

Sino–American Energy Cooperation

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As the world's first and second largest energy consumers, the United States and the People's Republic of China face serious common challenges that include increasing dependence on foreign sources, high energy costs, and increased environmental impacts. The energy security of both can be enhanced through cooperation. The US is a leader in many fields of energy research and technology, and the PRC has achievements of its own in such fields as high-energy physics, coal sequestration, and next-generation nuclear reactors. Promising steps have already been taken. Extensive bilateral energy dialogues exist at both policy and working levels. An energy policy dialogue between America's Department of Energy and its Chinese counterpart was inaugurated in 2004. The two sides are working together on 'smart buildings'. There are proposals for joint hydrogen development. Potential for further progress exists in these and other areas including air pollution and control, water treatment, solid waste treatment and disposal, renewable energy, pollution control, and energy efficiency equipment. Nonetheless, sovereignty issues remain, and both sides continue their desire for energy independence.

Energy competition seems poised to replace the war on terrorism as the focus of world attention.¹ The *New York Times* deemed it appropriate to headline its lead story on Chinese president Hu Jintao's April 2006 visit to the United States 'China's big need for oil is high on US agenda',² and two Chinese researchers entitled their article, published in *Far Eastern Economic Review* at the same time, 'Will China go to war over oil?'.³ A cartoonist portrayed Uncle Sam and a generic Chinese leader of 2020 circling each other menacingly as each prepared to grab the last gallon of oil on earth. While a Council on Foreign Relations/Baker Institute report observes that in fact the

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1. See, for example, Pamela Baldinger and Jennifer L. Turner, *Crouching Suspicions, Hidden Potential: United States Environmental and Energy Cooperation With China* (Washington, DC: Woodrow Wilson International Center for Scholars, 2002); David Zweig and Jianhai Bi, 'China's global hunt for energy', *Foreign Affairs* 84(5), (September–October 2005), pp. 25–38; Flynt Leverett and Jeffrey Bader, 'Managing China–US energy competition in the Middle East', *The Washington Quarterly* 29(1), (Winter 2005–2006), pp. 187–201; Kenneth Lieberthal and Mikal Herberg, 'China's search for energy security: implications for US policy', *NBR Analysis* 17(1), (April 2006), (Seattle: National Bureau of Asian Research), pp. 3–42; and *China Brief's* special edition on Chinese energy security 6(8), (12 April 2006), (Washington, DC: The Jamestown Foundation), pp. 1–8.

2. David Sanger, 'China's big need for oil is high on US agenda', *New York Times*, (19 April 2006), pp. A1, A8.

3. Lei Wu and Qinyu Shen, 'Will China go to war over oil?', *Far Eastern Economic Review* (Hong Kong), (April 2006), pp. 38–40. The authors' answer is yes, if the US were to try to cut off China's overseas oil lifeline 'in order to destabilize the country'.

global hydrocarbon resource base remains enormous, it notes the potential for sudden, severe strains at critical links in the energy supply chain.⁴

The impressive growth of the Chinese economy over the past three decades has literally been fueled by energy, and more growth means greater energy demands. In 1985, the People's Republic of China (PRC) was self-sufficient in energy and a net exporter of crude oil. In 1993, with demand growing and domestic production virtually flat, it became a net importer. Ten years later, the PRC became the world's second-largest consumer of petroleum. The same is true for other sources of energy. In 1985, China's share of world energy consumption was relatively modest: 20.2% for coal, 3.3% for oil, 0.8% for natural gas, and 4.2% for hydroelectricity. By 2003, the figures had risen to 29.2% of world coal consumption, 7.0% of oil consumption, 1.4% of gas consumption, and 10.5% of hydroelectricity consumption.⁵ Current estimates are that the PRC's demand for oil will double in the next 20 years and, given a continuation of stagnant domestic production, that two-thirds of this will have to be obtained from abroad.

This rapid increase, as well as predictions that the PRC's economy will continue its rapid growth, have caused concerns among other countries about whether energy supplies will be available to them, and at an affordable price, in the future. These worries have been magnified by recent rises in the price of oil, which reached as high as US\$75 a barrel in mid-2005. China's purchases are not solely responsible for the spike in oil prices: disruptions in oil supply due to instability in producer states and rising demand in other large countries, including India, Brazil, and the United States, are also factors. But it is China's purchases that have attracted the most attention.

In part, this concern exists because Chinese companies have sought to secure oil supplies through buying oil at the sources rather than on the world market. In an exceptionally blunt speech in September 2005, US Deputy Secretary of State Robert Zoellick accused the PRC of exhibiting increasing signs of mercantilism in seeking to lock up energy supplies and advised its government to take concrete steps to address what he called a cauldron of anxiety in the US and other parts of the world about Chinese intentions. The path to energy security, said Zoellick, was not through arousing anxieties.⁶

Zoellick's speech was, predictably, controversial. To several Chinese analysts, it confirmed their suspicions that the world's only superpower was trying to contain the rising power of the PRC in order to maintain its own hegemony, and to prevent their country from becoming the comfortably well-off society envisioned in former president Jiang Zemin's valedictory speech. Some Americans pointed out that the United States must look like a mercantilist state to the Chinese, given its war against Iraq and close ties with the Saudi monarchy.⁷

In an insecure world, it is understandable that nations are concerned with ensuring energy independence. Simultaneously, however, the world is becoming more energy

4. *Strategic Energy Policy: Challenges for the 21st Century* (Report of an Independent Task Force sponsored by the James A. Baker III Institute for Public Policy of Rice University and the Council on Foreign Relations, 2001), p. 3.

5. International Energy Agency (hereafter, IEA), statistics on the Web, available at: www.iea.org/statist/index.htm.

6. Glenn Kessler, 'US says China must address its intentions: how its power is used is of concern', *Washington Post*, (22 September 2005), p. A16.

7. William Martin, (30 November 2005), available at: http://www.cfr.org/publication/9335/chinaus_energy-policies.html. Mr Martin, a former deputy secretary of energy, subsequently became chair of the Washington Policy and Analysis group.

interdependent. For most countries, energy independence is unrealistic unless new, as yet undiscovered, technologies are developed. This would indicate the wisdom of a policy of energy cooperation rather than energy competition. Yet mutual suspicions make this hard to achieve. In February 2006, an American air force general opined that

confrontation is not inevitable, but it might be possible if China sees it as a pragmatic way of achieving their [sic] ends. Competition over resources, and particularly energy resources, would likely be the number one driver of future conflict in Sino-American relations.⁸

And an influential US senator described energy dependence as ‘the albatross of US national security’.⁹

China’s leaders, though less inclined to voice their insecurities publicly, seem to have the same concerns. The country’s energy industry is dominated by three state-owned oil companies, all established within the last quarter century. The China National Offshore Oil Corporation, better known as CNOOC, was established in February 1982, followed by the China Petrochemical Corporation, or Sinopec, in July 1983. These two were joined by the China National Petroleum Corporation, CNPC, in August 1988. Also in that year, as part of a government initiative to separate policy making and supervision from business operations, CNPC was given control over most of the upstream oil producing fields previously managed by the Ministry of Petroleum Industry.

The companies’ operations reflect a mixture of commercial and statist motives, though it is difficult to imagine any of them or their trading companies taking a position that ran directly counter to the expressed wishes of party and government. All three carried out successful initial public offerings (IPOs) between 2000 and 2002, raising billions of dollars of foreign capital. But these involved minority stakes only: the Chinese government holds majority stakes in all three. Foreign investors have not been given a meaningful voice in corporate governance nor have they received seats on their boards of directors.¹⁰

As relative newcomers to the competitive fray of oil markets and with, no doubt, Marx’s views on the duplicity of the international capitalist class in their collective educational backgrounds, executives of the Chinese companies have been wary that their perceived lack of experience and sophistication may put them at a disadvantage vis-à-vis the ilk of venerable multinationals like Conoco-Philips and Exxon. This would tend to reinforce their nationalistic impulses. So as well must have the uproar in the United States congress over CNOOC’s bid to take over California-based

8. Brigadier General Charles J. Dunlap, Jr, USAF, quoted by Michael P. Noonan, *The Future of American Military Strategy: A Conference Report* (Foreign Policy Research Institute, 3 February 2006). General Dunlap was speaking in his private capacity. *FPRI E-Notes*, (3 February 2006), available at: www.fpri.org.

9. Senator Richard Lugar, Republican of Indiana, quoted in: ‘US urged to work with China on energy’, *Financial Times*, (14 March 2006), available at: <http://news.ft.com/cms/s/a0470f9a-b2c6-11da-ab3e-0000779e2340.html>.

10. Testimony of Guy Caruso, Administrator, Energy Information Administration, before the United States–China Economic and Security Review Commission hearing on China’s Energy Needs and Strategies, (30 October 2003), available at: www.uscc.gov/hearings/2003hearings/written_testimonies/_31030bios/statementcaruso.eia.htm; Energy Policy Act, (February 2006), pp. 13–15.

Unocal. Members of congress charged, inter alia, that CNOOC's bid had been unfairly subsidized by the Chinese government.¹¹

Perceived disadvantages aside, the companies have acquitted themselves well in negotiations. An agreement between the Kazakhstan government and CNPC announced in June 1997 entailed a four billion dollar investment into Kazakhstan's Aktyubinskneft enterprise in return for a 60% share in the company; a month later, CNPC outbid both American and European-based firms for exclusive rights to develop oil with Kazakhstan's Uzenmunai-gaz. Referred to as the contract of the year, the Uzenmunai-gaz triumph, together with the Aktyubinskneft agreement, appeared symbolic of the PRC's successful entry into international petroleum competition.¹² It also raised anxiety levels elsewhere in the energy-seeking world.

With competitive impulses outweighing cooperative impulses, China has sought to ensure its energy requirements in many different ways:

- introducing energy efficiencies;
- using alternate sources of power;
- constructing pipelines, since existing maritime routes for oil and gas could be blocked in time of war;
- building the People's Liberation Army's naval arm (PLAN) into a true blue-water force that can protect tankers bound for China; and
- adding to the number of countries that supply the PRC with energy.

None of these is simple to implement or without disadvantages. However, in the absence of a perfect 'silver bullet' solution, these measures, when taken in aggregate, produce opportunities to significantly reduce China's power shortages.

Introducing energy efficiencies

China's leadership has repeatedly stressed the need to make better use of existing energy supplies. In March 2006, Premier Wen Jiabao told the National People's Congress that he had set a goal of reducing energy consumption per unit of GDP by 4% in 2006 and by 20% by 2010. Since consumption in the two previous years had been about 1.43 tons of coal per 10,000 RMB of GDP, these constituted ambitious targets. So as well did Wen's announcement that the amount of pollutants released into the air and water would be reduced by 10% by 2010.

The government quickly announced plans to increase existing taxes and impose new ones on a range of items from gas-inefficient vehicles to floorboards and disposable chopsticks. As for the former, Chinese vehicles consume 20% more gas than those of comparable size in developed countries. Pollutants emitted by these cars have become the main source of poor air quality in large and medium-sized cities. Previous prices, state controlled at low levels—for example, when the price of crude oil on international markets was \$60 a barrel, it was \$43 in China—provided little incentive to conserve.¹³ Higher taxes would impact owners of cars with engines

11. Stephanie Kirchgaessner, 'China's oil scramble "does not damage US"', *Financial Times* (London), (7 February 2006).

12. Ching Cheong, 'China competes for Central Asian oil', *Straits Times* (Singapore), (7 July 2001), p. 1.

13. 'Retail prices raised modestly amid speculation', *Xinhua* (Beijing), (26 March 2006).

larger than two liters; the previous low, state-controlled prices meant that the country's poor were subsidizing the wealthy, who favor larger and heavier vehicles. A new 10% tax was levied on yachts, as well as a modest increase of 0.1 *renminbi* (RMB) a liter for aviation fuel and 0.2 RMB for naphtha, solvents, and lubricants.

Also in March 2006, the Ministry of Construction set rules to make buildings more energy efficient, including halving the amount of coal used for heating over the next five years. Assuming it can be done, this could save as much as 350 million tons of coal, as well as the pollution the coal causes. Buildings that failed to conform could have their operating licenses rescinded.¹⁴

It is not certain that these measures will be effective. Analysts have pointed out that it would be simpler to base the tax rate on the actual fuel consumption of a vehicle rather than the size of its engine displacement, and that the new rule might lead automakers to produce vehicles with engines a hundredth of a liter below the thresholds for higher taxes. Moreover, the government has said it would not collect the taxes on aviation fuel, naphtha, and solvents now, while prices were high; there are concerns that this will set a precedent for the handling of taxes on gasoline and diesel as well.¹⁵ The same directive raising prices mentioned that subsidies could be offered to several sectors that included taxi drivers, fishermen, forestry enterprises, and grain producers. Moreover, the ever-larger numbers of people purchasing vehicles—3.1 million in 2005 as compared to 640,000 as recently as 2000—may in any case negate and even dwarf the quantity of oil saved by raising prices.

Both foreign and domestic analysts have pointed out that reaching these targets will cost billions of dollars, and ask where the money is to come from. The simplest solution economically, to raise prices, is politically dangerous since it would most severely impact low-income groups who are already restive. A further barrier will be to change the growth-at-any-cost mentality of local and provincial officials, who are aware that their performance evaluations depend on producing statistics that indicate rising prosperity.¹⁶ Yet another inhibiting factor is the level of corruption that is deeply embedded in the system. In the carefully-chosen words of one observer, China does not yet have a culture of compliance.

Using alternate sources of power

Coal

At present, coal provides the majority of China's energy needs, variously estimated at 63–75% of the total. Coal, which emits 34% more carbon per British thermal unit (BTU) than oil and 81% more carbon than natural gas, is also a major pollutant. If not controlled, these emissions may result in a significant lowering of the country's gross domestic product (GDP). Yet the costs of controlling the emissions are also

14. Clarissa Oon, 'Saving energy: call to take small steps', *Straits Times*, (28 March 2005).

15. Keith Bradsher, 'China raises taxes to curb use of energy and timber', *New York Times*, (23 March 2006), p. C6.

16. Tracy Quek, 'China's green policies good but lack bite', *Straits Times*, (11 March 2006); Laurence Brahm, 'Counting the costs of growth', *South China Morning Post*, (7 March 2006).

prohibitively high.¹⁷ Particularly when oil prices are high, it is tempting to increase coal production. However, apart from the toll this takes on the environment, there are direct human costs to doing so. China's mines are already the world's most unsafe, and pressure to increase production results in opening marginal mines, in miners working longer shifts, and in miners working in more risky areas. Efforts to make the mines safer have largely failed because owners are tempted to re-open closed pits illegally and officials, even those in charge of inspecting the mines, may own stakes in their profits.¹⁸

A coal-to-liquid production facility is expected to come on line at the end of 2007. The project, China's first, is located in the coal-rich northwestern Ordos Basin, which has rich coal reserves, and is said to use cutting-edge technology to which the PRC's largest coal company, Shenhua, has full intellectual property rights. This will enable coal to be directly converted into oil without producing crude oil as an intermediary product. Shenhua has signed a memorandum of understanding with Royal Dutch Shell, the world's third-largest listed oil company by market value, to develop a second coal liquefaction facility. Still in the preliminary stages, the project is to be sited in the Ningxia Hui Autonomous Region, and is not expected to start production until 2010.¹⁹

Natural gas

Natural gas has not been a major fuel in China. Despite its cleaner-burning nature and the presence of untapped domestic reserves, natural gas accounted for only 3% of the PRC's total primary commercial energy consumption, compared to an average of 15% for the rest of the Asia-Pacific region and 26% for the rest of the world. The government has begun a major expansion of China's natural gas infrastructure.²⁰

Most notable has been the construction of the East-West pipeline, which links deposits in the Tarim and Ordos basins to major demand centers on China's coast. Imports of liquefied natural gas are also expanding. The country's first LNG terminal is being constructed in Guangdong, and a second is expected to be completed in 2007. Other provinces, including Jiangsu, Zhejiang, Liaoning, Hebei, Shandong, and Shanghai are also considering LNG receiving terminals. Foreign suppliers include Russia, Australia, and Indonesia. CNOOC has taken a 17% stake in BP's Tangguh project in Indonesia, wherein about a third of its capacity of LNG will be shipped to the PRC over a 25-year period beginning in 2007 or 2008.²¹

17. Amy Myers Jaffe, *China and Long-Range Asia Energy: An Analysis of the Political, Economic, and Technological Factors Shaping Asian Energy Markets: Main Study* (The James A. Baker Institute for Public Policy, Rice University, 1999) p. 10.

18. 'Forty dead, 138 missing in coal mine blast', *Agence France Presse* (Beijing), (28 November 2005).

19. 'Coal-to-oil plant to begin work next year', *China Daily*, (10 March 2006).

20. Dr Kang Wu, Head, China Energy Project, East-West Center, before the Economic and Security Council hearing on China's Energy Needs and Strategies, (30 October 2003), available at: http://www.uscc.gov/hearings/2003hearings/written_testimonies/031030bios/statementkwu.htm; Energy Policy Act 2006, pp. 20–21.

21. China National Petroleum Corporation, 'Natural gas', available at: <http://www.cnpc.com.cn/english/zyyw/trqygd.htm>; Energy Policy Act 2006, pp. 20–21; Jamil Anderlini and Bloomberg Service, 'Zeng sends message of peace to neighbors', *South China Morning Post*, (23 April 2006).

Nuclear energy

In 2001, the nuclear capacity for all of China was slightly below that of sparsely populated and far smaller Finland. As observed by the US Department of Energy's Energy Information Administration, from 1996 through to the present, not one company has brought a single new reactor on line in the United States, nor cleared a patch of ground to begin building, nor applied for a license to start production. By contrast, China has brought six reactors on line in the PRC and another in Pakistan. This has raised its generating capacity from two giga-watts (GW) at the beginning of 2002 to 6.6 GW by mid-2005. Several of these have been supplied by foreign companies from Canada, France, and Russia.

The government plans to spend \$50 billion on an additional 30 nuclear reactors by 2020. This will include a new six GW nuclear facility planned for Guangdong province, and a second complex for Daya Bay, near Hong Kong. US-based Westinghouse is among the foreign companies that have placed bids.

The government anticipates that, by 2020, total nuclear generating capacity will reach 40 GB, thereby increasing nuclear power from the current 1% to approximately 5% of energy consumption predicted for that year.²² However, some analysts say that even if the nuclear program is a runaway success, it will not come close to solving the PRC's energy problems, so great has been the increase in demand.²³

Concerns have been voiced about the safety of the facilities, but a pebble bed reactor being developed at Tsinghua University is said to be meltdown-proof. Tennis-ball-sized 'pebbles' are wrapped in graphite, which has a higher melting point than the uranium inside, thus protecting against runaway reactions. Chinese researchers are also hoping to produce designs that use less uranium. So far the country's safety record has been good.

But critics charge that, if something does go wrong, given the lack of whistleblower protection, press freedom, and human rights laws, officials may be tempted to cover up rather than deal with problems before a catastrophe erupts. They also point to the very high cost of constructing reactors, currently estimated at \$3 billion, all of which is front-loaded. The issue of how nuclear waste will be disposed of is also a concern. Given rising levels of environmental awareness in the wealthier areas of the PRC's east coast, politically less powerful groups like Tibetans and the various Muslim groups of the country's northwest may bear the burden of accepting these wastes.²⁴

Hydroelectricity

There has been great interest in developing this far cleaner means of power generation, with official sources stating that the PRC has the most abundant hydroelectric resources in the world. By the end of 2004, the installed capacity of hydroelectric generators was 100 million kilowatts; the government hopes to raise

22. Energy Information Administration, (May 2004), available at: http://www.eia.doe.gov/cneaf/nuclear/page/nuc_reactors/china/china/html; 'China to speed up nuclear power construction', *People's Daily*, (2 November 2004).

23. Sarah Schafer, 'China leaps forward: the People's Republic is embarking on the world's biggest nuclear building spree', *Newsweek International*, (6 February 2006).

24. John Ruwitch, 'Nuclear dreams clouded by cost, waste', *Reuters*, (21 April 2006), available at: <http://today.reuters.co.uk/mis/PrinterFriendlyPopup.aspx?type = scienceNews&st>.

this to 165 million kilowatts by 2010 and 250 million kilowatts a decade later.²⁵ The centerpiece of the numerous large scale projects that are planned in order to reach this goal is the controversial Three Gorges Dam, scheduled to be operational by 2009. Shoddy construction due to corruption, disgruntled people who have been relocated due to the construction, ecological damage, sand slides in the area, and fears of earthquakes are among the most frequently mentioned concerns. Dams are expensive to construct, and the country's safety record on them is checkered.²⁶

Other

Biomass, plant and animal resources, accounted for about 13% of primary energy consumption in China as a whole in 2000, the majority of it in rural areas. However, when used as primary combustion, which is typical, burning biomass contributes to pollution and health problems. Technology offers several cleaner burning solutions. Two of the most widely used in China today are anaerobic digestion and small-scale thermochemical gasifiers. The country's first facility for producing ethanol from biomass opened in Jilin in 2003. While clean biomass has great potential, it is heavily dependent on state subsidies, and researchers have complained that institutional barriers inhibit its introduction.²⁷

Wind power resources are abundant. Experts calculate that if China develops even one-half of its conservatively-estimated wind resources, about a fifth of the country's current energy demands could be met. Achieving this target would simultaneously displace the need for 125 million tons of coal and the accompanying two million tons of sulfur dioxide and 65 millions tons of carbon emissions. Progress has definitely been made. In 2006, the PRC's Huadian Corporation announced a \$1.87 billion project to construct the country's largest wind power project in Xinjiang's Turpan Basin. Its anticipated installed capacity is two million kilowatts.²⁸ But wind-generated electricity is still relatively expensive, and technical problems must be solved before wind can contribute more significantly to China's power mix.²⁹

Constructing pipelines to avoid interdiction of energy supplies in time of war

Aware of the vulnerabilities of transporting oil to China by sea, PRC planners have examined the feasibility of bringing in oil via overland pipelines. In December 2005, an oil pipeline was opened linking Atasu in central Kazakhstan with Alashankou in western China. In deference to the rivalries of the area, it does not cross Russian

25. 'China has huge potential in hydroelectric generation', *People's Daily Online*, (24 October 2005), available at: http://english.people.com.cn/200510/24/print20051024_216336.html.

26. See, for example, <http://threegorgesprobe.org> for critical reports on the Three Gorges Dam and other hydroelectric projects.

27. 'Biomass energy use and emission in China', *United Nations Integrating Environmental Considerations into Economic Policy Making Processes* (ESCAP), (no date), available at: http://www.unescap.org/DRPAD/VC/CONFERENCE/bg_cn_15_beu.htm; Li Jingjing *et al.*, 'Biomass energy in China and its potential', *Energy for Sustainable Development* 5(4), (December 2001), pp. 66–80.

28. 'Xinjiang to develop China's major wind power project', *People's Daily*, (13 April 2006), available at: http://www.english.peple.cn/200604/13/eng20060413_258196.html.

29. Debra Lew and Jeffrey Logan, 'Energizing China's wind power sector', (March 2001), available at: <http://greenature.com.article600.html>.

territory. Fully operational, it could supply as much as 8% of China's energy needs. Talks on the construction of a second pipeline were held at Tokaev in April 2006. Discussions have also been held with regard to a gas pipeline and super high-voltage power lines.³⁰

In the same month, a pipeline agreement was also reached between the PRC and Turkmenistan president Niyazov under which 30 billion cubic meters of Turkmen gas would be delivered annually via Uzbekistan and Kazakhstan to Urumqi and ultimately Shanghai.³¹

In March, China and Russia agreed to build two new natural gas pipelines to the PRC within five years. With a total capacity of 60–80 billion cubic meters annually, the two lines have the potential to considerably ease power shortages in China. The first, some 3,000 kilometers in length, would stretch from Russia to western China; the second, to come on line several years later, would enter from the east.³²

In pipeline politics just as in other aspects of diplomacy, surface aspects do not necessarily reflect underlying reality, and many analysts believe that these ambitious pipeline plans are in fact pipe dreams. For example, in 2005, the state-owned China National Petroleum bought PetroKazakhstan, a Canadian-run company that had been the largest independent oil company in the former Soviet Union, for \$4.18 billion, and spent another million on the above-mentioned pipeline.

This proved to be a high price. Soon after the sale, the Kazakh government forced the Chinese company to resell a third of its new acquisition to Kazmunaigaz, its state-owned oil company and industry regulator. The Kazakh authorities are also believed to be enabling Russia's Lukoil to acquire the other half of Turgai Petroleum that it now jointly owns with PetroKazakhstan. Moreover, a Kazakh court awarded a \$200 million judgment to Lukoil against PetroKazakhstan.

It is unclear how much of PetroKazakhstan's oil the PRC will be able to send through its new pipeline. Additionally, the profitability of the pipeline is linked to the addition of crude oil from Siberia that Moscow has yet to agree to sell.³³ Kazakh president Nazarbayev appears to be playing Russia off against China in this twenty-first century version of the Great Game in Central Asia.

The future of the Turkmenistan–PRC pipeline is also uncertain, with energy experts casting doubt on both the Central Asian republic's ability to meet additional export commitments and the overall feasibility of the project. They point out that, in addition to political and technical uncertainties, it is not known how much gas Turkmenistan actually possesses.³⁴

Analysts noted that the agreements signed with Russia also have significant uncertainties. The credit ratings agency Standard and Poor pointed out that the gas

30. 'China carried away by Kazakh petroleum', *Kommersant* (Moscow), (14 April 2006), available at: <http://www.kommersant.com/page.asp?id = 666526>.

31. Daniel Kimmage, 'Central Asia: Turkmenistan–China pipeline project has far-reaching implications', *Radio Free Europe/Radio Liberty*, (10 April 2006), available at: www.rferl.org.

32. Tracy Quek, 'Russia to build two new gas pipelines to China', *Straits Times*, (22 March 2006).

33. Christopher Pala, 'China sees Kazakhstan as a safe source of oil', *New York Times*, (17 March 2006), p. C5.

34. Kimmage, 'Central Asia', p. 2.

pipelines lacked route details and cost estimates, and contained only a sketchy timetable.³⁵ Moreover, there was no agreement on the Angarsk to Daqing oil pipeline. Russian president Putin has been pitting China against Japan in a complicated negotiation game that has gone on for more than a decade. Currently, Russia ships a modest quantity of oil to China over an antiquated rail system at what one expert terms exorbitant prices; he opines that the PRC is in effect subsidizing the renovation of Russia's decrepit railway system.³⁶ Putin, too, has proved an adept player in the Great Game.

Building the People's Liberation Army's Naval arm (PLAN) into a true blue-water force that can protect tankers bound for China

Currently, about 60% of the PRC's oil imports come from the Middle East; the figure is expected to reach 75% by 2010. Oil from the Persian Gulf and Africa is shipped through the Malacca or Lombok/Makassar Straits, which therefore constitute a serious strategic vulnerability in time of war. According to the *China Youth Daily* of 15 June 2004, 'it is no exaggeration to say that whoever controls the Strait of Malacca will also have a stranglehold on the energy route of China'.³⁷ One option would be to construct a canal across the Kra Isthmus of southern Thailand. First proposed as early as 1677, the British actually received Thai government approval to construct the facility in the 1860s, but never followed through. The topic is still under discussion. Such a waterway would enable ships bound for the PRC from Europe, the Middle East, and India to bypass the straits of Malacca and Lombok/Makassar and enter directly into the South China Sea. If decided upon, construction is anticipated to take at least a decade. There is also opposition from countries such as Singapore, whose huge port stands to lose a lot of business.³⁸

Another option being pursued is to expand the People's Liberation Army Navy (PLAN) into a blue-water force able to protect energy shipments to the PRC against interdiction. A 2005 Department of Defense report quoted a high-ranking official of China's Academy of Military Science as saying 'Only when we break this blockade shall we be able to talk about China's rise . . . China must pass through oceans and go out of oceans in its future development'.³⁹

To this end a 'string of pearls' strategy is developing military bases and diplomatic ties from the Middle East to the South China Sea in order to protect oil shipments and other strategic interests. This includes construction of a new naval base at Gwadar,

35. Bei Fu, 'When it comes to energy supplies, can China and Russia connect?', *Standard and Poor's Ratings Direct Research*, (12 April 2006), pp. 1-7; Eric Ng, 'Politics at play in China's energy race', *South China Morning Post*, (14 April 2006).

36. Stephen Blank, 'China's new moves in the Central Asian energy sweepstakes', *China Brief* 6(3), (1 February 2006), p. 6.

37. Quoted by Ian Story, 'China's "Malacca dilemma"', *China Brief* 6(3), (1 February 2006), p. 4.

38. See, for example, Connie Levett, 'Thai canal plan to save millions', *The Age* (Melbourne), (29 March 2005), available at: <http://www.theage.com.au/news/World/Thai-canal-to-save-millions/2005/03/28/1111862317996.html>.

39. US Department of Defense, *Annual Report on the Military Power of the People's Republic of China 2005*, available at: <http://www.defenselink.mil/news/Jul2005/d20050719china.pdf>, p. 12, quoting General Wen Zongren, Political Commissar of the PLA Academy of Military Science.

Pakistan, naval bases in Burma, a military agreement with Cambodia, strengthening ties with Bangladesh, and the aforementioned Kra Isthmus Canal.⁴⁰

PLAN has also been a favored recipient of the generous defense budget increases since 1989. Acquisitions such as advanced destroyers and submarines reflect the pursuit of an active offshore defense to protect and advance control of sea lines of communication. The navy is acquiring additional amphibious assault ships, fast-attack craft, and two Project 965EM missile destroyers equipped with state-of-the-art SSN-22 Sunburn missiles. PLAN is also bringing into service eight new Russian Kilo-class nuclear-powered patrol submarines with anti-submarine warfare capabilities. Five new indigenously built destroyer classes have been developed since the 1990s.⁴¹

Increasing the number of countries that can supply China's energy needs

CNPC has made large investments in foreign oil fields such as Kazakhstan, Iran, Nigeria, Peru, Venezuela, and Sudan, and is exploring agreements with Burma. It has also announced plans to invest in Iraq's oil industry and promoted projects to transport Caspian oil and gas by pipeline directly to China or indirectly through Iran to the Persian Gulf. While official Chinese sources have presented these as strictly commercial deals, rivals have complained that Chinese companies have an advantage because they do not have to play by the same market-based rules as others do. In testimony to the United States Senate's Energy Committee in 2005, the China program manager of the International Energy Agency stated that PRC companies placed contract bids for sums under cost, and that they 'could not pass the commercial test'.⁴² Another energy expert, responding to reports that a Chinese firm won a tender in Angola by offering a signing bonus in excess of \$1 billion, opined that the PRC's oil companies were more concerned with gaining access to the energy resources for their country than in reaping optimum commercial profits.⁴³

A number of these states have scant regard for the human rights of their citizens, and critics charge that lucrative contracts between these countries' leaders and the PRC enable them to evade United Nations sanctions, perpetuating both their hold on power and their ability to continue these reprehensible policies. With regard to Latin America, American policymakers worry that China seeks out contracts with countries whose governments are in conflict with the United States, such as Castro in Cuba, Chavez in Venezuela, Morales in Bolivia, and Lula da Silva in Brazil.

40. See, for example, 'China developing "string of pearls" plan', *Daily Times* (Karachi), (19 January 2005), available at: http://dailytimes.com.pk/default.asp?page = story_19-1-2005_pg4_5.

41. Ronald O'Rourke, 'China naval modernization: implications for US navy capabilities—background and issues for Congress', Congressional Research Service, Library of Congress, (18 November 2005); International Institute for Strategic Studies, *The Military Balance 2005–2006* (London: IISS, 2005), pp. 259–260.

42. Jeffrey Logan, 'Energy outlook for China: focus on oil and gas', testimony to United States Senate Energy Committee, (3 February 2005), available at: <http://energy.senate.gov/public/index.cfm>. See also Juan Forrero, 'China's oil diplomacy in Latin America', *New York Times*, (1 March 2005), p. C6.

43. Amy Meyers Jaffe, testimony before the US–China Economic and Security Review Commission hearing on China's Role in the World: Is China a Responsible Stakeholder, (4 August 2006), p. 2, available at: www.uscc.gov.

There are also fears that the PRC will form oil-for-arms military–client relationships with nations that may become adversaries of the US. In addition to human rights violations, Iran is in confrontation with the United States over nuclear proliferation issues. American policymakers worry about the possibility of a US military confrontation with an Iran whose nuclear program has received Chinese help. A leading journalist cites a Council on Foreign Relations report that the PRC has established three arms factories in Sudan and the proliferation of Chinese-made AK-47s, rocket-propelled grenades, and machine guns as evidence for his charge that China’s purchases of Sudanese oil have underwritten the slaughter and pillage of Darfur.⁴⁴

Cooperation

While concern with energy independence and sovereign rights are understandable, they also enhance the possibilities of conflict. In a major address to the Council on Foreign Relations in November 2005, Senator Joseph Lieberman posed the issue as a stark choice between cooperation and collision. He likened Sino–American energy engagement to a twenty-first-century version of what arms control negotiations with the Soviet Union were in the last century, but cautioned that it would be necessary to start discussions with China before the race for oil became as hot and dangerous as the nuclear arms race between the US and the Soviet Union did in the twentieth century.⁴⁵

In fact, cooperation already exists and has for some time. Major conduits through which this occurs include:

- the US–China Energy Policy Dialogue;
- the US–China Oil and Gas Industry Forum;
- the US–China Economic Development and Reform Dialogue;
- the US–China Defense Consultative Talks.

US–China Energy Policy Dialogue

Formed in May 2004 through a Memorandum of Understanding signed by then-Secretary of Energy Spencer Abraham, the US–China Energy Policy Dialogue (EPD) established a partnership between the Department of Energy (DOE) and China’s National Development Reform Commission (NDRC). Topics have included energy policy making, supply security, power sector reform, regulatory issues, energy efficiency, and the development of energy technology.⁴⁶ China has been encouraged to establish a strategic petroleum reserve as a hedge against supply disruptions and other emergencies. Experts agree that the use of strategic petroleum reserves must be coordinated internationally to maximize the efficiency of energy markets; ideally the Bush administration would also like the PRC leadership

44. Nicolas D. Kristof, ‘China and Sudan, blood and oil’, *New York Times*, (23 April 2006), IV:12.

45. Joseph I. Lieberman, ‘China–US energy policies: a choice of cooperation or collision’, (30 November 2005), available at: http://www.cfr.org/publication/9335/chinaus_energy-policies.html.

46. Katherine A. Fredriksen, ‘China’s role in the world: is China a responsible stakeholder?’, testimony to US–China Economic and Security Review Commission, (4 August 2006), p. 9, available at: www.uscc.gov.

to provide a clear statement on how and under what circumstances China would use its strategic reserves.⁴⁷ In summer 2005, the DOE opened an office in Beijing to support the activities of the EPD.⁴⁸

US-China Oil and Gas Industry Forum

Founded in 1998 to facilitate Chinese familiarity with western business practices as well as open the PRC market to American and western investment, the Oil and Gas Forum has held six formal meetings in the intervening years. Co-hosted on the US side by the Departments of Energy and Commerce with China's NDRC, the organization has been described as playing an important role in bringing representatives of the two countries together for discussion on available technologies for such topics as deep water and unconventional oil and gas exploration, coal bed methane production, and risk management for large energy infrastructure projects.⁴⁹

US-China Economic Development and Reform Dialogue

Initiated in 2003 by the US Department of State with the NDRC, its discussions have included market approaches to energy security as well as broader topics such as agriculture, investment, and telecommunications.⁵⁰

US-China Defense Consultative Talks

Begun in December 1997, the seventh meeting of this dialogue in April 2005 featured an in-depth discussion between then-Undersecretary of Defense Douglas Feith and Deputy Chief of the PLA General Staff Xiong Guangkai on global energy security issues.⁵¹

There has also been science and technology cooperation on issues including energy. A *Fossil Energy Protocol* was signed in April 1985 between the United States DOE and China's Ministry of Coal Industry. It has sponsored seminars and joint projects in such areas as distributed generation fuel cell development, the economic and ecological impacts of coal liquefaction plants, the technological feasibility of coal bed methane development, and a joint carbon capture and sequestration leadership forum (CSLF).⁵² None of these is a perfect solution. For example, the process used to release methane from subterranean coal creates huge volumes of waste water that can

47. Andrzej Zwanecki, 'US-China cooperation could advance mutual, global energy goals', (4 April 2005), available at: <http://unsinfo.state.gov/eap/Archive/2005/April/04-622583.html>.

48. Anne Womack Colton, 'Energy department opens office in Beijing', (1 July 2005), available at: <http://uninfo.state.gov/eap/Archive/2005/Jul/01-4397.html>; 'US, China not competitors for energy supply', *China Daily*, (19 December 2004), available at: http://www.chinadaily.com.cn/english/doc/2004-12/19/content_401441.htm.

49. See, for example, 'The sixth US-China Oil and Gas Industry Forum', (28-29 June 2005), available at: <http://www.usea.org/th-OGIF-proceedings.htm>.

50. United States Trade Representative, *US-China Trade Relations: Entering a New Phase of Great Accountability and Enforcement: Top-to-Bottom Review*, (February 2006), p. 18, available at: http://www.ustr.gov/assets/Document_Library/Reports_Publications/2006/asset_upload_file921_8938.pdf.

51. Energy Policy Act 2005, p. 38.

52. Department of Energy, 'Bilateral agreements: fossil energy protocol between the United States and China', (no date), available at: http://www.fossil.energy.gov/international/International_Partners/China.html.

destroy soil for agricultural purposes.⁵³ And coal sequestration, which involves capturing carbon dioxide and placing it underground in tapped-out oil fields or deep saline aquifers, can cause deadly accidents if the gas escapes. It can also trigger earthquakes.⁵⁴

The United States has sponsored several pollution control workshops in China since 2003. The two countries are working together through the International Partnership for a Hydrogen Economy (IPHE), which hopes to bring hydrogen-based vehicles to the international market.

The US National Safety Council has a contract to improve mine safety inspection and mine rescue operations.⁵⁵

There is also cooperation in so-called smart buildings. According to American energy expert Robert Watson, the PRC's buildings use up more energy than its cars or industries. Taken together, households and office buildings account for an estimated 45% of the country's energy consumption. The cooperation project has involved training building designers and helping to develop technology to produce green buildings that feature energy-saving air conditioning systems and reflectors to maximize natural lighting. Ultimately, argues Watson, the increased cost will pay for itself: every dollar invested in green buildings results in savings of \$12 in operating and even health care costs.⁵⁶

In May 2006, the US Trade and Development Agency (USTDA) provided technical assistance for a contract between America's Caterpillar Corporation and the PRC's Shanxi Jincheng Anthracite Coal Mining Group for the enhancement of clean energy sources;⁵⁷ during the following month, the USTDA announced the establishment of grants to encourage clean energy production that will improve air quality in China.⁵⁸

Internationally, the US and China are cooperating on an international thermonuclear reaction project (ITER). The acronym, whose Latin meaning is 'way', is intended to symbolize an international effort to harness nuclear fusion as a peaceful power source. The US has also encouraged China to seek some form of association with the International Energy Agency. The PRC has also joined the international Methane to Market Partnership, whose voluntary, non-binding framework aims to advance the use of methane as a clean energy source.⁵⁹

53. Jim Robbins, 'In the west, a water fight over quality, not quantity', *New York Times*, (10 September 2006), p. A16.

54. In 1986, at Lake Nyos in Cameroon, 300,000 tons of naturally occurring carbon dioxide that had been trapped in the lake suddenly rose to the surface, forming a cloud that suffocated 1,700 people. Jeff Goodell, 'Our black future', *New York Times*, (23 June 2006), p. A26.

55. Leo Carey, prepared statement presented to the Congressional-Executive Commission on China, roundtable *Coal Mine Safety in China: Can the Accident Rate Be Reduced?*, (10 December 2004), p. 33.

56. Oon, 'Saving energy'.

57. Jane Morse, 'US helping China with "clean energy" development', (23 May 2006), available at: http://unsinfo.state.gov/eap/east_asia_pacific/china.html.

58. Susan Krause, 'Development grants promote US-China environmental cooperation', (6 June 2006), available at: <http://lists.state.gov/scripts/wa-usiainfo.exe>.

59. See www.methanetomarkets.org.

For the future

Senator Lieberman's choice of collision versus cooperation notwithstanding, there is not an either/or choice for the US and PRC on energy matters. The case for cooperation as opposed to collision is cogent. But speaking realistically rather than rhetorically, the issue is likely to be cooperation versus contention rather than collision, and to involve some degree of both. Cooperative ventures are likely to co-exist with efforts to ensure energy security not only on the part of the US and the PRC but other nations as well: the real issue is managing the balance between the two. For example, in spring 2006, Australia not only signed an agreement to supply China with uranium for its nuclear power plants,⁶⁰ but conferred with the United States, Japan,⁶¹ and Great Britain⁶² on China's aggressive purchases of energy assets in Africa and Latin America.

There have been frictions with Japan as well, most recently when Chinese maritime authorities banned shipping traffic in the East China Sea near the median line with Japan while it expands the Pinghu gas field. Tokyo claims that the area straddles the disputed median line between the two countries and extends into waters that Japan considers part of its exclusive economic zone.⁶³ Japanese sources have been disappointed that several efforts at negotiation have achieved so little, with some opining that the Chinese side is simply stalling in order to present Japan with a *fait accompli*.⁶⁴ At the same time, an influential member of the ruling Liberal Democratic Party and cabinet minister-presumptive called for a strategic partnership between China and Japan.⁶⁵

Energy relationships between China and Russia also have aspects of both cooperation and contention. A series of delays from the Russian side due to the need for feasibility studies on building pipelines points up the observation of one analyst, 'the paradox that the better the relationship becomes, the more Russians worry about China'.⁶⁶

China and the United States have made substantial strides toward cooperation in energy relationships and have established the basis for a continued constructive partnership that they intend to expand upon; but frictions exist between the two countries, and are likely to continue to do so. Actions speak louder than words. Sovereignty issues remain important. As a case in point, one of the first responses to the discovery of a major oilfield in the Gulf of Mexico in September 2006 was to ask whether it could ensure energy independence for the United States.

60. 'China, Australia ink uranium trade deal', *China Daily*, (3 April 2006).

61. Nicholas Krlev, 'US confers with allies on China energy efforts', *Washington Times*, (19 March 2006).

62. Agence France Presse, 'Secure energy supplies to China, India "vital"', *South China Morning Post*, (27 March 2006).

63. 'China bans vessels near gas field: report', *Japan Times* (Tokyo), (17 April 2000), available at: <http://search.japantimes.co.jp/cgi-bin/nn20060417al.htm>.

64. See, for example, 'Editorial: China pouring trouble on gas-rich waters', *Yomiuri Shimbun* (Tokyo), (8 March 2006).

65. 'Japan talks of "strategic partnership" with China', *Financial Times*, (7 March 2003), available at: <http://new.ft.com/cms/s/862776c4-ad6a-11da-9643-0000779e2340.html>.

66. 'Moscow still wary despite closer ties', *South China Morning Post*, (24 March 2006), quoting Chatham House expert on Russia, Lo Bobo.

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Just as many Chinese are concerned that Washington uses a desire to establish democracy to disguise its desire for hegemony and many Americans believe that Beijing talks about a China that is peacefully rising while providing its military with unjustifiably large annual budget increases, each side worries that gestures of cooperation may disguise an intent to block oil supplies to the other. It behooves both China and the US to match words with actions, on energy as well as other aspects of behavior.

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