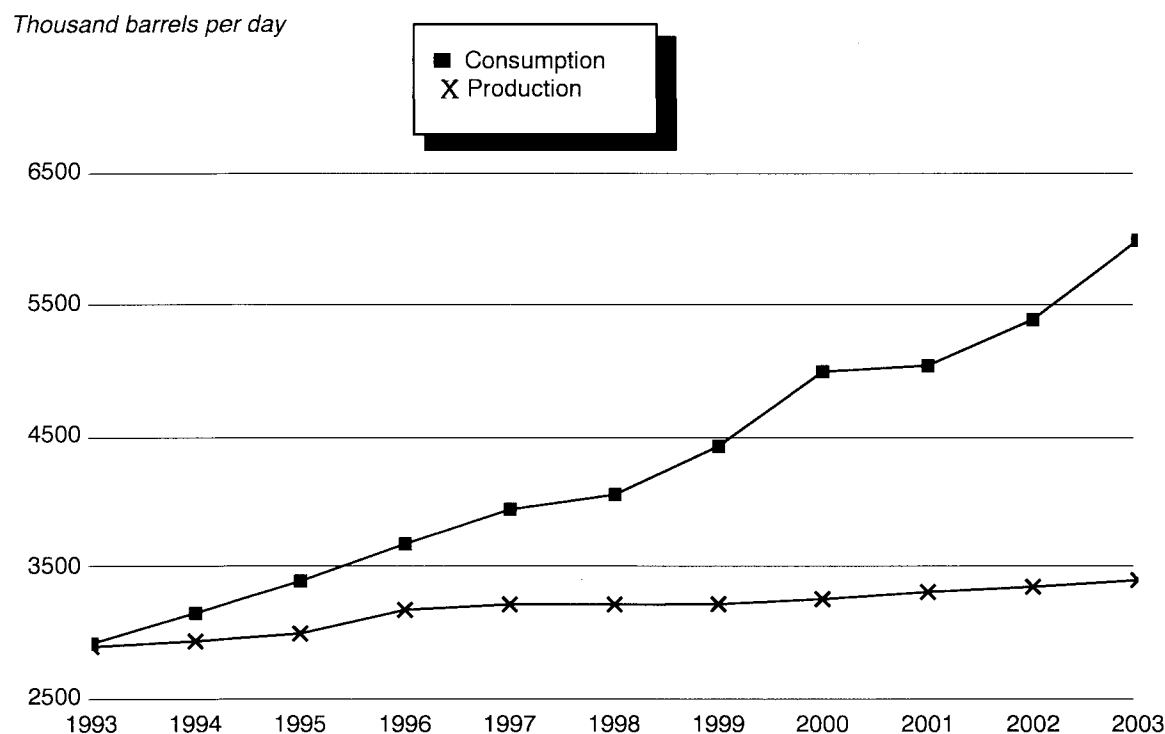
<sup>24</sup> Lan, Luo, "Chinese official explains measures to tackle energy tension," *China Economic News*, No. 23, Series 1223, June 21, 2004.

<sup>25</sup> Gang, Huang, "Intense coal-power-oil-transportation situation becomes issue," *China Economic News*, No. 20, Series 1220, May 31, 2004.

<sup>26</sup> BP, "World Energy 2004."

<sup>27</sup> BP, "World Energy 2004."

**Figure 2**  
Trends in oil production and consumption in China



Source: British Petroleum, "Statistical Review of World Energy 2004," found at [http://bp.com/sectiongenericarticle.do/?/](http://bp.com/sectiongenericarticle.do?/), and U.S. Department of Energy, retrieved July 23, 2004.

tions are investing in oil fields both domestically and abroad. Together, the three largest firms (CNPC, Sinopec, and CNOOC) have invested in fourteen countries.<sup>28</sup> China is expected to account for nearly 15 percent of global energy investment for the 2001-2030 period, with oil receiving a significant portion of those funds.<sup>29</sup>

There are four state-backed crude oil importers, of which the China National Chemical Import and Export Corporation (Sinochem) is the largest. Sinochem has worked closely with the other three licensed importers,

the China International United Petroleum and Chemical Corporation (Unipec, owned largely by Sinopec<sup>30</sup>), CNPC, and Zhuhai Zhenrong, to implement domestic refining and distribution. Although Sinochem typically imports and exports quantities determined by State planners, CNOOC has some agreements that allow for direct exports from offshore fields.<sup>31</sup>

In an effort to facilitate oil imports, the main corporations have signed agreements to build pipelines and expand shipping capacity. CNPC is financing pipelines from Kazakhstan and from Russia that, when completed in 2008 and 2010 respectively, could allow

<sup>28</sup> Economist Intelligence Unit, "Business China: Efforts to diversify oil supplies," *EIU Viewswire*, Feb. 16, 2004, found at Internet address <http://www.viewswire.com>, retrieved on June 7, 2004; and Economist Intelligence Unit, "Energy and electricity forecast," *EIU Viewswire*, Apr. 1, 2004, found at Internet address <http://www.viewswire.com>, retrieved on June 7, 2004. Included in the 14 are Kazakhstan, Yemen, Sudan, and Burma/Myanmar.

<sup>29</sup> International Energy Agency, "World Energy Investment Outlook 2003," found at Internet address <http://www.worldenergyoutlook.org/pubs/gio2003.asp>, retrieved on July 8, 2004.

<sup>30</sup> Sinopec and Sinochem jointly acquired Unipec in February 1993. In July 1998, this arrangement was restructured such that Sinopec owned 70 percent of the shares in the company and Sinochem owned the remaining 30 percent. Sinopec Corporation, "About Sinopec," found at Internet address <http://english.sinopec.com/en-company/en-subsidiaries/en-holdingsub/en-unipec/1318.shtml>, retrieved on July 8, 2004.

<sup>31</sup> Energy Information Administration, "The Key Decision-Makers Affecting China's Energy Sector," found at Internet address <http://www.eia.doe.gov/emeu/cabs/archives/china/part3.html>, retrieved on July 8, 2004.

additional imports of up to 50 million tons per year.<sup>32</sup> Sinopec has signed an agreement with the China Ocean Shipping Company (Cosco) to double the capacity of Cosco's fleet to carry crude oil.<sup>33</sup> As growth in demand outpaces growth in crude oil production, China's oil giants have become more involved in investing overseas and developing efficient import solutions.

### Oil Consumption

Oil consumption has been steadily increasing in China, nearly doubling in the 10 years from 1993 to 2003 (from just less than 3 million b/d to roughly 6 million b/d), accounting for 7.6 percent of world oil consumption. In 2002, China surpassed Japan to become the second largest oil consumer in the world,

<sup>32</sup> Platts, "Kazakhstan and China start second phase of pipeline construction," found at Internet address <http://www.platts.com>, retrieved on June 22, 2004, and Economist Intelligence Unit, "Russia-China oil agreement detailed," *EIU Viewswire*, May 29, 2003, found at Internet address <http://www.viewswire.com>, retrieved on June 22, 2004.

<sup>33</sup> "Cosco to double crude fleet," *Business Times*, June 21, 2004, found at Internet address <http://www.business-times.asia1.com>, retrieved on June 7, 2004.

following the United States.<sup>34</sup> Figure 3 shows the rise in China's oil use along with the rise in world oil prices for the period. China is projected to account for 16 percent of the increase in world oil demand between 2000 and 2030.<sup>35</sup> In 2003, oil consumption was 11 percent higher than a year earlier, and accounted for 41 percent of the growth in world oil demand.<sup>36</sup>

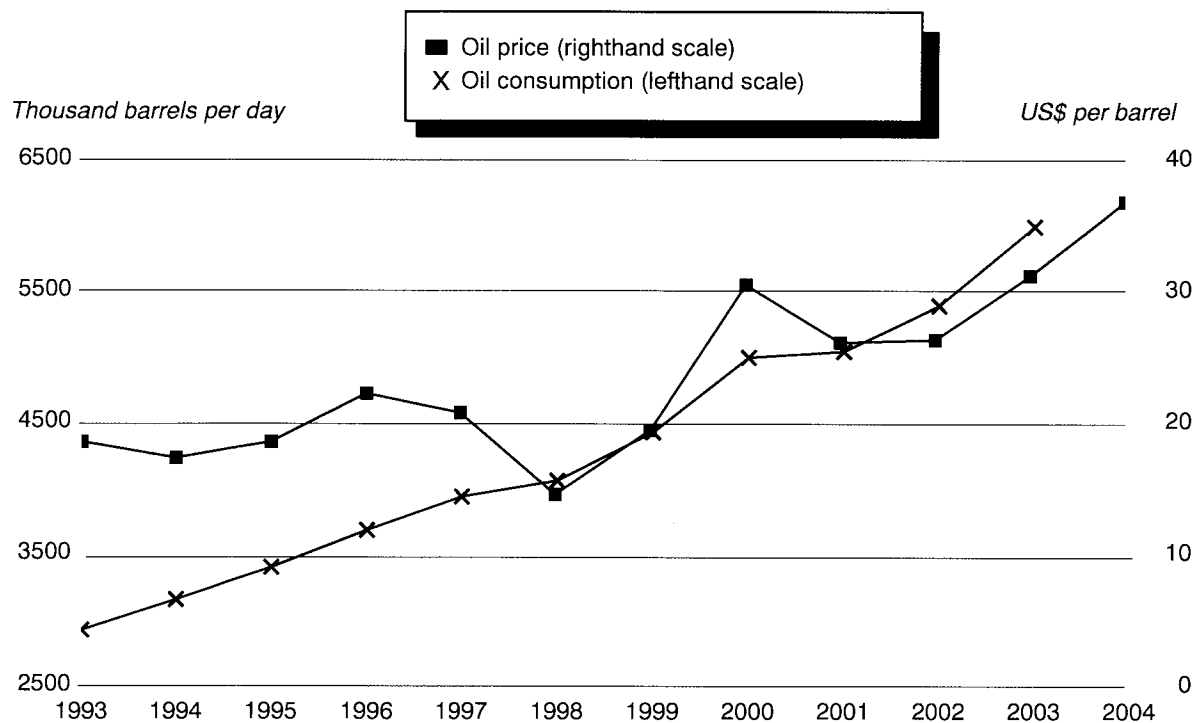
Figure 4 details how much oil is used by each sector, with transport (42 percent of China's oil use) and industry (32 percent) leading the list in 2001. Each sector shows room for growth and is expected to con-

<sup>34</sup> BP, "World Energy 2004."

<sup>35</sup> International Energy Agency, "World Energy Investment Outlook 2003," found at Internet address <http://www.worldenergyoutlook.org/pubs/gio2003.asp>, retrieved on July 8, 2004.

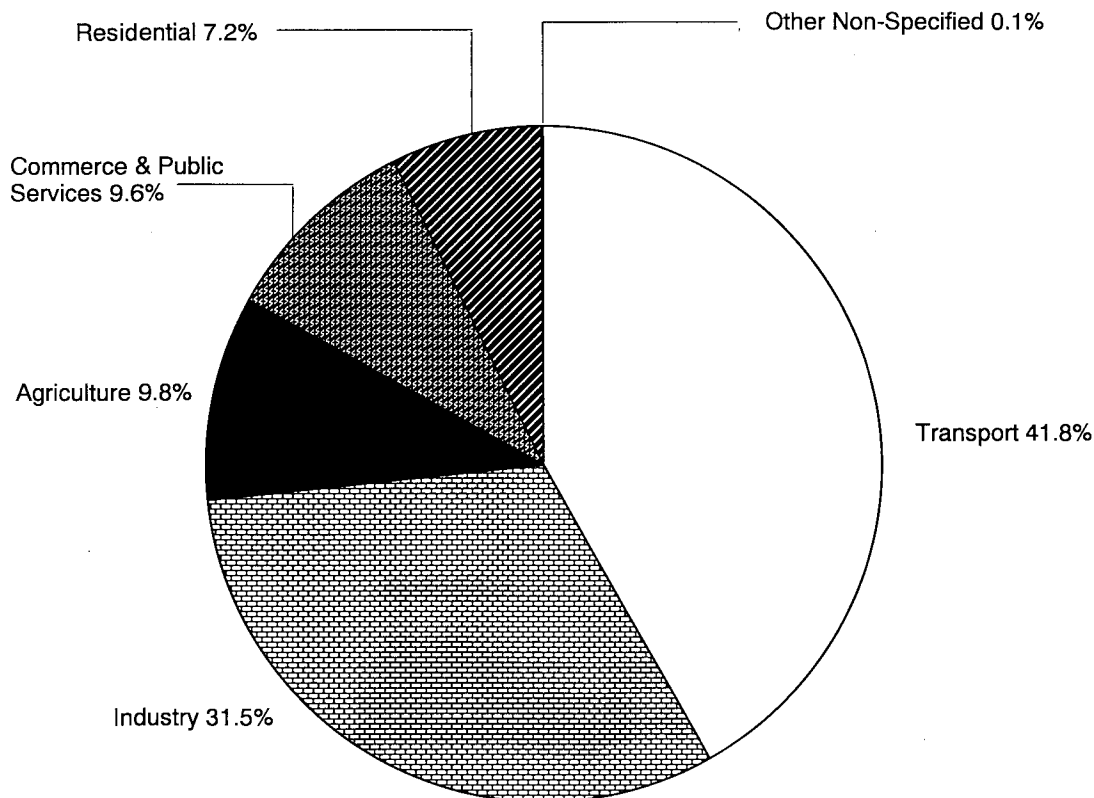
<sup>36</sup> Lorenzetti, Maureen, "BP: World oil and gas reserves still growing at healthy pace," *Oil and Gas Journal Online*, June 21, 2004, found at Internet address <http://ogj.pennnet.com/home.cfm>, retrieved on June 22, 2004.

**Figure 3**  
Consumption of oil in China and world oil price



Source: British Petroleum, "Statistical Review of World Energy 2004," found at <http://bp.com/sectiongenericarticle.do?/>, and U.S. Department of Energy, retrieved July 23, 2004. Oil price is the average yearly spot price, Cushing, Oklahoma, f.o.b., US dollars per barrel (right scale).

**Figure 4**  
Oil use by sector, 2001



Source: International Energy Agency, "Energy Statistics of Non-OECD Countries, 2002."

tribute to the overall increase in demand for oil. Oil use is expected to rise 3.3 to 4.6 percent each year.<sup>37</sup>

## Transportation

Transportation was the largest user of oil in 2001, at 42 percent of the total. As private ownership of automobiles becomes more prevalent, oil use in transportation is likely to increase. Automobile sales rose 34.2 percent in 2003, bringing total vehicles purchased to 4.39 million.<sup>38</sup> The Development Research Center of the State Council, a part of China's cabinet, believes there will be more than 156 million vehicles in China by 2020, a sharp increase from the

1998 automobile stock of 13 million.<sup>39</sup> Road transport is expected to be the primary contributor to increased demand of transportation fuels.<sup>40</sup> Consumption of oil in the transportation sector has been growing rapidly, having more than doubled from 26 million tons in 1990 to more than 65 million tons in 2000.<sup>41</sup> This growth is anticipated to continue as rising incomes and a growing managerial class enable more people to afford automobiles.<sup>42</sup>

Although cars typically consume gasoline, manufacturers have made an effort to introduce diesel

<sup>37</sup> Dadi and Levine, "China's Sustainable Energy Future: Scenarios of Energy and Carbon Emissions," Energy Research Institute of the National Development and Reform Commission, People's Republic of China, October 2003, p. 21.

<sup>38</sup> Lanfranco, Ed, "Cars becoming 'Irresistible' in China," United Press International, Jan. 22, 2004.

<sup>39</sup> Dadi and Levine, "China's Sustainable Energy Future: Scenarios of Energy and Carbon Emissions," Energy Research Institute of the National Development and Reform Commission, People's Republic of China, October 2003.

<sup>40</sup> Energy Information Administration, "International Energy Outlook 2004," found at Internet address <http://www.eia.doe.gov/oiaf/ieo/>, retrieved on July 8, 2004.

<sup>41</sup> International Energy Agency, *Energy Statistics of Non-OECD Countries*, 2002, OECD, Paris.

<sup>42</sup> International Energy Agency, "Monthly Oil Market Report," November 2002, found at Internet address <http://omrpublic.iea.org/>, retrieved on June 22, 2004.

cars in China. Diesel motors save 15-30 percent of oil use compared to gasoline engines. Some estimates indicate that if all 18.8 million sedans in China switched to diesel motors, it would save 75 million liters of oil per day. This shift is expected to take place slowly, as the quality of diesel in China is still relatively low.<sup>43</sup>

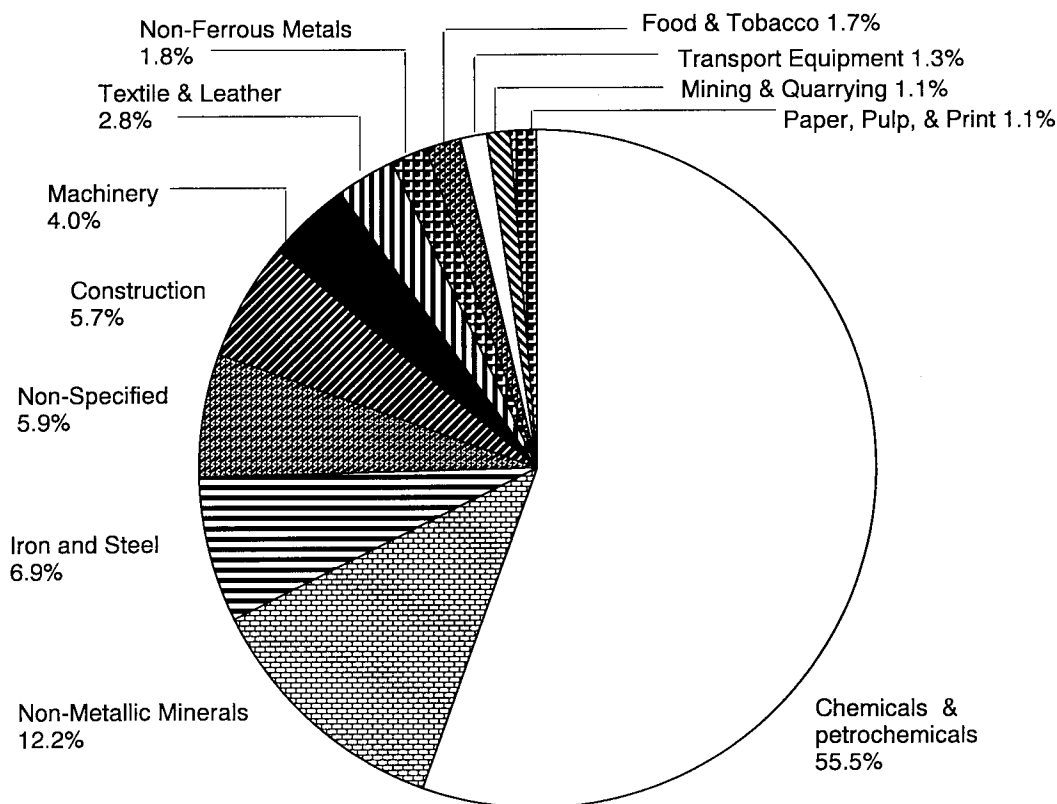
Oil use in transportation may also increase as the government implements extensive infrastructure reforms, including more than \$42 billion to build 4,375 miles of new railroad track, leading to greater capacity on the railway systems.<sup>44</sup> The new Guangzhou international airport, which opened in August 2004, may boost jet fuel demand.<sup>45</sup> More efficient airports and diminishing wariness regarding the impact on public health of outbreaks of Severe Acute Respiratory Syndrome (SARS) could encourage increased air travel to China.

<sup>43</sup> "The rise of oil price and diesel cars in China," China Economic Net, June 23, 2004, found at Internet address <http://www.en.ce.cn>, retrieved on June 24, 2004.

<sup>44</sup> Energy Information Administration, "International Energy Outlook 2004," found at Internet address <http://www.eia.doe.gov/oia/ieo/>, retrieved on July 8, 2004.

<sup>45</sup> International Energy Agency, "Monthly Oil Market Report," March 2004, found at Internet address <http://omr-public.iaea.org/>, retrieved on June 22, 2004.

**Figure 5**  
Oil consumption by industry sector, 2000



Source: International Energy Agency, "Energy Statistics of Non-OECD Countries, 2002."

## Industry

China's industrial energy requirements are high in part because of high energy intensity in heavy industry. Although China has made significant gains towards improving its energy efficiency, particularly in aluminum and petroleum refining where its values are well within the OECD range, there is still room for progress. While it takes China 36 gigajoules (GJ) to produce a ton of crude steel, OECD countries range from 18-26 GJ/ton. Similarly, where China needs 73-90 GJ/ton to produce ethylene, OECD countries produce it for 58-68 GJ/ton.<sup>46</sup> If China continues to develop an efficient energy system it may somewhat mitigate the effect of sectoral growth on overall energy demand.

As figure 5 indicates, chemicals and petrochemicals account for a majority of oil consumption in industry. China is the world's largest producer of

<sup>46</sup> Price, et al., "China's Industrial Sector in an International Context," Ernest Orlando Lawrence Berkely National Laboratory, Environmental Energy Technologies Division, May 2000, found at Internet address <http://eetd.lbl.gov/ea/IES/iespubs/46273.pdf>, retrieved on July 8, 2004.

ammonia, an intermediate product in the fertilizer industry.<sup>47</sup> Although ammonia production is expected to increase, the energy intensity used to produce ammonia has the potential to decrease from a 1998 value of roughly 1.75 tons of coal equivalent (tce)/ton to projections for 2020 ranging from 1.35 to 1.5 tce/ton.<sup>48</sup> Strong growth in China's ethylene production capacity has boosted oil demand.<sup>49</sup> Such growth—first quarter production of ethylene in 2004 was 7.4 percent higher than its first quarter 2003 value<sup>50</sup>—is likely to continue due to current investments aimed at expanding ethylene cracking capacity.<sup>51</sup>

Although steel and iron production represented only 7 percent of China's oil use in industry in 2001, steel grew to become the largest single consumer of energy in China in 2003, representing over 15 percent of industrial energy consumption in the first quarter of 2004.<sup>52</sup> Steel production has grown rapidly over the last 30 years (from 21 million metric tons (mmt) in 1971 to 124 mmt in 1999), making China the largest steel producer in 2000.<sup>53</sup> Steel production is projected to increase, but there is potential for the energy intensity in producing steel to decrease from 1.4 tce/ton to just under 1 tce/ton.<sup>54</sup> For January-March 2004 steel production in China was up 26.4 percent from the same period in 2003.<sup>55</sup>

China has dominated world cement production since the 1980s, and produced 36 percent of the world

total in 2000.<sup>56</sup> During the first quarter of 2004, cement production was 23.8 percent higher than in the first quarter of 2003.<sup>57</sup> Automobile production has also grown tremendously, up 24.0 percent in the first quarter of 2004 compared to the same period a year earlier,<sup>58</sup> and China is now the fourth largest global automobile producer.

## Residential Use and Power Generation

Aside from low levels of direct residential oil use, primarily stemming from kerosene consumption used for household heating, most residential energy use is in the form of electricity. Household electricity demand has been growing rapidly in conjunction with growing appliance ownership. Rapid growth in electricity consumption has stretched power generation capacity, forcing plants to use oil-fired units to meet electricity demand.<sup>59</sup> Factories and shopping malls have increased use of diesel generators to compensate for power shortages on the national power grids.<sup>60</sup> Both of these changes are expected to be short run trends, with power plants investing in other energy sources (coal, hydropower, natural gas) to meet electricity needs, which may ease demand for oil. Middle distillates, which include kerosene and diesel, have grown rapidly over the last 10 years, doubling from under 1 million b/d in 1993 to nearly 2 million b/d in 2003.<sup>61</sup>

## China vs. the United States

Figure 6 compares Chinese production and consumption of oil with U.S. oil production and consumption. To fuel its growing economy, China is now the second largest global consumer of energy as well as of oil, following the United States. In 2003, the United States accounted for 25.1 percent of world oil consumption and China accounted for 7.6 percent. Together, they consumed one-third of the global oil supply. On the production side, China is the sixth largest producer of oil in the world, and the United States ranks third, following Saudi Arabia and the

<sup>47</sup> Price, et al., "China's Industrial Sector in an International Context," Ernest Orlando Lawrence Berkeley National Laboratory, Environmental Energy Technologies Division, May 2000, found at Internet address <http://eetd.lbl.gov/ea/IES/iespubs/46273.pdf>, retrieved on July 8, 2004.

<sup>48</sup> Dadi and Levine, "China's Sustainable Energy Future: Scenarios of Energy and Carbon Emissions," Energy Research Institute of the National Development and Reform Commission, People's Republic of China, October 2003.

<sup>49</sup> International Energy Agency, "Monthly Oil Market Report," November 2002, found at Internet address <http://omrpublic.iaea.org/>, retrieved on June 22, 2004.

<sup>50</sup> National Bureau of Statistics of China, "China's Industrial Production Figures for January-March 2004," *China Economic News*, No. 17, series 1217, May 10, 2004.

<sup>51</sup> International Energy Agency, "Monthly Oil Market Report," November 2002, found at Internet address <http://omrpublic.iaea.org/>, retrieved on June 22, 2004.

<sup>52</sup> Jian, Zhang, "Potential risks for the steel industry," *China Economic News*, No. 21, series 1221, June 7, 2004.

<sup>53</sup> Price, et al., "China's Industrial Sector in an International Context," Ernest Orlando Lawrence Berkeley National Laboratory, Environmental Energy Technologies Division, May 2000, found at Internet address <http://eetd.lbl.gov/ea/IES/iespubs/46273.pdf>, retrieved on July 8, 2004.

<sup>54</sup> Dadi and Levine, "China's Sustainable Energy Future: Scenarios of Energy and Carbon Emissions," Energy Research Institute of the National Development and Reform Commission, People's Republic of China, October 2003.

<sup>55</sup> National Bureau of Statistics of China, "China's Industrial Production Figures for January-March 2004," *China Economic News*, No. 17, series 1217, May 10, 2004.

<sup>56</sup> InterChina Consulting, "China Cement Industry," February 2003, p.2.

<sup>57</sup> National Bureau of Statistics, "China's Industrial Production Figures for January-March 2004," *China Economic News*, No. 17, series 1217, May 10, 2004.

<sup>58</sup> National Bureau of Statistics of China, "China's Industrial Production Figures for January-March 2004," *China Economic News*, No. 17, series 1217, May 10, 2004.

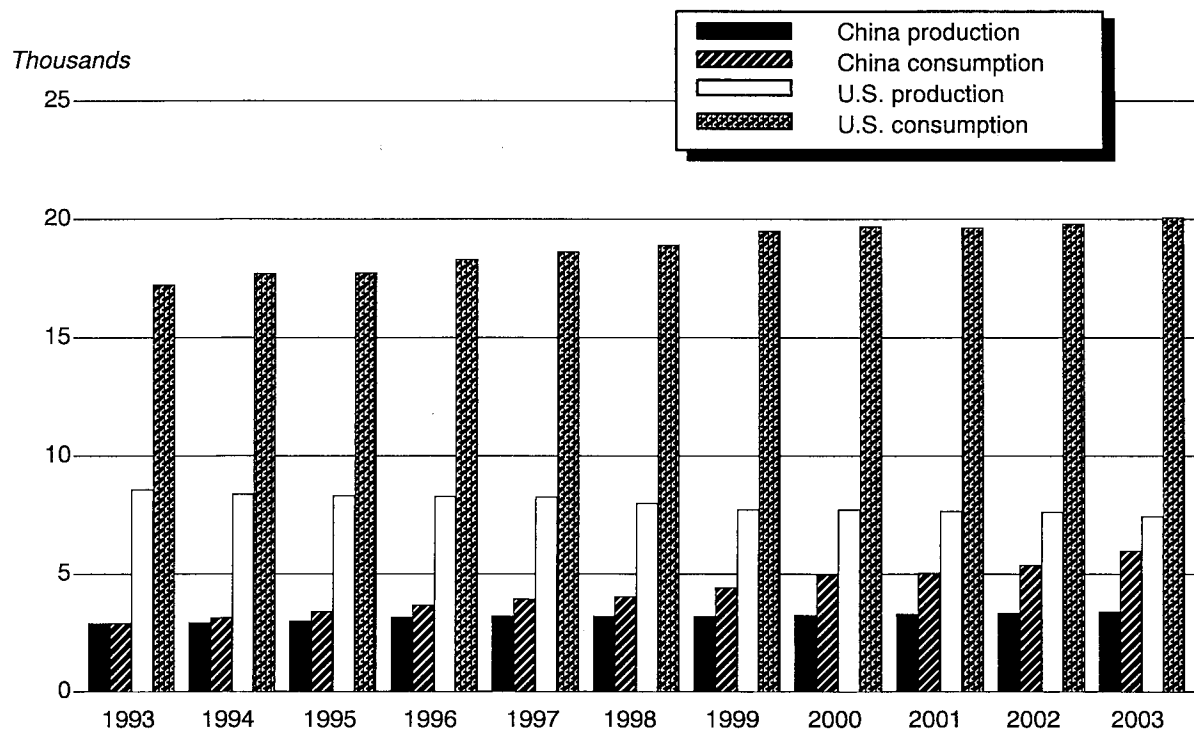
<sup>59</sup> International Energy Agency, "Monthly Oil Market Report," May 2002, found at Internet address <http://omrpublic.iaea.org/>, retrieved on June 22, 2004.

<sup>60</sup> "China May Oil Imports Stay High," Reuters, June 21, 2004, found at Internet address <http://news.moneycentral.msn.com>, retrieved on June 22, 2004.

<sup>61</sup> BP, "World Energy 2004."



**Figure 6**  
**Oil production and consumption in China and the United States**  
 Thousand barrels per day



Source: British Petroleum, "Statistical Review of World Energy 2004," found at [http://bp.com/sectiongeneric-article.do/?/](http://bp.com/sectiongeneric-article.do?/), and U.S. Department of Energy, retrieved July 23, 2004.

Russian Federation. In 2003, U.S. oil production accounted for 9.2 percent of world production and Chinese production accounted for 4.6 percent. For both countries, oil imports continue to grow as the gap between domestic production and consumption continues to widen.<sup>62</sup>

### Conclusion

In 2003, China accounted for 41 percent of the growth in world oil demand and its oil imports rose 32 percent,<sup>63</sup> part of an ongoing trend. In the 1993-2003 period, U.S. oil consumption grew 16 percent, while

China's oil consumption grew 105 percent. Unlike the United States, where petroleum production has declined, oil production in China has climbed over the last 10 years. Nonetheless, this increase in production has not kept pace with the growth in oil consumption; thus, China's reliance on imported oil is likely to continue to grow.

As China continues the development process, it will likely maintain its shift away from the production of agricultural goods, deriving a greater share of its GDP from the energy intensive industrial sector. Increased focus on industry, higher levels of automotive transportation, and an increase in overall energy use may continue to increase demand for oil. Continuing growth in its level of oil imports could have an important impact on world prices.

<sup>62</sup> BP, "World Energy 2004."

<sup>63</sup> Lorenzetti, Maureen, "BP: World oil and gas reserves still growing at healthy pace," *Oil and Gas Journal Online*, June 21, 2004, found at Internet address <http://ogj.pennnet.com/home.cfm>, retrieved on June 22, 2004.

## **Abbreviations and Conversions**

b/d	barrels per day	T.o.e.	tons of oil equivalent (metric)
EJ	exajoule (10 <sup>18</sup> joules)	MWe	megawatt-electric
GJ	gigajoule (10 <sup>9</sup> joules)	MWh	megawatt-hour
LPG	liquid petroleum gas	tce	ton of coal equivalent (metric)
Mt	metric ton		