China’s Energy Rise

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James Kynge, the former China bureau chief of the Financial Times, has observed that “the rise of a great nation will result in great appetites.” Indeed, one of the most visible manifestations of China’s reemergence as a global power is the extraordinary surge in the country’s energy demand during the first decade of the twenty-first century. Rapid economic growth and an unexpected increase in the energy intensity of the Chinese economy contributed to the near doubling of China’s energy demand from 2001 to 2007, accounting for 50 percent of the growth in world energy demand over this period. Although China’s energy demand growth slowed in 2008 because of the economic downturn, China still provided three-quarters of the increase in global energy demand. China, the world’s second largest energy consumer, is projected to displace the United States as number one within the next decade.

China’s voracious appetite has heightened anxiety in Beijing that energy, which has literally fueled China’s rise to international prominence, may derail its further ascent. To be sure, successive generations of Chinese leaders have regarded China’s low level of energy resources per capita as a constraint on the country’s development. However, China’s “runaway” energy demand growth after the turn of the century hastened the realization among the Chinese leadership that if such unrestrained consumption of energy continues, then resource shortages and environmental degradation will jeopardize China’s future prosperity. Consequently, a top priority for Beijing is to ensure that China’s appetite for energy does not prove to be its downfall.

The effects of China’s hunger for energy are also being felt far beyond China’s borders. The growth and volatility of China’s energy demand have made
China a major force in global energy markets. China's impact has been greatest on the oil market, where both the explosion in Chinese demand and the international expansion of China's national oil companies (NOCs) have captivated market watchers and policymakers around the globe. Moreover, China's heavy coal use is contributing to the warming of the planet. Additionally, China's worldwide search for energy is increasing its global activism and changing the geopolitics of energy.

This chapter assesses China's "energy rise." The first section examines China's dramatic energy demand growth since the turn of the century from both a Chinese historical and a global perspective. The second section discusses the global impacts of China's energy appetite, and the third section analyzes China's domestic and international responses to its energy demand surge.

**CHINA'S ENERGY DEMAND SHOCK**

At the turn of the century, neither Chinese nor international energy experts anticipated the surge in Chinese energy demand that was about to occur. After all, China had just accomplished the remarkable and unprecedented feat of quadrupling its GDP while only doubling its energy use between 1980 and 2000. This achievement was remarkable because energy consumption usually grows more rapidly than GDP in early stages of economic development. It was also unprecedented because no other large developing country at a similar stage of economic development has experienced a decline in energy intensity, the amount of energy required to produce one unit of GDP. In fact, energy intensity tends to increase in the early stages of economic development because the infrastructure buildout that occurs during industrialization and urbanization is an energy-intensive activity.

Why did the energy intensity of the Chinese economy fall from 1980 to 2000? First, China's energy intensity had nowhere to go but down. During the first three decades of the People's Republic, Beijing pursued a development strategy of rapid industrialization, pouring resources into heavy industries such as cement and steel. The increase in heavy industry's share of economic output also increased the energy intensity of the Chinese economy because heavy industry requires much more energy to produce a unit of GDP than other economic sectors. Moreover, Western export controls that denied China access to advanced technologies and a command economy that provided state-owned enterprises (SOEs) with little motivation to control energy costs also contributed to the development of some of the world's most energy-intensive heavy industry in China. As a result, there was an enormous amount of inefficiency. Second, reform and opening up gave SOEs incentives
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and tools to improve energy intensity. The introduction of the right to retain profits and limited competition focused attention on energy cost management. Additionally, falling trade barriers enabled Chinese SOEs to obtain energy efficient technologies. Third, and most important, beginning in the 1980s, Beijing implemented a large-scale effort to reduce energy intensity. The main components included the allocation of capital to energy efficiency projects, the creation of a system of quotas for both the amount of energy provided to SOEs and the energy intensity of manufacturing processes, and the establishment of nationwide energy conservation service centers.

Chinese planners intended to maintain the decoupling of energy and economic growth into the new millennium. They set the broad goal of once again quadrupling GDP while only doubling energy use over the period 2001–2020. This objective reflected a mix of aspiration and optimism. Repeating this achievement would ensure that China, which had long equated self-sufficiency with security of supply, would continue to be able to meet most of its growing energy needs with domestic supplies. Moreover, the overcapacity in China's electric power sector and the overproduction in its coal sector at the turn of the century, the result of slower economic growth due to the Asian financial crisis, probably buoyed the confidence of Chinese planners that China's industrialization would continue to require less energy than the experience of other large countries would suggest. Indeed, both Chinese and foreign energy experts expected that China's energy demand would grow much more slowly than its GDP through 2020.

Much to everyone's surprise, China's economic and energy growth “recoupled” at the start of the new millennium. Not only did China's economy grow faster than expected, but energy consumption rose even more rapidly than GDP. Between 1980 and 2000, GDP grew by 11 percent per year, while energy demand increased by only 4 percent per year. In contrast, between 2001 and 2007, the average annual growth rates for GDP and energy demand were 10.4 percent and 10.8 percent respectively (see figure 8.1).

The principal driver of this rise in energy intensity was the same as that responsible for the growth in energy intensity from 1949 to 1980, an increase in the share of GDP provided by heavy industry. However, as Trevor Houser and Daniel Rosen argue, the recent shift in the structure of the Chinese economy toward heavy industry differs from the one that occurred in the 1950s and 1960s in that it is the result of economic incentives rather than political dictate. The recent boom in investment in energy-intensive heavy industries occurred because those industries simply were more profitable than light industries. Cheap land offered by local governments competing against each other to grow GDP, energy prices that exclude environmental costs, and distortions in the Chinese financial system facilitated the stampede of inves-
tors into energy-intensive heavy industries. The expansion of the economy and the rise in energy intensity caused China's appetite for energy to surge. By 2007, China's energy demand reached the levels that some prominent Chinese and foreign institutions had earlier projected for 2020. In the six years between 2001 and 2007, China's demand for energy increased by 90 percent. About three-quarters of this growth came from coal, which meets more than two-thirds of China's energy requirements.

China was ill-equipped to handle the demand shock. The strain placed on China's energy supply manifested itself in shortages of electricity, coal, and oil. The electric power sector was hardest hit. Shortages started to appear in 2002, with twelve of the country's thirty-one provinces reporting inadequate electricity supplies. By 2004, the number of provinces experiencing prolonged power shortages had increased to twenty-four and the national power deficit reached an estimated 30 gigawatts (GW), equivalent to the total installed capacity of Poland in that year. Around the country, factories shifted production to off-peak hours, traffic lights went dark, and children did homework by candlelight.

The power “famine” was partly rooted in the power “feast” of the late 1990s. In 1997, after decades of chronic electricity shortfalls, China suddenly found itself with a glut of power-generating capacity resulting from the economic slowdown associated with the Asian financial crisis. The supply overhang probably bolstered the confidence of China's planners in projections made during the late 1990s of single-digit electricity demand growth during the Tenth Five Year Plan period (2001–2005). Indeed, when officials from the State Development and Planning Commission drafted the Five Year Plan in 2000, they expected electricity demand to increase by less than 7 percent per
year. Concerned about overcapacity, the State Council announced a three-year moratorium on the construction of new power plants in 1999. This effort to eliminate excess capacity soon came back to haunt them: electricity use increased at an annual rate of 14 percent from 2001 to 2005, more than twice as fast as China's planners had anticipated.

A "shortage" of coal, which accounts for about 70 percent of China's power generation mix, exacerbated the electricity crisis. Although China is rich in coal, transportation bottlenecks and price controls limited the delivery of coal to power plants. More than half of China's coal is moved by rail, and coal takes up more than half of freight capacity. Rail, however, has long been the weak link of China's transportation. The shortage in rail cars made it difficult to transport coal from mines in the north to power plants in the south and east. Additionally, as discussed below, tightly controlled electricity prices that prevented power generators from passing on rising coal costs to consumers prompted some power plants to purchase less coal and produce less electricity.

China's power shortage also had a knock-on effect on the country's demand for oil. China's oil use soared in 2003 and 2004 as consumers who could not get the electricity they needed from the grid ran backup diesel generators and coal producers shipped more coal by road because of the lack of rail capacity. Over these two years, China's oil demand grew by 28 percent, rising from 5.3 million barrels per day (b/d) to 6.8 million b/d. Most of this growth was met with imports, which increased from 1.9 million b/d to 3.3 million b/d between 2002 and 2004.

INTERNATIONAL IMPACTS

The extraordinary growth in China's energy demand from 2001 to 2007 was felt around the world as China emerged as a key source of growth and volatility in global energy markets. The surge in China's energy consumption also exacerbated the threat of global warming. In addition, China's efforts to access energy abroad are changing the geopolitics of energy.

Energy Markets

China's increasing reliance on global energy markets has made China a major factor at the margin in these markets. China accounted for almost 40 percent of the growth in world oil demand from 2001 to 2007, adding the equivalent of a medium-sized country like Argentina or Malaysia to global oil demand each year. During this period, China became the world's second largest oil consumer after the United States (2003) and the world's third largest oil im-
porter behind the United States and Japan (2004). China especially shocked the world oil market in 2004 with its 969,000 b/d demand growth, a 17 percent increase over the previous year.

China, the world's largest coal producer and consumer, was also the most important driver of world coal demand growth from 2001 to 2007. The country supplied 75 percent of the increase in global coal demand over this period. Just as China stunned the world oil market with its oil demand surge in 2004, China surprised the world coal market with its faster than expected shift toward becoming a net coal importer on an annual basis. China was the world's second largest coal exporter as recently as 2003, the year its exports peaked at 93 million tons. Since then, China's coal exports have dropped by more than half while its coal imports have climbed steadily upward. China was a net importer of coal for eleven out of the twenty-four months in 2007 and 2008. This volatility in China's coal trade has created considerable uncertainty about how much coal other countries can buy from or sell to China.

China is likely to remain a large force on world energy markets. The International Energy Agency (IEA) projects that China will remain the largest source of growth in world oil and coal demand through 2030. China alone is expected to account for more than 40 percent of the rise in world oil demand from 2007 to 2030 and two-thirds of the increase in world coal demand from 2006 to 2030.

Environment

The most widespread impact of China's appetite for energy on the global environment is its contribution to the buildup of carbon dioxide (CO₂) in the atmosphere, the likely consequences of which include sea-level rise, more intense extreme weather events, and increased droughts and floods. The primary source of China's CO₂ emissions is the combustion of coal. China's faster than expected energy demand growth after 2000 caused a faster than expected rise in China's CO₂ emissions. Indeed, China accounted for more than half of the increase in the world's energy-related CO₂ emissions from 2000 to 2006. China may have surpassed the United States to become the world's largest CO₂ emitter in 2007. However, China's per capita energy-related CO₂ emissions are less than one-quarter of those of the United States. According to the IEA, China will account for nearly half of the growth in the world's energy-related CO₂ emissions during the period 2006–2030.

China's emergence as the world's top CO₂ emitter and the projected dramatic increase in its emissions has made it, along with the United States, a pivotal actor in international efforts to stop climate change. China and the United States together are responsible for 40 percent of the greenhouse gases
produced each year. Consequently, any successful international effort to address climate change requires both China and the United States to transition to low-carbon economies. If either fails to do so, then any measures adopted by other countries to control greenhouse gas emissions will fall short of preventing the amount of carbon dioxide in the atmosphere from reaching disastrous levels.27

Geopolitics

China's "energy rise" is reshaping the geopolitical landscape. First, China's appetite for energy is transforming China into a global power.28 China's quest for energy has increased its presence around the world, notably in Africa, Latin America, and the Middle East. Energy investments in Central Asia have also helped expand China's footprint in its own backyard.

Second, foreign energy investments have given China a stake in the politics of host countries. When China's NOCs began operating abroad, there was an expectation in China that business and politics could be kept separate, as then vice foreign minister Zhou Wenzhong stated in 2004 in his oft-quoted remark about China's approach to Sudan.29 Since then, Beijing and China's NOCs have learned that this is easier said than done because foreign companies—and their governments—often become entangled in political developments in host countries. Indeed, Chinese oil workers have been kidnapped or killed by rebel groups in Eritrea, Nigeria, and Sudan seeking to advance political objectives. In addition, international consternation has compelled China to play a more active role in resolving the conflict in the Darfur region of Sudan. China's status as the biggest foreign investor in Sudan's oil industry and a major buyer of Sudanese crude give China influence over Sudan. Under considerable international pressure, Beijing used that influence to play a critical role in convincing Khartoum to allow a UN-African Union hybrid peacekeeping force to deploy to Darfur.30 China may find itself becoming even more involved in Sudanese politics to keep peace between the north and south to protect substantial Chinese oil investments in the border region.31

Third, major energy exporters have sought to exploit China's energy demand to attain political objectives. Saudi Arabia is a success story.32 Since the mid-1990s, Riyadh has moved to diversify its major power relationships away from the United States in response to domestic criticism of Riyadh's close ties to Washington based on anger over America's support for Israel vis-à-vis Palestine and images of Iraqi children starving because of UN sanctions. Energy ties have strengthened Saudi Arabia's relationship with China. Saudi Arabia has been China's top crude oil supplier since 2001. Additionally, Saudi Aramco and Sinopec are building a refinery in Fujian that will run Saudi crude, pro-
viding Saudi Arabia with security of demand and China with security of supply. Riyadh's closer ties to Beijing have helped Saudi Arabia counter criticism that it is a lackey of the United States and demonstrate that it is an important player in the world.

In contrast, Iran has been less successful in capitalizing on China's energy demand to advance political goals. Tehran has been courting China's NOCs to undermine the US-led international effort to curb Iran's nuclear program, hoping for much-needed capital for the development of its oil and gas resources and a protector on the UN Security Council. As international oil companies have stalled projects in Iran under pressure from home governments, the Islamic Republic has stepped up negotiations with Chinese firms, which signed three major contracts between December 2007 and June 2009. However, Tehran has not yet received the level of diplomatic support that it desires. Much to Tehran's dismay, Beijing has supported all the resolutions against Iran in the UN Security Council (albeit after watering down the content). Although Iran is attractive to China's NOCs, Beijing is torn between its opposition to Iran developing nuclear weapons and its desire to access its energy resources.

Fourth, China's demand for energy is also reshaping geopolitical relations in Eurasia, strengthening ties between China and energy-rich states in Central Asia at Russia's expense. Although China and Russia have all the ingredients for the perfect energy "marriage" (Russia is a large energy producer and China is a large energy consumer and they share a long border), they have not yet built the cross-border infrastructure necessary to substantially expand their energy trade. Russia has also prevented China's NOCs from establishing a substantial presence in its energy sector. In contrast, China National Petroleum Corporation (CNPC) has achieved a dominant position in Kazakhstan and Turkmenistan. Furthermore, oil and natural gas pipelines from these countries are binding them more closely to China and eroding Russia's influence over them. The natural gas pipeline currently under construction from Turkmenistan to China via Uzbekistan and Kazakhstan, in particular, is reaffirming the autonomy of these states from Russia by providing them with a non-Russian outlet for their natural gas and greater bargaining power in gas price negotiations with Russia. Moscow has had enormous influence over the economic fortunes of those states because most of their export pipelines run north, leaving them with little choice but to sell gas to Russia at low prices. However, the Turkmenistan-China pipeline has reportedly already yielded the supplying countries higher prices for the gas they sell to Russia.

Fifth, China's growing reliance on foreign oil is increasing Chinese interest in the Indian Ocean. About three-quarters of China's oil imports pass through the Indian Ocean and the Strait of Malacca. Chinese anxieties about the secu-
rity of these imports is reflected in the substantial attention paid by Chinese analysts to Hu Jintao’s reported reference to China’s “Malacca Dilemma” during the November 2003 Economic Work Conference.\(^{36}\) Even if Hu never uttered these words, Beijing’s concern about the vulnerability of China’s oil supplies to accidents, piracy, and interdiction by various modern navies is indicated by both the public policy debates over how to enhance the safety of China’s seaborne oil imports and China’s pursuit of multiple transnational oil pipelines, including one from Myanmar. These words and actions have prompted some international commentators to speculate that China’s demand for oil is contributing to the emergence of the “great game” in the Indian Ocean.\(^{37}\)

China’s energy insecurities, however, are unlikely to result in a major Chinese naval presence in the Indian Ocean anytime soon.\(^{38}\) First, the People’s Liberation Army Navy (PLAN) does not possess the enormous force needed to protect Chinese oil shipments in the Indian Ocean. Second, the top strategic priority of the PLAN is to secure China’s coastal waters. Projecting power to the Indian Ocean is a secondary objective. Third, even if the PLAN had the capabilities and the intention to guard China’s seaborne oil imports it would be difficult for it to do so because only about 10 percent of China’s oil imports are carried by Chinese-flagged tankers. Fourth, India is likely to oppose a substantial Chinese naval presence in the Indian Ocean and geography dictates that the Indian navy will probably enjoy superiority over the PLAN in its ocean.

**CHINA’S RESPONSE**

China’s energy demand surge and the international attention it garnered have heightened anxieties that energy would become an even more serious constraint on China’s continued economic rise than Beijing had previously feared. The “runaway” demand growth of the early years of the twenty-first century rendered obsolete the goal of quadrupling GDP while only doubling energy use and threatened to make just quadrupling GDP difficult. Chinese officials and energy experts warned that if energy demand continued to grow faster than GDP then China’s objective of creating an affluent society (*xiaokang shehui* 小康社会)—which includes raising living standards and providing people with clean air and water—by 2020 would be at risk.\(^{39}\) Energy consumption on such a large scale would require so much coal that global production and transportation would be strained to supply it. The use of such vast amounts of coal also would severely damage the environment.\(^{40}\)

China’s energy demand growth in 2001–2007 also reaffirmed the contention of some Chinese officials and energy experts—dating back to the 1980s—that China will not be able to follow the “old road” to industrialization based
on high fossil fuel consumption and "polluting first, cleaning up later" taken by the United States and other developed countries. There is simply not enough fossil fuel in the world for China's 1.3 billion people to live like Americans. This realization reignited discussion in Beijing about the need to forge a new path to industrialization that is resource conserving and environmentally friendly.

The demand shock impacted the Chinese government efforts at home and abroad to prevent energy from derailing the country's economic development. Domestically, Beijing has broadened its approach to energy security to emphasize conservation and environmental protection, attempted to strengthen the country's energy institutions, and took steps toward getting energy prices right. Internationally, Beijing has increased efforts already under way to secure energy and sought to reassure other countries that China's appetite for energy is not a threat to their well-being.

**New Approach to Energy Security**

Ensuring access to oil was Beijing's paramount energy security concern for the first five decades of the People's Republic. During the 1950s and early 1960s, the Western trade embargo made China dependent on the Soviet Union for all of the refined products that fueled the Chinese military. The reduction in Soviet oil exports to China after the Sino-Soviet split in 1960 forced China to cut back on its military activities at a time when China's leaders perceived the international environment to be highly threatening. This unhappy experience with foreign oil dependence strengthened the Chinese leadership's convictions that oil self-sufficiency was necessary for national survival and China's emergence as a major power. Fortunately for China, the discovery of the Daqing oil field in 1959 made the dream of oil independence a reality. Over the next two decades China became one of the largest oil exporters in East Asia, and even embarked on a strategy of "petroleum export-led growth" in the early 1970s, which aimed to use oil exports to purchase foreign technology and equipment needed for industrialization. However, China's oil fields failed to pump enough oil to "buy" modernization and satisfy growing domestic demand. In 1993, China shifted to a net importer of oil, ending nearly three decades of self-sufficiency and focusing Chinese energy security debates on identifying and mitigating the vulnerabilities associated with dependence on foreign oil.

Despite Beijing's long-standing preoccupation with imported oil as the Achilles' heel of China's energy security, most of the country's energy crises, including that of 2002–2005, have resulted from actions taken by the Chinese government, not foreign ones, and have involved widespread shortages of electric power rather than oil. The brownouts that China suffered in the early 2000s
originated, as mentioned above, with the failure of China’s economic planners not only to anticipate the surge in electricity demand that occurred after the turn of the millennium but also their imposition of a moratorium on the construction of new power plants. The fact that the country’s worst energy crisis in two decades was entirely of domestic origin helped to broaden the focus of China’s energy security concerns beyond foreign oil dependence. Specifically, the energy shortages helped expose the limits of the “growth at any cost” model of economic development and forged a consensus among the senior Chinese leadership that curbing the country’s voracious appetite for energy was necessary to meet the material and environmental needs of future generations.

The shift in the Chinese leadership’s thinking about China’s energy security is reflected in the Eleventh Five Year Plan for 2006–2010, which enshrines “conserving energy and reducing emissions” (jie neng mian pai 节能减排) as the guiding principle for China’s economic development. The document lays out a blueprint for ensuring the sustainability of economic growth over the long term. The pièce de résistance is a highly ambitious target for reducing the energy intensity of the economy. Specifically, the plan calls for reducing energy consumption per unit GDP by 20 percent from 2005 to 2010, which implies an annual decrease of 4 percent.

China has made substantial progress toward achieving its energy intensity reduction goal. The decrease in energy consumption per unit GDP was 1.79 percent in 2006, 4.04 percent in 2007, and 4.59 percent in 2008; China used 10.4 percent less energy per unit GDP in 2008 than in 2005. Two of the most important measures that contributed to the decrease in energy consumption per unit GDP are the Ten Key Projects for Energy Conservation, which range from coal-fired boiler renovation to the creation of an energy conservation and monitoring technical services system, and the Top 1,000 Energy Consuming Enterprises Program, which set energy consumption targets for the one thousand largest firms that account for about one-third of China’s total energy consumption and about one-half of industrial energy consumption. Other initiatives include the strengthening of appliance standards, the adoption of vehicle fuel efficiency standards, and the closure of small, inefficient industrial and power plants.

Beijing has also set ambitious mandates for clean energy use. On January 1, 2006, two targets for 2020 went into effect: increasing the share of renewable energy in primary energy consumption to 15 percent and raising the share of renewable energy used in electricity generation to 20 percent. Most of this growth will come from large hydropower projects, with the country’s hydropower capacity expected to nearly double between 2006 and 2020. The Chinese government also has set the objective of increasing China’s nuclear power generating capacity to 40 gigawatts (GW) by 2020, up from 7 GW in 2006,
which would slightly increase the share of electricity produced by nuclear power from 2 percent to 2–4 percent. Although China is unlikely to meet its nuclear target by 2020 because of the long construction times and supply chain bottlenecks, the country should be able to install 40 GW of nuclear power generation capacity after 2020. There are, however, currently limits to the extent to which China will be able to substitute cleaner forms of energy for coal over the longer term because of problems of scale.

Efforts to Strengthen Energy Institutions

China’s energy demand surge and the strains it put on China’s energy supply highlighted the mismatch between China’s energy challenges and the ability of the country’s energy institutions to handle them. China’s energy sector is characterized by “strong firms and weak government” (qiang qiye ruo zhengfu 强企业弱政府), with “strong” and “weak” referring to capacity.47 The central government’s energy bureaucracy is weak because responsibility for energy is splintered among many agencies—some of which are understaffed, underfunded, and politically weak—and poor coordination among them impedes decision making and implementation. In contrast, China’s state-owned energy firms are strong because they have the institutional coherence, resources, expertise, and political clout to shape the development of China’s energy sector. As a result, energy governance is undermined by both a lack of state capacity and the activities of China’s energy firms, whose corporate interests do not always align with national ones.48

China’s fractured energy bureaucracy has limited Beijing’s ability to manage the energy sector. There is no single institution, such as a Ministry of Energy, with the authority to coordinate the interests of the various stakeholders. For example, a fuel tax approved by the National People’s Congress in 1999 was not implemented until a decade later, in large part because of conflicts of interest. One key dispute involved the Ministries of Transportation and Finance and the State Administration of Taxation, which deadlocked over which agency should take responsibility for the toll collectors who were expected to lose their jobs when the national fuel tax replaced local road fees.49 Similarly, turf battles among government agencies have resulted in energy laws that fail to specify the agencies responsible for the content of those laws. The use of the term “relevant departments” (youguan bumen 有关部门) can delay or prevent implementation by allowing disputes over who is in charge to continue or by making it difficult for the agency in charge, once selected, to acquire the resources it needs because its role as the implementing agency is not defined in the law.50

Beijing’s ability to handle the country’s energy challenges is also hampered by the fact that it is managing the energy sector with a skeleton crew. China’s
National Energy Administration has just 112 people. In comparison, the US Department of Energy has about 4,000 people dedicated to energy-policy-related matters.\textsuperscript{51} Chinese energy officials are so overwhelmed by the large number of projects requiring their approval that they have insufficient time to devote to broader issues, such as policy analysis and formulation.\textsuperscript{52} The State Commission for Public Sector Reform—the agency that determines the functions, internal structure, and staff quotas for government institutions—has probably resisted calls for more personnel out of concern that other government bodies would press for more manpower, limiting Beijing's attempts to streamline the bureaucracy.

The policy paralysis that often plagues the energy bureaucracy stands in sharp contrast to the activism of the state-owned energy firms. These companies are relatively powerful actors due to their full and vice ministerial ranking, membership of top executives in the Central Committee of the Chinese Communist Party, industry expertise, internationally listed subsidiaries, and profitability.\textsuperscript{53} More often than not, energy firms initiate projects that are later embraced by Beijing, such as the west-east natural gas pipeline and the acquisition of foreign energy assets. The energy firms also occasionally advance corporate interests at the expense of national ones. For example, oil and power generating companies have periodically cut back supplies to Chinese consumers to pressure the government to raise the state-set prices for refined products and electricity when those prices have lagged far behind the market prices for crude oil and coal.

Despite widespread awareness of the inadequacy of China's energy institutions, attempts to strengthen them since the turn of the century have been rather timid. Powerful vested interests that favor the status quo have ensured that calls for the establishment of a ministry of energy have gone unanswered. The National Development Research Council (NDRC) and the state-owned energy companies are two of the main sources of opposition. The NDRC fears the establishment of such a ministry would deprive NDRC of a substantial portion of its portfolio and important tools of macroeconomic control.\textsuperscript{54} The energy firms worry a ministry of energy might become another political master that would limit their direct access to China's top leaders.\textsuperscript{55} Such opposition and other conflicts of interest have repeatedly prevented China's consensus-driven government from taking bolder steps to reform the country's energy bureaucracy.

**Working toward Getting Prices Right**

The extraordinary growth in China's energy demand also resulted in lots of talk and some action on the issue of further liberalizing energy prices. State-set
prices for oil products and electricity have undermined China’s energy security by spurring state-owned energy companies to prioritize protecting their bottom lines over supplying Chinese consumers. China’s energy prices also are not compatible with promoting resource conservation and environmental protection.

The gap between the market-determined price for crude oil and the state-set prices for refined products lies at the heart of the oil shortages that plagued China in recent years. Domestic diesel and gasoline that failed to keep pace with the increase in international crude oil prices caused CNPC and Sinopec to hemorrhage billions of dollars per year from their refining operations because they could not pass rising crude costs to consumers. The companies reduced supplies to the domestic market to limit losses and pressure the government to raise oil product prices by exporting refined products or closing refineries for maintenance resulting in widespread shortages at the pump.

Beijing responded to the oil shortages with a series of stopgap measures. As world oil prices climbed to a high of $147 per barrel in July 2008, the government periodically raised oil product prices to narrow the gap between domestic retail and international crude prices and handed out multi-billion-dollar subsidies to Sinopec, the country’s largest refiner. In January 2009, the NDRC implemented a new refined product pricing regime, which, according to the IEA, moves a step closer to aligning domestic prices with international benchmarks but does not closely resemble more conventional, market-based mechanisms. Beijing also instituted an increase in fuel consumption taxes, which is targeted at curbing oil demand growth and buffering domestic retail prices from volatility in global crude prices.

Just as the misalignment between crude oil and refined product prices resulted in oil shortages, the gap between the market-determined price for coal and state-set prices for electricity contributed to the brownouts that have roiled China since 2002. Until that year, coal companies sold coal to power generators at a price well below cost determined by guideline price bands set by the NDRC. In 2002, Beijing abolished the guidance prices for “power coal” but left state-set electricity prices unchanged. At the annual coal procurement conference in December 2002, coal and power producers failed to reach an agreement on price. The coal companies sought to recoup years of losses by demanding substantially higher prices, while the power companies resisted price increases they wouldn’t be able to absorb. About 150 million tons of coal was not contracted for, which exacerbated the electricity shortages caused by the government’s failure to anticipate the surge in electricity demand and to approve new power plant construction.

The electricity crisis prompted Beijing to implement a new pricing mechanism under which power generators may pass 70 percent of coal price increases
to consumers.\textsuperscript{61} However, this change has not prevented the gap between power coal and electricity prices from undermining the adequacy and reliability of China's electricity supplies. The ongoing price dispute between China's coal and power firms lay behind the brownouts that seventeen provinces suffered during the blizzard of January 2008. Chinese officials were quick to blame the weather, arguing that heavy snow prevented rail deliveries of coal to power generators.\textsuperscript{62} However, the main reason transportation bottlenecks resulted in supply cutbacks was because power generators unable to pass rising coal costs to consumers had maintained dangerously low coal stocks.\textsuperscript{63}

In addition to contributing to shortages, China's energy prices, especially for coal, are at odds with the leadership's objective of creating a resource-conserving and environmentally friendly society. Although the price of coal is market determined, it does not reflect the environmental and social costs associated with its mining, transportation, and consumption. One recent study estimates that in 2007 alone the total external costs of coal equaled 7.1 percent of China's GDP for that year.\textsuperscript{64}

Although China's leaders recognize China's energy prices are incompatible with sustaining rapid economic growth over the longer term, they have moved slowly to reform energy prices. First, pricing power is an important tool of macroeconomic control; Beijing has been reluctant to raise prices in recent years because of fears about inflation.\textsuperscript{65} Second, China's leaders are concerned about the impact of higher prices on certain constituencies, especially farmers and taxi drivers, who have been quick to protest increases at the pump.\textsuperscript{66} Third, firms in energy-intensive heavy industries, which are huge consumers of electricity, successfully lobby local and provincial officials for rates that keep their businesses profitable.\textsuperscript{67}

**Enhance Security of Energy Imports**

China's energy demand surge has increased China's reliance on energy imports and accelerated efforts already under way to enhance the security of China's foreign energy supplies. Between 2001 and 2007, China's dependence on imported energy expanded from 6 percent to 11 percent.\textsuperscript{68} In 2007 alone, China's net energy imports were almost as much as the total primary energy consumption of the United Kingdom.\textsuperscript{69} The IEA projects that by 2030, China's oil imports will reach 12.5 million barrels per day and supply 75 percent of total oil consumption (see figure 8.2).\textsuperscript{70}

China's reliance on imported natural gas and coal is also expected to increase. China began importing liquefied natural gas (LNG) in 2006, and the IEA projects the country's imports of natural gas will grow from 1 billion cubic meters (bcm) in 2006 to 106 bcm in 2030, increasing China's dependence on natural gas
imports from about 2 percent to almost 50 percent (see figure 8.3). China is also expected to become a net coal importer on an annual basis by 2015, although imports will only meet 3 percent of China’s coal demand by 2030.71

Of these three fossil fuels, Beijing is most concerned about China’s rising oil imports. Not only is oil the fuel for which China’s import dependence is highest, but there currently is no alternative to oil in the transportation sector that is as efficient and cost-effective. While some motor vehicles can run on natural gas and electricity, there is no substitute for jet fuel for aircraft, which makes access to oil a national security issue.

The rapid growth in China’s oil imports reinforced efforts to enhance supply security through the diversification of oil suppliers and transport routes. China wants to expand the number of countries from which China imports oil and to decrease dependence on the Middle East. Beijing also seeks to reduce China’s reliance on the sea lines of communication (SLOCs) —through which more than 85 percent of the country’s crude oil imports
travel—because of their vulnerability to disruption on the high seas by various modern navies.\textsuperscript{72}

Since China became a net oil importer in 1993, the Chinese government and oil companies have heeded the advice of Winston Churchill that "safety and certainty in oil lies in variety and variety alone."\textsuperscript{73} China has achieved considerable success in diversifying the sources of its oil imports. In 1995 the Middle East and the Asia Pacific regions supplied almost 90 percent of China's oil imports, with Indonesia alone accounting for 31 percent. Over the past decade, the Middle East's portion of China's oil imports has hovered just below 50 percent. At the same time, growth in the share of supplies from Africa and Russia has offset a dramatic decline in the contribution of the Asia Pacific region. In 2007, the Middle East and Africa accounted for three-quarters of China's crude imports. Russia, China's fourth largest supplier of crude oil, provided 9 percent (see figures 8.4 and 8.5).

Beijing also wants to diversify China's oil import routes away from the SLOCs and especially the Strait of Malacca, one of the world's most important oil transit chokepoints.\textsuperscript{74} Almost 80 percent of China's crude oil imports pass through this strait, and Chinese leaders are concerned about the supply disruption risks posed by piracy, tanker congestion, terrorism, and the navies of major powers.\textsuperscript{75} Pipelines from Kazakhstan and Russia occupy a prominent place in China's diversification plans because these two countries are located outside of the Persian Gulf region and their exports ship overland to China. Russia and Kazakhstan supplied China with 412,000 b/d of oil in 2007, 13 percent of China's crude oil imports.\textsuperscript{76} China wants to increase this

\begin{figure}[h]
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\includegraphics[width=\textwidth]{China\_energy\_rise\_figure\_8.4.png}
\caption{China's Crude Oil Imports by Region, 1995}
\end{figure}
amount through two pipeline projects: a 400,000-b/d pipeline from western Kazakhstan to western China, which is being built in stages, with the easternmost leg to the Chinese border operational, and a proposed 300,000-b/d pipeline spur to the Chinese border from the East Siberia Pacific Ocean pipeline, which is also being built in stages. China National Petroleum Corporation (CNPC) has also planned a 400,000 b/d oil pipeline from the Burmese oil port of Sittwe to Kunming and Chongqing. Although the pipeline from Burma will not reduce China’s dependence on seaborne oil imports, it will provide oil tankers bound for China with an alternative to the Strait of Malacca. If all three pipelines are built and operated at design capacity, the combined throughput of 1.1 million b/d would constitute 14 percent of China’s projected oil imports of 7.7 million b/d in 2015 and 9 percent of China’s projected oil imports of 12.5 million b/d in 2030.77

The jump in China’s oil demand and imports also spurred China’s NOCs to acquire more exploration and production assets abroad.78 China’s oil firms have a political mandate to enhance China’s energy security that includes investing in foreign oil fields.79 There has been a fairly widespread perception within Beijing that oil pumped by China’s NOCs provides a more secure supply of oil than purchases made on the international market. This idea is rooted in skepticism of the view of Western oil industry analysts that the world market will always make oil available to the highest bidder. In the late 1990s, some Chinese energy officials argued that China might one day find itself in a situation where China has money to buy oil but none is available on the international market because of war or other political turmoil.80 In such a situation,
they continued, Beijing could order China’s NOCs to send their foreign oil production back to China. Despite these concerns, it is difficult to imagine a scenario in which China has money but no oil to purchase because the world is filled with buyers and sellers. Moreover, China’s NOCs are unlikely to ever pump enough oil abroad to cover China’s oil import requirements because more than three-quarters of the world’s oil reserves are in countries that do not permit foreign equity participation.

Beijing’s energy security concerns complement the strong commercial drivers that are propelling China’s NOCs to expand their international portfolios. First, China’s NOCs, like all other oil companies, need to continuously acquire new oil and natural gas reserves to replace what they produce, and the opportunities to do so are often more attractive abroad than at home. Second, exploration and production historically have been the most profitable sector of the oil business, and this is especially true for China’s NOCs, whose refining operations have hemorrhaged billions of dollars in recent years due to rising crude costs and state-set prices for diesel and gasoline. Moreover, the compensation and future career prospects of Chinese oil executives, some of whom aspire to high-ranking positions in the Chinese Communist Party, depend in large part on the profitability of their firms. Third, if China’s NOCs want to become world-class companies, and be internationally competitive, they must compete internationally. These factors have propelled China’s NOCs to take advantage of the economic downturn to acquire overseas assets that might otherwise not have been available to them.

In 2007, China’s NOCs pumped a combined total of 780,000 b/d of liquids abroad, an amount equal to 19 percent of China’s oil imports and less than 1 percent of global oil production in that year. Although China’s NOCs are invested in upstream projects in more than two dozen countries, most of these assets have done little to substantially bolster their overseas output. The foreign production of China’s NOCs is concentrated in two countries, Kazakhstan and Sudan, which accounted for 59 percent of the NOCs’ foreign oil production in 2007.

**Diplomatic Reassurance**

China’s extraordinary energy demand growth has prompted China’s leaders to include energy in their diplomatic reassurance strategy. One of China’s foreign policy priorities is to reassure other countries that China’s economic growth and military modernization do not pose a threat to their economic and security interests. International anxiety about China’s increasing demand for energy raised concerns in Beijing that other countries, notably the United States, view China as a threat to their energy and environmental security.
Uncomfortable with being blamed for higher prices at the pump and concerned that unease in the United States and other major powers about China's energy appetite might prompt those states to attempt to derail China's economic growth and continued emergence as a global power, China's leaders set out to persuade the rest of the world that China is a responsible major power with respect to global energy and environmental security.83

Beijing's efforts to reassure other countries about China's burgeoning appetite first took aim at disproving what Chinese officials refer to as the "China energy threat theory," a corollary of the "China threat theory." While the China threat theory holds that an increasingly powerful China is likely to destabilize the international system, the China energy threat theory maintains that China's increasing appetite for energy is likely to destabilize world energy markets.84 The China energy threat theory gained currency in Beijing after the unexpected surge in Chinese oil demand in 2004 heralded China's arrival as a major factor in the world oil market, subjecting the country to increased international scrutiny. After China's CO₂ emissions replaced China's oil demand as the focal point of global anxieties about China's energy appetite, Chinese officials turned their attention to refuting the China environmental threat theory, which holds that China is not doing enough to slow global warming. Ma Kai, the minister in charge of the NDRC from 2003 to 2008, spearheaded both efforts.

Nobody likes to be blamed for the world's problems. This is especially true for China when the issues are energy consumption and CO₂ emissions and the fingers being pointed belong to the industrialized world. Chinese officials are irritated by even mere insinuations from industrialized countries that China and other developing countries, which contain the majority of the world's population, should consume less energy to ensure there are enough resources to support the high-energy-consumption lifestyles of those who industrialized first. Moreover, it undoubtedly vexes Beijing to have China's energy appetite criticized by countries that consume energy-intensive goods made in China.85 As Ma observes, "A considerable amount of the increase in China's energy consumption is a 'substitute' for energy consumption in other countries and regions."86

Similarly, Beijing is irritated by demands from the industrialized countries, especially the United States, for China to do more to control its CO₂ emissions, especially through the adoption of hard targets for emissions for several reasons. First, China's cumulative historical emissions of carbon dioxide, which remains in the atmosphere for a hundred years, are only a small fraction of those of the United States, which has emitted more than any other country. Second, China's per capita emissions are very low, less than one-quarter of the United States. Third, the industrialized countries have already
completed the high-emissions stage of industrialization while China has not. Fourth, many in China are irked by people in industrialized countries who both enjoy the energy-intensive and high-emissions products manufactured in China and criticize China for not doing more to control its emissions.\(^{87}\) That 15–25 percent of China’s emissions are created by Chinese exports has prompted Beijing to call for importing countries to bear responsibility for emissions generated in exporting countries.\(^{88}\)

The visceral reaction of Chinese officials to the China energy threat theory and the China environmental threat theory stems from concerns that if other countries view China’s energy consumption as a threat to their well-being, then those countries might seek to deny China the energy needed to fuel its continued rise to international prominence. The United States is the country China is most worried about. American unease with China’s reemergence as a global power and anxiety about China’s rising energy demand and the international expansion of China’s NOCs has aroused suspicions in China that the United States is attempting to weaken China by making it difficult for China to access energy abroad.\(^{89}\) Many in China also suspect that demands for China to adopt more aggressive measures to limit its emissions growth, when China is still in the high-emissions stage of industrialization, are a tool to slow China’s economic development.\(^{90}\)

China’s leaders have used high-profile summits to reassure the rest of the world about China’s growing energy demand. For example, during the G8 meeting in Russia in 2006, Hu Jintao discussed China’s high level of energy self-sufficiency and ambitious plans to reduce the energy intensity of China’s economic growth (to allay fears that China is gobbling up the world’s energy resources), low per capita energy consumption (to subtly point out that the Chinese are not the world’s energy gluttons), and the view that energy security is a global problem requiring a global solution (to address concerns that China views energy as the object of a zero-sum game between countries).\(^{91}\) Two years later, at the global oil summit convened in Jeddah, Saudi Arabia, Hu’s heir apparent, Xi Jinping, delivered a similar message.\(^{92}\)

**CONCLUSION**

The extraordinary growth in China’s appetite for energy in the early 2000s shocked China and the rest of the world. For China, the unexpected demand surge was a reminder that energy is a vulnerability that could jeopardize the country’s continued economic rise. China’s leaders worried that if the energy consumption binge of the early 2000s continued, then they would not achieve their long-term development of raising the living standards of the Chinese
people and providing them with a healthy natural environment. For the rest of the world, China's seemingly insatiable hunger for energy was viewed as a sign of strength. International observers regarded the sudden and far-reaching impact of China’s extraordinary energy demand growth on energy markets, the global environment, and geopolitics as a sign not only of China's continuing reemergence as a major power but perhaps also of that ascent occurring much more rapidly than previously expected.

The concerns voiced abroad, especially in the United States, about the impact of China's energy appetite on their ability to meet their energy and environmental requirements and foreign policy objectives heightened Chinese fears in turn that international anxiety about China's energy demand would make it more difficult for China to sustain rapid economic growth over the long term. As a result, China's efforts to ensure that energy does not undermine its continued economic rise have domestic and international dimensions. Domestically, the Chinese government is attempting to forge a path to industrialization that the world's energy resources and natural environment can support. Internationally, Beijing is trying to secure energy supplies and reassure the rest of the world that the threats associated with China's energy appetite have been greatly exaggerated in order to ensure that China has continued access to the energy it needs from abroad and is not pressured to adopt CO₂ emissions caps that would jeopardize future economic growth.

Beijing has achieved mixed results in its responses to China's energy demand surge at home and abroad. Domestically, not only have China's leaders made “conserving energy and reducing emissions” the new mantra guiding the country's economic development, but they have supported their words with aggressive measures to reduce the energy intensity of the Chinese economy and to substantially expand the role of renewable energy and nuclear power in the country's energy mix, both of which are also key components of China's climate change policy. However, these efforts have been hampered by slow movement on liberalizing energy prices and strengthening energy institutions. Internationally, China has made progress in diversifying its oil suppliers and import routes. China's NOCs have also secured a modest international upstream presence, although the oil they pump abroad is unlikely to enhance the security of China's oil supply. In terms of diplomatic reassurance, Beijing's attempts to convince other countries that China's energy appetite is not a threat have sometimes fallen on deaf ears. In some cases, this is because of genuine concerns about the impact of China's energy demand on planet earth. In other cases, it is because voicing alarm over China's energy consumption and emissions has been a useful way for some countries, notably the United States in the recent past, to divert attention from their own lackluster records.
of reducing energy demand and CO₂ emissions. China’s efforts to ensure that its appetite for energy does not constrain its continued rise to international prominence will continue to be closely watched by other countries because China’s energy challenges are also their own.

NOTES

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