

**ENERGY TRENDS IN CHINA AND INDIA:
IMPLICATIONS FOR THE UNITED STATES**

HEARING

BEFORE THE

**COMMITTEE ON FOREIGN RELATIONS
UNITED STATES SENATE**

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CONTENTS

	Page
Allen, Hon. George, U.S. Senator from Virginia, prepared statement	19
Ganguly, Prof. Sumit, professor of political science and director of the India Studies Program, Indiana University, Bloomington, IN	47
Prepared statement	49
Garman, Hon. David K., Under Secretary for Science and Environment, De- partment of Energy, Washington, DC	12
Prepared statement	13
Written response to question submitted by Senator Lugar	53
Herberg, Mikkal E., director, Globalization and Asian Energy Security Pro- gram, National Bureau of Asian Research, Seattle, WA	28
Prepared statement	30
Lugar, Hon. Richard G., U.S. Senator from Indiana	1
Schriver, Randall G., partner, Armitage International, Arlington, VA	39
Prepared statement	43
Wayne, Hon. E. Anthony, Assistant Secretary for Economic and Business Affairs, Department of State, Washington, DC	3
Prepared statement	7

ENERGY TRENDS IN CHINA AND INDIA: IMPLICATIONS FOR THE UNITED STATES

TUESDAY, JULY 26, 2005

U.S. SENATE,
COMMITTEE ON FOREIGN RELATIONS,
Washington, DC.

The committee met, pursuant to notice, at 9:33 a.m., in room SD-419, Dirksen Senate Office Building, Hon. Richard G. Lugar (chairman of the committee) presiding.

Present: Senators Lugar, Allen, Coleman, Kerry, and Obama.

OPENING STATEMENT OF HON. RICHARD G. LUGAR, U.S. SENATOR FROM INDIANA

The CHAIRMAN. This hearing of the Senate Foreign Relations Committee is called to order.

Today, the Committee on Foreign Relations meets to examine trends in energy markets and policies of two rising powers, India and China. The December 2004 National Intelligence Council report, entitled "Mapping the Global Future in 2020," states that the single most important factor affecting the demand for energy will be global economic growth, especially that of China and India.

To maintain steady rates of economic growth, China reportedly will need to boost its energy consumption over the next 15 years by about 150 percent. Over the same period, India will need to nearly double its energy consumption to maintain its growth rates. China, the world's second-largest oil importer, receives more than 40 percent of its oil from abroad, while India, the sixth-largest energy consumer, fills 70 percent of its oil demand with imports.

To cope with their growing energy needs, India and China are re-orienting their foreign and domestic policies and investing heavily in securing supplies from abroad. India's state-owned oil and natural gas company has invested about \$3 billion in overseas exploration and energy projects since 2000, while China also has invested several billions of dollars during the same timeframe. And both countries are creating emergency oil reserves and stepping up domestic oil and gas exploration.

This activity has implications for our current relationships with China and India, as well as America's own energy future. Our Government must devote careful study and analysis to the questions raised by recent actions taken by China and India to secure greater energy supplies, and we must think creatively about the long-term strategic implications of the energy-consumption trends of these and other developing nations.

China is the third-largest United States trading partner, with total United States/Chinese trade estimated at \$232 billion in 2004. Its consumption of crude oil accounted for approximately 34 percent of the increase in world demand last year. China surpassed Japan in 2003, to become second to the United States in the consumption of primary energy. And after the United States and Russia, China is the third-largest energy producer in the world. India, with its rapidly expanding economy, democratic traditions, and growing presence throughout the world, is becoming a significant power in its own right.

The Bush administration recognized the importance of cultivating deeper ties to India and hosted Indian Prime Minister Singh for a historic visit last week. During the Prime Minister's address to a joint session of Congress, he noted common interests between the United States and India and pointed to energy as a key area for increased cooperation. President Bush and Prime Minister Singh released a joint statement last week that included cooperation on nuclear energy issues. This committee will review legislative proposals submitted by the administration on these important subjects. I look forward to working closely with the administration on these issues to examine their possible impact on U.S. non-proliferation policy and other goals the President and I share.

The energy trends in India and China reinforce the notion that the United States should strive to lessen dependence on oil through greater investment in energy research and development. I recently introduced a renewable fuels bill that was incorporated into the comprehensive Senate energy bill passed by the Senate last month, and now in conference with the House. This legislation would more than double the production and use of domestic renewable fuels, including ethanol, biodiesel, and fuels produced from cellulosic biomass. These fuels must be an important part of our strategy to achieve greater energy independence.

In addition to our domestic efforts, we should explore opportunities to cooperate more with India, China, and other countries to encourage global energy efficiency and security. The December 2004 report of the National Commission on Energy Policy calls for increasing collaboration with other countries to develop and to deploy alternative energy technologies that will not be pursued absent governmental support. The Commission also calls for tripling investment in cooperative international research, expanding and diversifying worldwide oil production, and expanding the global network of strategic petroleum reserves. Congress should be active in encouraging such measures. Energy experts note the benefits of providing incentives to countries such as India and China to employ clean coal technologies, and, as a world leader in these technologies, the United States would benefit greatly if coal gasification plants could be manufactured on a large scale and exported to India and China and other nations in need of new energy resources. India, in particular, appears open to such cooperation.

In his address to Congress last week, the Indian Prime Minister noted the importance of allowing greater access for developing countries for clean coal technologies and exploring partnerships that encourage more efficient use of hydrocarbon resources.

We're delighted to welcome two distinguished panels today to help us interpret the trends that I've described and to suggest policy options that can help guide U.S. leaders.

On the first panel, we welcome Mr. Anthony Wayne, Assistant Secretary for Economic and Business Affairs at the State Department, and Mr. David Garman, Under Secretary for Science and Environment at the Department of Energy.

On our second panel, we will hear from three experts in the field, Mr. Mikkal Herberg, Director of the Globalization and Asian Energy Security Program at the National Bureau of Asian Research; Mr. Randall Schriver, partner at Armitage International; and Dr. Sumit Ganguly, the director of the Indian Studies Program at Indiana University.

We're grateful for all of our witnesses for being with us today. We look forward to their insights.

Let me suggest that your statements will be included in the record in full. Please summarize those statements, preferably in 10 minutes or less. We will proceed, at that point, depending upon our rollcall schedule.

And if you would proceed, Secretary Wayne.

STATEMENT OF HON. E. ANTHONY WAYNE, ASSISTANT SECRETARY FOR ECONOMIC AND BUSINESS AFFAIRS, DEPARTMENT OF STATE, WASHINGTON, DC

Mr. WAYNE. Thank you very much, Mr. Chairman. It's a pleasure to be here. And these are very important topics. We're very happy to have this opportunity to testify before you. And I'm very happy to be here with my colleague from the Department of Energy, Under Secretary Garman. We have very close partnership between the State Department and the Energy Department on the international aspects of our energy policy.

As you well know, China and India have implemented significant changes in their economies to allow market forces to play a larger role. That has helped result in significant economic growth. In China, the economy has grown at an astounding 9 percent a year for the past 25 years. And the Indian economy has also grown, at about 5 percent annually, during this same period. And it's natural that, as economies grow, the demand for energy grows with that.

China's consumption of energy, for example, has grown at 4.3 percent per year since 1980. And India's has grown at 5.4 percent. China and India are, thus, understandably concerned about their energy security, as is the United States and most every other nation in the world.

Our continued engagement with these two rising economic giants is the best means to help shape their energy outlook and their policies and to help ensure that world energy resources are used in the most efficient, affordable, and environmentally sound ways possible.

Although coal still comprises over 50 percent of each of these two countries' primary energy consumption, it's been the growing share of oil—and particularly imported oil—in each country's energy mix that has captured the attention of the world. According to data published by the International Energy Agency in early 2005, China consumes about 6.4 million barrels of oil per day. That's about one-

third the level of the United States. China, 25 years ago, was largely energy self-sufficient; but China, today, imports about 40 percent of its oil needs. That's somewhere between 2.5 and 3 million barrels per day.

India hasn't made any major new domestic oil discoveries since the mid-1970s. In 1990, Indian domestic supply met about 60 percent of its oil demand; in 2004, the country was importing over 65 percent of its oil.

This growing demand for both countries' oil has often been characterized as the cause of the recent surge in high global energy prices. However, demand from China and India is by no means the only factor in the tightening markets. Energy prices have been impacted by sustained general increases in world demand for energy. The United States comprised about 27 percent of the total increase in global demand between 2003 and 2004, for example. China was about 36 percent, and Indian, only about 4 percent of that increase.

Other important factors in the tightening markets included the slowing increases in non-OPEC oil production, dwindling spare production capacity in OPEC, constrained refinery capacity, temporary supply disruptions due to natural disasters, and simply the risk of significant disruptions due to political instability or acts of terrorism in countries that produce, transship, and refine oil and gas.

Still, the energy demands, and the growing demands of China and India, are important. According to the International Energy Agency, overall demand for energy in China and India is projected to approximately double by 2030; whereas, United States demand is expected to grow by only 35 to 50 percent.

What is notable about the Chinese case is that, while China has set a goal of quadrupling the size of its economy in the next two decades, it has also set a goal to only double its consumption of energy. This will take a massive amount of investment—over \$2 trillion worth of investment estimated by the IEA in the oil sector, the natural-gas sector, and the electricity sector, which would be the area of the largest investment. That would include the construction of up to 40 new nuclear powerplants. And, of course, U.S. companies and firms are going to be interested in participating in all of this investment and growth.

Given the projected energy-demand growth, policymakers and national oil companies in China and India have begun to develop a mix of policies to improve oil security. These include steps to diversify energy suppliers, to strengthen oil diplomacy, to build strategic oil reserves, to enact conservation and efficiency policies, and to develop alternative energy sources.

Most visible and most commented on, however, has been the effort by their respective national oil companies to purchase overseas assets and participate in bilateral oil deals. In the past 10 years, the Chinese national oil companies have acquired interests in upstream oil projects in Burma, Kazakhstan, Venezuela, Sudan, Iraq, Iran, Indonesia, Ecuador, Peru, Yemen, Oman, Azerbaijan, as well as small projects in Canada and Australia.

But, even so, it's important to remember that China's outward investment pales in comparison with that of the United States. China's cumulative realized stock in investments overseas, in all commercial sectors, totaled approximately \$37 billion for all coun-

tries at the end of 2004. By contrast, United States direct investment in stock abroad stands above \$2 trillion, including \$15 billion in China.

Oil imports account for almost two-thirds of India's consumption, and, like China, it has increased its energy diplomacy with states in South Asia, as well as in Central Asia, Russia, the Middle East, Latin America, and Africa.

Driving this strategy of acquiring overseas equity investments is a belief among policymakers that, although their imports could be met by purchases on the world market, physically owning oil-producing assets overseas provides the country with greater energy security. As this theory goes, equity investments would reduce dependence on oil from major oil companies, as well as limit exposure to price volatility by reducing purchases of oil on the open market.

This strategy of intensified acquisition of equity oil has met with considerable skepticism from international oil-market analysts, and you'll probably hear some of that from your second panel, Mr. Chairman.

Whether purchased on the open market or produced by national oil companies, China, for example, will effectively pay the world price, either directly or in foregone revenues, if China were to ship every barrel of equity oil back home.

Even if its national oil companies continue their acquisition strategy, it's very unlikely that China would satisfy its demand or insulate its economy through China-owned assets. China will continue to be affected by the world market, just like most other countries, including the United States.

Industry analysts have noted that, in their rush to stake claims around the world, Chinese national oil companies have accepted terms that would often not be considered commercially viable for major Western oil companies. They base their investment criteria on assuming a long-term average oil price of between \$20 and \$30 per barrel. If oil continues selling for over \$50 a barrel, China's oil deals may prove to have been a good bet, from a commercial perspective; but if prices drop considerably, the results could be quite painful.

A troubling aspect of the recent surge in overseas energy deals by China and India is their willingness to invest in countries that are pursuing policies that are harmful to global stability. Both Chinese and Indian firms have reportedly been involved in oil-gas sector deals in Iran that raise concerns under United States law and policy. For example, Indian and Pakistani officials are reportedly discussing the possibility of building a pipeline that would bring Iranian natural gas to Pakistan and India. This is a project that, as Secretary Rice has said, raises U.S. concerns. India, and to a larger extent, China, also have significant upstream investments in Sudan's energy sector. The economic support such investment provides regimes such as Iran and Sudan can undermine efforts to encourage policy changes that will reduce global instability and enhance energy security for us all.

There are other important trends that the Department of State and the Department of Energy are addressing, including the environmental challenges of rapid economic development in India and China. China and India are expected to account for 85 percent of

the projected rise in coal use in the developing world and nearly 70 percent of the total world increment in coal demand. However, I think, as you know, many of the two countries' coal-fired plants are inefficient and lack adequate pollution control equipment.

As their consumption of fossil fuel accelerates, so will India and China's emissions of greenhouse gases, such as carbon dioxide. Based on data from our Energy Information Administration, India and China contribute, now, about 4 percent and 14 percent of total global carbon dioxide emissions, respectively. However, these figures are projected to increase to 5 percent and 18 percent by 2025, roughly equalling the level of the United States.

There are, thus, both opportunities and many challenges for China and India in the coming decades. The United States has an active policy of engagement, with both countries, to ensure that energy interests are pursued in a manner that seeks to engender cooperation rather than conflict or confrontation.

We're engaged with India on energy issues through our comprehensive energy dialog. Energy Secretary Bodman launched this dialog in May of this year, and I'm sure my colleague will give you some more specifics on that broad and comprehensive exchange.

During the recent visit of India's Prime Minister, as you noted, Mr. Chairman, he spoke of the importance of building energy cooperation between the two countries. There was also agreement on the details to try to move forward on civil nuclear cooperation. The joint statement released during the visit stressed President Bush's desire to achieve full civil nuclear-energy cooperation with India as it realizes its goals of promoting nuclear power and achieving energy security. The President would also seek agreement from Congress to adjust U.S. laws and policies. And the United States will work with friends and allies to adjust international regimes to enable full civil nuclear cooperation and trade with India. India would, reciprocally, agree that it would be ready to assume the same responsibilities and practices, and acquire the same benefits and advantages, as other leading countries with advanced nuclear technology.

India and China are taking a number of other steps to increase their energy security. Notably, India decided, in early 2004, to set up a strategic petroleum reserve. These reserves are to be established gradually; initially, covering 15 days of domestic consumption, and then moving up, in phases, to 45 days.

China is also working to establish a strategic petroleum reserve and is taking steps to build four storage sites on its east coast, which would cover up to 23 days of net imports in 2010, based on IEA projections. Chinese officials say they will be able to start filling parts of their SPR later this year.

The United States conducts a wide range of discussions on energy policy matters with China in a number of different fora. In the APEC framework, there is an energy working group, which brings together China, the United States, and all the other members to do a number of very important things, including identifying best practices in the energy area. We have a number of cooperative technology arrangements with China, including clean coal technology and nuclear power issues. China, India, and the United States also work together in exciting future-oriented programs,

such as the International Partnership for a Hydrogen Economy, the Carbon Sequestration Leadership Forum, and the Methane to Markets Partnership.

The Department of State also engages with China on these—some of these broad issues in the United States/China economic development and reform dialog, which we began in 2003 with the Chinese National Development and Reform Commission, the NDRC. We’ve had three sessions so far, and Deputy Secretary Zoellick will be conducting the next session of this dialog, which will include energy in its agenda, in early August.

The broadest dialog that we have with China, however, is the new energy policy dialog, which former Energy Secretary Abraham and NDRC Vice Chairman agreed to in May 2004. Secretary Bodman and Vice Chairman Zong launched that dialog on June 30, and I’m sure my colleague, Under Secretary Garman, will say a bit about it.

We hope that working closely with India and China will go far to increase their energy security, as well as our own. Participation by China and India in the recent G–8 Summit in Gleneagles, Scotland, was an example of the importance that we, and our other G–8 partners, hold for their growing role as economic powers and as energy consumers.

As President Bush has said in recent months, “We need to help India and China become more efficient,” users of energy. We need to discuss ways we can share clean energy technologies with them. We need to help them reduce their own demand for crude oil and gasoline. And by doing this we can help ease the pressure on global supply and, thus, help reduce gasoline prices here at home.

Thank you very much, Mr. Chairman.

[The prepared statement of Mr. Wayne follows:]

PREPARED STATEMENT OF E. ANTHONY WAYNE, ASSISTANT SECRETARY FOR
ECONOMIC AND BUSINESS AFFAIRS, DEPARTMENT OF STATE, WASHINGTON, DC

Mr. Chairman, distinguished committee members, I am pleased to be here today, with Department of Energy Under Secretary Garman to discuss the energy trends in China and India and their implications for the United States. They, along with the United States, represent three of the largest energy consuming countries in the world today.

The ability to bring economic growth and prosperity to its citizens is a key function that defines the legitimacy of any government. Economic growth, affordable energy, and environmental stewardship are all connected. One of the best ways to help nations develop is to promote energy-generating technologies that are clean, affordable, and secure.

In recent years, China and India have implemented significant changes that allow market forces to play an increasing role in their economies. The leadership in India and China has been successful in reducing poverty and delivering better lives for the many of their citizens. In China, for example, the economy has grown an astounding 9 percent per year for the past 25 years. The Indian economy has grown by 5 percent annually during this same period—still remarkable—putting the country in the ranks of what are often termed as the “rapidly industrializing economies.”

A greater demand for energy is a natural consequence of expanding economic activity. To support its recent level of economic growth, China’s growth rate of the consumption of energy has increased 4.3 percent per year since 1980; India’s has been 5.4 percent. The China of 25 years ago was largely energy self-sufficient, but in order to fuel its growing economic engine, an increasing share of petroleum and natural gas inputs must be obtained beyond China’s borders. China now imports 40 percent of its oil needs, approximately 3 million barrels per day.

To improve the living standards of its citizens, China and India are understandably very concerned about energy security, as is the United States and every other nation in the world. Our continued engagement with these two rising economic gi-

ants is the best means to shape their energy outlook and policies, helping to ensure that world energy resources are used in the most efficient, affordable, and environmentally sound ways possible.

It is important to stress that while I may characterize, as similar, some aspects of China's and India's quest for energy security, we do not view this as a monolithic policy challenge. The two countries are very different, and we will tailor our policies toward each country as needed.

Although coal, sourced largely from domestic supplies, still comprises over 50 percent of each country's primary energy consumption, it has been the growing share of oil, particularly imported oil, in each country's energy mix that has captured world attention. In 2003, China replaced Japan as the world's second largest petroleum consumer. According to data published by the International Energy Agency (IEA) in early 2005, China consumes 6.4 million barrels per day (b/d), or about one-third the level of the United States. While domestic production of oil has only increased approximately 7 percent between 2000–2004, overall demand has increased by 36 percent. Prior to 1993, China was a net exporter of petroleum.

India has not made any major new domestic oil discoveries since the mid-1970s. According to the International Energy Agency (IEA), domestic production has stagnated in recent years while overall demand for oil doubled since 1990 to 2.4 million b/d in 2003 and is expected to double again by 2030. Total net oil imports for India were about 1.6 million b/d in 2003 with India holding the position of the ninth largest net importer worldwide. In 1990, Indian domestic supply met almost 60 percent of oil demand; whereas the country now imports over 65 percent of its oil.

This growing demand for oil by both countries is often characterized as “the cause” of the recent surge in high global energy prices. However, Chinese and Indian demand growth has by no means been the only factor in tightening markets. Indeed, Indian oil demand, unlike Chinese oil demand, has not surged in recent years, but continued on the historical trend. Energy prices have been impacted by a sustained general increase in world demand for energy. The United States comprised 27 percent of the total increase in global demand between 2003 and 2004; China: 36 percent; and India: 4.0 percent. Other important factors include slowing increases in non-OPEC oil production, dwindling spare production capacity within OPEC, constrained refinery capacity, temporary supply disruptions due to natural disasters and, simply, risk of significant disruptions due to political instability or acts of terrorism in countries that produce, transship, or refine oil and gas.

While their current economic performance and corresponding demand for energy are impressive, we should not overstate the issue. It is important to remember that at \$1.5 trillion, the GDP of China in 2004 is only 12 percent of the United States \$12 trillion. India's GDP of \$642 billion is 5 percent. United States per capita GDP for 2004 was \$40,540 compared to \$1,118 for China and \$594 for India. In terms of oil, each American consumes 28 barrels per year. In China, per capita consumption is approximately two barrels per year; and less than one barrel per person per year in India.

More importantly, we must consider the future demands for energy by India and China if they maintain their policies of economic expansion.

According to the IEA, overall demand for energy in China and India is projected to approximately double by 2030, whereas U.S. demand is expected to grow by only 35–50 percent.

What is notable about the case of China is that while it has set a goal of quadrupling the size of its economy during the next two decades, it aims to only double its consumption of energy. This will take a massive amount of investment in more modern, efficient energy systems. The International Energy Agency estimates that China's oil sector alone will require investment of \$119 billion by 2030 while natural gas will need \$100 billion. The electricity sector will require an investment of \$2 trillion, part of which will be devoted to the construction of up to 40 new nuclear powerplants—a field in which U.S. companies will compete.

Energy use for transportation in China is projected to grow by 5 percent per year between now and 2025. Virtually all of the projected increase is for petroleum products; about two-thirds of that is expected to be for transportation. Personal travel in China has soared in the past two decades, with passenger miles traveled increasing fivefold. China had 14.5 million registered vehicles (including passenger cars, trucks, and buses) at the end of 2001. According to forecasts conducted by the International Energy Agency, this number could climb to 130 million by 2030. (There are approximately 230 million vehicles on America's roads today.)

India's energy demand for transportation is projected to grow at an average rate of 4.4 percent a year, and the transportation sector is expected to account for 20 percent of the country's total energy consumption in 2025. There were about 12 million vehicles in use in India in 2001.

The challenge before both countries, therefore, is energy security—especially oil security—in an expected environment of expanded economic growth. Policymakers and the national oil companies in China and India have begun to develop a mix of policies to improve oil security. These include steps to diversify suppliers, strengthen oil diplomacy, build strategic oil reserves, enact conservation and efficiency policies, and develop alternative energy sources. But the most visible, and commented on, aspect of their energy strategy has been the effort by their respective national oil companies to purchase overseas assets and participate in bilateral oil deals. China has been particularly active in this regard.

In the past 10 years, Chinese national oil companies have acquired interests in upstream oil projects in Burma, Kazakhstan, Venezuela, Sudan, Iraq, Iran, Indonesia, Ecuador, Peru, Yemen, Oman, Azerbaijan as well as small shares in projects in Canada and Australia. Leading the drive among Chinese national oil companies is China National Petroleum Corporation (CNPC). It plans to spend \$18 billion in overseas oil and gas development between now and 2020. China recently became one of the largest investors in Indonesia, buying into oil and gas interests worth \$1.2 billion. The Kazakh and Chinese governments signed an agreement in May 2004 for the construction of a \$700 million pipeline to export Kazakh crude oil into western China. Even so, China's outward investment pales in comparison with that of the United States. China's cumulative realized stock of investments overseas in all commercial sectors totaled approximately \$37 billion for all countries at the end of 2004. By comparison, U.S. direct investment stock abroad stands at over \$2 trillion, including \$15 billion in China.

Oil imports account for two-thirds of India's oil consumption. Like China, it has increased its energy diplomacy with states in the South Asia region; as well as states in Central Asia, Russia, the Middle East, Latin America, and Africa. The Indian state-owned Oil and Natural Gas Company (ONGC) has invested \$3.5 billion in overseas exploration since 2000. It has invested in gasfields in Vietnam, as well as energy projects in Algeria, Kazakhstan, Indonesia, Venezuela, Libya, and Syria. Indian private sector firms have pursued projects in Iran, Yemen, and in Africa. India reached agreement in principle with Iran this year to purchase a total of 5 million tons per year of LNG for 25 years beginning in 2009. Pipelines involving Iran, Turkmenistan, Burma, and Bangladesh have also been considered in recent years.

Driving the strategy of overseas equity investments in oil and gas ventures is a belief among policymakers that although their oil imports could be met by purchases on the world market, physically owning oil-producing assets overseas provides the country with greater energy security. As the theory goes, equity investments would reduce dependence on oil from major oil companies from developed countries (which dominate global oil production outside oil controlled by national oil companies), as well as limit exposure to price volatility by reducing purchases of oil on the open market.

This strategy of intensified acquisition of equity oil has met with considerable skepticism from international oil market analysts. They argue that overseas investments are unlikely to shelter China from volatility in the oil market. Equity investments by China in distant producing fields in Africa, Latin America, or the Middle East are not likely to improve the physical security of its energy supply. Whether purchased on the open market, or produced by its national oil companies, China will effectively pay the world market price, either directly or in foregone revenues, if China were to ship every barrel of equity oil back home. In fact, according to industry press reports, most of the oil currently produced by Chinese oil companies abroad is not shipped back to China, but instead is sold on markets closer to production.

Crude oil is fungible and the market for this commodity is globally integrated. Due to the laws of supply and demand, any oil that is pumped from the earth and added to the world market will increase supply relative to demand and tend to have a downward effect on price. Any increase in demand relative to supply would tend to push prices upward. Even if its national oil companies continue their acquisition strategy, it is very unlikely that China would satisfy its demand or insulate its economy through China-owned assets. China will continue to be affected by the world market—just like most other countries, including the United States—and its impact on the world oil market, and on the global price of oil, is determined by China's level of demand, not from where its oil is supplied.

Industry analysts have noted that in their rush to stake claims around the world, Chinese national oil companies have accepted terms that would often not be considered commercially viable for major Western oil companies, who base their investment criteria assuming a long-term average price of oil at between \$20 and \$30 per barrel. The question is how long can China pursue such a strategy? If oil continues

selling for \$50 per barrel or more, it may prove to have been a good bet from a commercial perspective, but if prices drop considerably, the results could be quite painful. In response to the oil crises of the 1970s and early 1980s, Japan embarked on a similar policy: Establishing the state-owned Japan National Oil Company to lock in equity oil around the globe as a way to improve national energy security. After investing billions of dollars with lackluster results, the Government of Japan abandoned that policy and now plans to dissolve the majority of the parastatal and privatize some of its healthier subsidiaries.

A more troubling aspect of the recent surge in overseas energy deals by China and India, is their willingness to invest in countries that are pursuing policies that are harmful to global stability. Both Chinese and Indian firms have reportedly been involved in oil and gas sector deals in Iran that raise concerns under U.S. law and policy. For example, Indian and Pakistani officials are engaged in detailed discussions on the technical, financial, and legal aspects of building a \$4 billion pipeline that would bring Iranian natural gas to Pakistan and India—a project that, as Secretary Rice has said, also raises U.S. concerns. India, and to a much larger extent China, have significant upstream investments in Sudan's energy sector. Additional sources of oil and gas on the world market are, of course, welcome, and for over two decades U.S. international energy policy has promoted the reduction of barriers to energy trade and investment around the world as a means to enhance global energy security. However, the economic support such investment provides regimes, such as Iran and Sudan, can undermine efforts to encourage policy changes that will reduce global instability and enhance energy security for all.

Other important trends that the State Department is addressing include the environmental challenges that rapid economic development will pose for India and China. Both countries intend to rely on their plentiful supplies of coal to fuel their expanding industrial and electric generation needs. According to the U.S. Energy Information Administration (EIA), over the next 20 years, China and India are expected to account for 85 percent of the projected rise in coal use in the developing world and nearly 70 percent of the total world increment in coal demand. However, many of the countries' coal-fired plants are inefficient and lack adequate pollution-control equipment.

In 2003, 63 percent of the 330 Chinese cities being monitored had poor air quality. One of the main pollutants is sulfur dioxide, resulting in the formation of acid rain, which now falls on about 30 percent of China's total land area. About 34 percent (6.6 million tons) of the country's total sulfur dioxide emissions in 2002 were released from powerplants. In addition to point sources (such as powerplants and factories), vehicles account for an increasing percentage of the country's air pollution especially in urban areas. For instance, city planners in Shanghai estimate that about 90 percent of the city's air pollution is from vehicle traffic.

As their consumption of fossil fuels accelerates, so will India's and China's emissions of greenhouse gases such as carbon dioxide. Based on data from the Energy Information Administration, India and China contribute only 4 percent and 14 percent, respectively, to total global carbon dioxide emissions. However, these figures are projected to increase to 5 and 18 percent by 2025, roughly equaling that of the United States. This represents a 3.3-percent annual average percentage increase by China over the next 20 years, and a 2.9-percent increase for India, compared to a 1.5-percent increase for the United States.

The opportunities for China and India in the coming decades are huge, as are the challenges. The United States has an active policy of engagement with both countries to ensure that energy interests are pursued in a manner that seeks to engender cooperation rather than conflict or confrontation.

We are engaged with India on energy issues through our comprehensive Energy Dialogue. Energy Secretary Bodman launched this energy dialogue in May of this year. The Energy Dialogue builds upon the broad range of existing energy cooperation between the two countries and seeks ways to develop new avenues of collaboration. It is organized across five Working Groups with the following key goals: (1) Strengthening energy security through increased information and trade and investment in the oil and gas sector; (2) advancing understanding of efficient generation, distribution and use of electricity; (3) enhancing the understanding of coal-related energy issues; (4) promoting the development and deployment of clean energy technologies and energy conservation practices; and (5) dialogue and action on issues associated with safe and secure civil uses of nuclear energy.

The recent visit of the Indian Prime Minister provided more opportunity to reach agreement on the details of this civil nuclear cooperation. The joint statement released during the visit stressed President Bush's desire to achieve full civil nuclear energy cooperation with India as it realizes its goals of promoting nuclear power and achieving energy security. The President would also seek agreement from Congress

to adjust U.S. laws and policies, and the United States will work with friends and allies to adjust international regimes to enable full civil nuclear energy cooperation and trade with India. India would reciprocally agree that it would be ready to assume the same responsibilities and practices and acquire the same benefits and advantages as other leading countries with advanced nuclear technology. These responsibilities, among others, include taking a decision to voluntarily place its civilian nuclear facilities under IAEA safeguards and signing and adhering to an Additional Protocol with respect to civilian nuclear facilities.

India's decision in early 2004 to set up a strategic petroleum reserve was an important step in improving its energy security. The Chinese Government is already working to establish four oil storage sites on the east coast of China with total storage capacity of about 100 million barrels. The Chinese Government intends to start filling the SPR this year.

We have also established high-level dialogues with the Chinese leadership to improve cooperation on the crucial issue of global energy supply and coordination of energy policy. The United States and China are expanding cooperation on developing clean and renewable energy sources, which has important environmental as well as energy implications.

The United States conducts discussions on energy policy matters with China in a number of fora. Both China and the United States are active participants in the Asia-Pacific Economic Cooperation (APEC) organization's Energy Working Group. Work in the Energy Working Group in the recent past has focused on developing and implementing an Energy Security Initiative, which includes enhanced data transparency, sharing best practices for trade in liquefied natural gas, strategic oil stock issues, and a Real-Time Emergency Information System.

The United States has a number of cooperative technology arrangements with China, including clean coal technology and nuclear power issues. China, India, and the United States also participate in several multilateral agreements to promote the development of transformational technologies needed to address climate change. These initiatives include the International Partnership for the Hydrogen Economy, the Carbon Sequestration Leadership Forum and the Methane-to-Markets Partnership.

These multilateral engagements are useful in encouraging Chinese behavior in the international economic and energy arenas that are consistent or harmonious with Western norms. Together with countries that share our sense of market economy and energy security, the USG may introduce and promote practices in China that would help it transition into the world economy in an effective and undisruptive manner.

We also work to support American firms from all industrial sectors in their efforts to invest and work in China through advocacy by the Department of Commerce, USTR, and State as well as our diplomatic posts in China.

The State Department initiated the U.S.-China Economic Development and Reform Dialogue in 2003 with the Chinese National Development and Reform Commission (NDRC), China's premier economic development agency. NDRC has the lead in broad macroeconomic policy and is involved in virtually every key sector of the economy. Through the Dialogue—which is flexible and informal in format—we have sought to move China toward a more market-oriented and rules-based economic system. The discussions have focused on long-term structural reform challenges, avoiding current bilateral disputes. NDRC puts a high priority on the Dialogue, and has recently initiated similar dialogues with the European Union and United Kingdom, among others.

We have held three sessions since 2003, covering a wide range of topics, including energy, agriculture, macroeconomic policy, investment, and telecommunications. The next session of the Dialogue will be chaired by Deputy Secretary Zoellick, and is planned to take place in early August in Beijing.

The United State's broadest dialogue on energy with China is the new Energy Policy Dialogue that former Energy Secretary Abraham and NDRC Vice Chairman Zhang Guobao agreed to in May 2004. Secretary Bodman and Vice Chairman Zhang launched that dialogue on June 30, here in Washington, with a session that focused on a general review of energy policies, petroleum stockpiling (strategic petroleum reserves), energy efficiency, and coal mine safety.

We hope that working closely with India and China will go far to increase their energy security as well as our own. Participation by China and India in the recent G-8 Summit in Gleneagles is an example of the importance we hold for their growing role as economic powers and as energy consumers. Through the newly established "Dialogue on Climate Change, Clean Energy, Sustainable Development," the leaders of the G-8 will invite nations of the developing world and the transitioning economies, to join them in building on the progress achieved at the summit.

As President Bush has said in recent months, "we need to help India and China become more efficient" [users of energy]. We need to discuss ways we can share clean energy technologies and help them reduce their own demand for crude oil and gasoline. By doing this, we will help ease pressure on global supply and thus help reduce gasoline prices here at home.

Many thanks for the opportunity to testify today.

The CHAIRMAN. Thank you very much, Secretary Wayne.
Secretary Garman.

**STATEMENT OF HON. DAVID K. GARMAN, UNDER SECRETARY
FOR SCIENCE AND ENVIRONMENT, DEPARTMENT OF EN-
ERGY, WASHINGTON, DC**

Mr. GARMAN. Thank you. Thank you, Mr. Chairman.

Let me begin with a caveat. The figures in my testimony are from the Energy Information Administration, or EIA. EIA is an independent, nonpolitical arm of the Department. And, when viewed with hindsight, EIA is sometimes wrong. That's not surprising, since forecasting the future is a very imprecise science, or art, particularly when dealing with nations such as India and China.

I have the highest regard for EIA, and the estimates in our testimony are the very best available to us, but I wouldn't want to convey a false sense of precision when saying, for instance, that, "Well, demand will increase by 36.2 million barrels per day over the next 20 years," because, in truth, nobody really knows for sure. So, I begin with that caveat.

We do know that today the global demand for oil exceeds 80 million barrels per day. From the early 1990s until 2003, we were used to seeing average daily demand rise by roughly 1 million barrels with each passing year. Meanwhile, over that same period, excess production capacity averaged between 3 and 5 million barrels per day. In other words, we enjoyed modest and seemingly predictable demand growth and comfortable production margins. Industry made investment decisions with respect to exploration, development, and new production capacity, accordingly.

However, in 2003 and 2004, a dramatic increase in demand, approximately 4.5 million barrels per day in just 2 years, surprised the world. Suddenly, oil production capacity was stretched nearly to its limit. At this moment, we find oil supply ahead of demand, but supply's lead is small. Currently, we estimate something around 1 million barrels per day of excess production capacity, most of that located in Saudi Arabia. This is clearly a thin cushion, as reflected in the price increases and volatility that we've witnessed over the last couple of years.

With that background in mind, consider the fact that, of the 4½-million-barrel-per-day increase in oil demand in 2003 and 2004, China accounted for roughly 1½ million barrels per day, or nearly double the demand growth in the United States over that same period.

Opinions vary on what China's demand growth will be in 2005, ranging from the International Energy Agency's forecast of 400,000 barrels per day to the Energy Information Administration's estimate of 700,000 barrels per day. Over the next 20 years, EIA forecasts that world oil demand will increase by 36.2 million barrels per day, with developing countries around the world, particularly

in Asia, accounting for most of that growth. India's demand growth is forecast to pick up speed over the next several years, adding approximately 1 million barrels per day by 2015, then another nearly 2 million barrels per day by 2025. Clearly, we see India and China playing a growing role in the global petroleum balance. And, as a consequence of this issue, and others, we have engaged both of these nations as never before.

To cite just a few examples, we've been working closely with India and China on energy security measures, both bilaterally and through the IEA and Asia Pacific Economic Cooperation. Both nations have recognized the importance of energy security, and both nations have taken action to build their own oil reserves. On May 31, 2005, we launched a new United States/India energy dialog, encompassing five working groups, covering oil and gas, coal, power and energy efficiency, new technologies and renewable energy, and civil nuclear energy.

Both China and India are charter members of our multilateral technology collaborations, including the International Partnership for the Hydrogen Economy and the Carbon Sequestration Leadership Forum. These are our signature efforts to promote next-generation technologies with the potential to sharply reduce oil consumption through the development of hydrogen fuel and to sharply reduce carbon emissions globally through the development of technologies to affordably remove and sequester carbon dioxide from fossil-fuel power plants.

Through these bilateral and multilateral efforts, we will communicate and understand, but we also must act. We need to advance our own comprehensive energy strategy, and encourage others to do the same. Four years ago, the President offered his vision of a national energy policy plan, with 105 recommendations addressing both energy supply and demand efforts. And we're most gratified to see progress, in the Congress, on comprehensive energy legislation that promotes greater energy efficiency, new production, and new technology. Passage of a comprehensive energy bill would be a tangible demonstration of our belief that all countries have to invest heavily in oil—in energy supply, diversification, energy efficiency, and infrastructure expansion, as well as new technology, in order to meet the world's growing demand for energy to sustain economic and social development.

With that, Mr. Chairman, and knowing of the time and the hour, I'll stop now and look forward to the questions, either today or in the future, from the committee.

Thank you.

[The prepared statement of Mr. Garman follows:]

PREPARED STATEMENT OF DAVID K. GARMAN, UNDER SECRETARY FOR SCIENCE AND ENVIRONMENT, DEPARTMENT OF ENERGY, WASHINGTON, DC

Mr. Chairman and members of the committee, I am pleased to appear before you this morning to discuss China's and India's expanding role in the global energy market and important energy dialogues taking place with these two countries.

Most recently, when one talks of China's and India's energy growth it is often in the context of a tight and volatile world oil market. The dramatic increase in world oil demand in 2003–2004 caught the world by surprise. Since 1990, annual world oil demand growth had averaged approximately 1 million barrels per day (bpd). Investment in production capacity expansion was being made on the assumption of the continued relatively modest growth. World excess production capacity had been

averaging between 3 and 5 million bpd since the early 1990s, so supply losses from Venezuela, Nigeria, and Iraq in 2002 and 2003 had not created undue concern for the world oil market—at least not until it became apparent that something extraordinary was happening with demand growth.

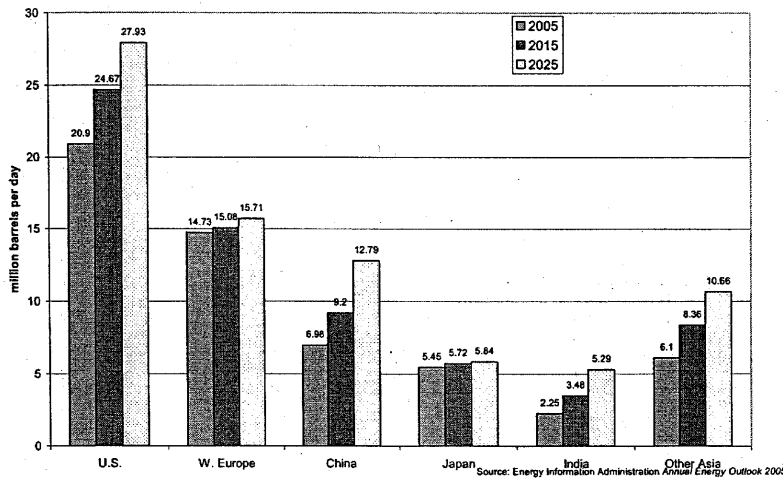
In 2003 and 2004, world oil demand rose approximately 4.5 million bpd in just 2 years, nearly as much as in the previous 5 years. World oil production capacity was stretched nearly to its limit. China's oil demand grew 1.5 million bpd in 2003 and 2004, while growth in the United States was 800,000 bpd. Opinions vary on what China's demand growth will be in 2005, ranging from the International Energy Agency's forecast of 400,000 bpd to the Energy Information Administration's (EIA) estimate of 700,000 bpd.

This year finds oil supply still ahead of demand, but supply's lead is not all that impressive. Currently there is something around 1.5 million bpd of excess production capacity, most of that located in Saudi Arabia. With such a small margin for error, we can be thankful for the supply insurance policy provided by our Strategic Petroleum Reserve and our partnership with our allies in the International Energy Agency. We have been working closely with China and India on energy security measures bilaterally and through the IEA and Asia Pacific Economic Cooperation. Both nations have recognized the importance of energy security and have both taken action to build their own oil reserves.

Over the next 20 years, EIA forecasts that world oil demand will increase by 36.2 million bpd, with developing countries around the world, particularly in Asia, accounting for most of the growth. India's demand growth is forecast to pick up speed over the next several years, adding approximately 1 million bpd by 2015, then another nearly 2 million bpd by 2025. During that period, the United States is also expected to add several million bpd of growth.

Rising demand has left major consuming countries such as the United States, China, and India with the shared goals of diversifying and expanding the oil supply sources available to the world market. Both China and India have attended the recent meetings of International Energy Agency member-country Energy Ministers in Paris where a key topic for discussion was how to create a more stable and transparent framework for ensuring adequate and timely investment. What is clear is that all countries will have to invest heavily in energy supply, diversification, energy efficiency, and infrastructure expansion in order to meet the world's growing demand for energy to sustain economic and social development.

World Oil Demand Growth



ENERGY IN CHINA AND INDIA TO 2025

Robust economic growth has led to the steep increase in energy use in the developing countries of Asia, particularly China and India. While the world, as a whole, will see economic growth of 3 percent annually over the next 20 years, developing

Asia will see its economy expand at a rate of 5.1 percent. To fuel its economic growth, China will see its overall energy demand increase by 3.5 percent per year, while India will follow at 3.2 percent per year.

In addition to the expected growth in oil consumption, China and India are expected to see among the fastest growth in natural gas use worldwide, increasing by an average annual rate of 6.9 percent and 4.8 percent, respectively, between 2001 and 2025. Gas generation is seen by many as a desirable option for electricity, given its relatively short deployment time line, efficiency relative to other energy sources, and the fact that it burns more cleanly than either coal or oil. Although natural gas production is expected to increase in both of these countries, natural gas imports are expected to grow faster. In 2001, India and China produced sufficient natural gas to meet domestic demand, but by 2025, gas production in these two countries will only account for around 60 percent of demand. The growing dependence on imports occurs despite efficiency improvements in both the consumption and the production of natural gas.

Coal will continue to dominate the energy markets of both India and China, accounting for 51 percent and 64 percent, respectively, of total energy consumption in both countries. While the share of coal in total energy is expected to decline, coal will still account for 41 percent in India and 56 percent in China by 2025. These two countries alone account for 67 percent of the total expected increase in coal use worldwide. These levels of coal consumption are major environmental and infrastructure concerns for both countries.

The largest increase in nuclear generation is expected for the developing world, where consumption of electricity from nuclear power increases by 4.1 percent per year between 2001 and 2025. Developing Asia, in particular, is expected to see the largest increment in installed nuclear generating capacity over the forecast period accounting for 96 percent of the total increase in nuclear power capacity for the developing world as a whole. Of over 50 gigawatts of additional installed nuclear generating capacity projected for developing Asia, over 30 gigawatts are projected for China, 15 for South Korea, and 6 for India. India has stated that they would like to have a significantly larger share for nuclear power. While India is a nonsignatory of the Nuclear Nonproliferation Treaty, the recent U.S.-India civil nuclear cooperation agreement will, in the coming years, likely increase their ability to access civilian nuclear technology.

Consumption of electricity from hydropower and other renewable energy sources is expected to grow by 1.9 percent per year over the projection period. Much of the growth in renewable energy use is expected to result from large-scale hydroelectric power facilities in the developing world, particularly among the nations of developing Asia. China, India, and other developing Asian countries are constructing or planning many new, large-scale hydroelectric projects over the forecast period, including China's 18.2-gigawatt Three Gorges Dam project which is scheduled to be fully operational by 2009. The Indian Government has announced plans to add 50 gigawatts of hydroelectric generating capacity by 2012.

In China energy intensity is forecast to improve (decline) by 2.4 percent per year between 2001 and 2005, falling from 33,000 Btu per 1997 dollar of GDP to 18,300 Btu per 1997 dollar of GDP. In India, energy intensity declines from 24,600 Btu to 15,400 Btu, an average annual improvement of 1.9 percent.

U.S. ENERGY POLICY RESPONSES

As we have witnessed and tried to address sharply higher and more volatile energy—especially oil prices over the last 5 years, we recognize that we indeed participate in a global, integrated energy market and that we need to address energy supply, demand, and infrastructure here at home as well as abroad. As one of its first and highest priorities, this administration initiated a comprehensive energy policy. The administration's policy provides a long-term strategy to increase the supply and suppliers of petroleum, diversify our sources of energy and improve the overall efficiency of energy use. We are pleased that Congress has now moved forward as well. In addressing our need for adequate supplies of oil we are pursuing policies that will enhance domestic oil production, such as exploration of ANWR; add new sources into our energy mix, such as nuclear and increased LNG imports; stimulate the development of alternative fuels, such as ethanol and biodiesel; and increase the efficiency of motor vehicles and appliances. We are promoting more efficient use of the energy we already generate—believing that the next best source of energy is the one we currently waste. Internationally we are working with countries to help them put in place fair and transparent legal regimes that will attract private investment for the development of oil resources while helping the developing countries and growing economies to be more efficient producers and consumers of energy. We began engag-

ing both India and China more than a decade ago. We realized the enormous growth potential in their economies, but at that time saw it more as an opportunity for U.S. energy firms, with their unparalleled excellence in efficient management and effective technology, to gain markets for their equipment, know-how and technology. We still believe that cooperation with China, India, and other major developing countries can bring us quicker and better solutions.

Longer term, we believe that breakthrough technologies are needed to address our energy security and environmental challenges. To help achieve these goals, the Department has implemented two major international Presidential initiatives. First, the International Partnership for a Hydrogen Economy (IPHE), which the President envisions as bringing hydrogen-based vehicles to market in a generation to finally ending oil's chokehold on the transport sector. Second, involving another potentially transformational technology, is the focus of the Department's Carbon Sequestration Leadership Forum (CSLF). Given their potential technical contributions as well as the importance of their future markets, India and China have been important partners in both initiatives. India has been involved in the CSLF since its inception. China has been an active member of the CSLF and the IPHE since their inceptions. China hosted the IPHE Steering Committee meeting in May 2004 in Beijing, and has offered to host the IPHE Implementation-Liaison Committee meeting in October 2005 in Shanghai.

India and China are also active members in the Methane to Markets Partnership, an international initiative headed by the U.S. Environmental Protection Agency, to reduce methane emissions to the atmosphere by recovering the gas and using it for fuel. At the first ministerial meeting for the Partnership, India volunteered to be cochair and China volunteered to be a vice chair of the Partnership's Coal Sub-Committee.

ENERGY COOPERATION

India

Growing concerns about energy security have prompted the United States and India to launch a new energy dialogue that reflects the transformed strategic relationship between the world's two largest democracies. Adequate and reliable supplies of energy at reasonable cost are essential to fuel India's rapidly growing economy. Both the United States and India are increasingly reliant upon global oil and natural gas markets to satisfy their energy needs. Both nations depend heavily upon domestic supplies of coal for electric power generation and seek to increase their utilization of natural gas, renewable energy and nuclear power as well as pursue energy efficient practices to ensure a balanced and sustainable energy economy that helps preserve a clean environment. The United States and India recognize their mutual interests are best served by working together in a collaborative fashion to ensure stability in global energy markets.

DOE's engagement with India stems back a decade to 1994. Efforts focused on improving the efficiency of India's coal-fired powerplants, promoting the use of clean fuels such as natural gas, wind, and solar energy, helping establish public-private partnerships in industrial energy efficiency, and improving the investment climate for U.S. energy firms. This cooperation went on hiatus due to the imposition of Glenn Amendment sanctions in 1998 following India's test of a nuclear weapon.

Our energy cooperation revitalized in November 2001 when President Bush and Prime Minister Vajpayee issued a joint statement establishing energy as one of five pillars of the Indo-U.S. Economic Dialogue, with the other pillars being trade, investment, commerce, and the environment. This enabled the implementation of the President's National Energy Policy (NEP) plan's recommendation that DOE work with India's Ministry of Petroleum and Natural Gas (MPNG) to enhance domestic oil and gas supply.

There followed a number of activities, including:

- A "Building Gas Markets in India" conference in 2002.
- The creation of a Coal Advisory Group in 2002.
- A study mission on Coal Bed Methane to the United States by the Indian Secretaries of Petroleum and Natural Gas, Coal and Labor (January 2003).
- A visit by the Indian Minister of Petroleum and Natural Gas to a Strategic Petroleum Reserve (SPR) site in mid-2003, followed by a technical seminar on strategic oil storage in Washington for an Indian engineering team.

These activities helped promote the deployment of clean energy technologies and fuels, supported reforms in the power sector, enhanced India's awareness of steps it needed to take to attract foreign investment in the energy sector and bolstered India's energy security. In regards to energy security, India has announced plans to develop a 5 million ton strategic crude oil reserve. Several locations near

Mangalore on the east coast are being considered. The Indian Strategic Petroleum Reserve Ltd. was incorporated on June 16, 2004, to implement this project, which is expected to take about 4 years to complete.

India also supported President Bush's call for a transformed Indo-U.S. relationship premised upon a new strategic alliance under which energy security and energy cooperation are key factors. In addition to the recent U.S.-India civil nuclear cooperation announcement, this relationship was also reflected in the launch of the new U.S.-India Energy Dialogue on May 31, 2005. It established five working groups along with a steering committee to provide oversight. The goals of the Dialogue are to promote increased trade and investment in the energy sector by working with the public and private sectors to further identify areas of cooperation and collaboration. Building upon the broad range of existing cooperation, it is hoped that this effort will help mobilize secure, clean reliable and affordable sources of energy.

The five Working Groups are: Oil and Gas, Coal, Power and Energy Efficiency, New Technologies and Renewable Energy, and Civil Nuclear. We hope they will be successful in developing robust work programs to achieve the objectives of the Dialogue.

China

The Department of Energy's engagement with China dates back to immediately after the normalization of diplomatic relations between the United States and China. Much of the overall cooperation with China focused on science and technology cooperation including exchange of scientists, training, demonstration programs, and collaborative visits. In 1995 the Department initiated bilateral consultations with China's State Planning Commission (a predecessor to the National Development and Reform Commission—NDRC). The range of bilateral technical cooperation includes high energy physics, fusion, peaceful uses of nuclear technologies, fossil energy, and energy efficiency.

China's rising energy demand has become a global concern in recent years. Recognizing the strong demand rise as a potential bottleneck to its economic development, the Chinese Government has begun looking deeply into energy policymaking, seeking advice from other countries and reviewing energy issue priorities. Conversely, fast developments in Chinese energy demand and supply conditions and energy policymaking system have heightened the need for a concrete mechanism to obtain accurate facts and information on China's energy policies and plans.

DOE and the NDRC have agreed to engage in policy-level discussions on a range of energy issues, including energy policymaking, supply security, power sector reform, energy efficiency, renewable energy, and energy technology development options. Through the Energy Policy Dialogue, the Department specifically aims:

- To exchange views with China on each side's views of current and future national and international energy markets;
- To better assess the impacts of China's energy policies on U.S. energy security;
- To offer relevant U.S. experiences (positive and negative) in energy and related environmental policies and regulations to assist Chinese energy economic and environmental policymakers as they develop and revise their policy, legal, and regulatory framework; and
- To mitigate environmental affects of China's rising fossil energy consumption.

The first meeting for Energy Policy Dialogue on June 30 clearly emphasized how the United States and China share many common challenges and opportunities as the two largest energy consumers.

Another key bilateral energy engagement is the U.S.-China Oil & Gas Industry Forum, established in 1995. U.S. industry continues to be the largest investor in China's petroleum sector and they view the forum as an important opportunity for facilitating U.S. investment in China's oil and gas industry. The Sixth Forum meeting in New Orleans, Louisiana, June 28–29, 2005, was attended by over 30 delegates from China, including representatives from the NDRC, PetroChina, Sinopec, CNOOC, SinoChem, and China United Coalbed Methane Corporation. Key topics included deep water/offshore development; coalbed methane production; U.S. participation in China's upstream activities; LNG infrastructure development and prospects; and risk management issues for large energy infrastructure projects in China.

In addition to these major bilateral initiatives, the Department is actively engaged with China through a number of multilateral frameworks to enhance our energy security objectives. In the Asia Pacific Economic Cooperation (APEC) Energy Working Group, China is an important participant in the Energy Security Action Plan that APEC adopted during the Bangkok Leaders Meeting at the initiative of President Bush. Through International Energy Agency (IEA) workshops, the Department has been encouraging the Chinese Government to create or improve a legal framework, price regulation, and taxation scheme for the natural gas sector,

and advising them in addressing technical challenges as China has embarked upon a major expansion of its gas infrastructure. Also, the Department has steadily encouraged the Chinese Government to establish strategic oil stocks.

With the opening of the Department of Energy Office in Beijing, which was announced by Secretary Bodman on June 30, the Department will renew its push to seek opportunities to better assess the impacts of China's energy policies on U.S. energy security, positively affect Chinese energy and economic policymaking, as well as advance commercial opportunities for U.S. industry.

IGCC

The committee has expressed an interest in my addressing opportunities for cooperation between the United States and India and China on Integrated Gasification Combined Cycle (IGCC) development. Let me say the following about our efforts with both countries in this regard:

India—The Department's National Energy Technology Laboratory is managing a \$2.5 million engineering study for India funded by the United States Agency for International Development (USAID). The study is expected to be completed by yearend or early next year, but so far initial numbers have indicated the cost of IGCC to be very high relative to the conventional powerplant technology.

China—In 2003 an "On-Site IGCC Briefing" took place for a delegation from China with the purpose of helping to increase China's interest and knowledge in U.S. Clean Coal Technologies and promote their acceptance in China's marketplace. It is hoped that a study of Chinese gasification experiences slated to start in 2006 might be applicable to future IGCC designs for both the United States and Chinese markets.

In support from Nexant and the Gas Technology Institute (GTI), DOE/NETL conducted a study of the application of GTI's U-Gas fluidized-bed gasification technology. The history of the operation of the U-Gas technology has demonstrated significant issues that have resulted in limited domestic applications of these systems. The only commercial-scale application of the U-Gas technology is at Shanghai Chemical and Coking (SCC) Corporation outside Shanghai, China, which was of similar scale to that being studied. While the U-Gas gasifiers were run by SCC for approximately 5 years, they no longer operate owing to design and operational difficulties. As part of the study, DOE/NETL, Nexant, and GTI engineers visited the SCC facility as well as a second, operating fluidized-bed gasification system in Shaanxi Province that is of a similar design to the GTI technology. During the visits, the NETL team was able to meet with design and operations personnel of the SCC and Shaanxi facilities and discuss their past experience with the U-Gas and U-Gas similar gasifiers. Their extensive knowledge of past plant operations provided insight to critical design parameters. Discussions with plant operators and inspection of the changes made or desired for plant improvement were key to plant design improvements incorporated in the DOE/NETL study.

CONCLUSION

Mr. Chairman and members of the committee, let me conclude by acknowledging that economic growth and the inevitable increase in energy demand that it entails is steadily shifting—at the margin—from the traditional industrialized countries, such as the members of the OECD (Organization for Economic Cooperation and Development) to Asia. This transformation, like any other, is creating strains in a number of areas, and energy certainly is foremost among them. But we cannot simply blame China, India, and other developing nations for seeking the same levels of affluence that our citizens enjoy. First and foremost the United States must address its energy problems at home and, in this regard, we are happy to see the progress being made by the conference committee on the energy bill and hope that after 4 years the country will have comprehensive energy legislation enacted by the end of the summer. Second, we believe that we need to continue to engage countries like China and India in energy dialogues so that we better understand their markets and their motivations, and that we can offer assistance in developing market-based regulatory regimes that lead to greater energy efficiency and opening of their markets to U.S. trade and investment. And finally we are convinced that bilateral and multilateral energy cooperation maximizes everyone's energy security.

Thank you, Mr. Chairman, for the opportunity to address the committee on this important subject and I am happy to take any questions you or the members may have.

The CHAIRMAN. Well, thank you very much.

Let me say, to my colleagues, Senator Allen and Senator Coleman, we commenced the hearing at about 9:30 in view of the fact that the rollcall votes are commencing at 10:15. We can proceed with your questions of these witnesses—or with testimony from our other three witnesses, and then questioning of all of them after we return, probably after an hour and a half of recess before we commence the hearing again.

Senator ALLEN. Personally, Mr. Chairman—thank you for your consideration—I would prefer to ask these two gentlemen questions now. And, if we let them do that, then they could leave, out of courtesy to them, as well.

The CHAIRMAN. Yes.

Well, let's do that. Let's proceed with your question, Senator Allen, and then Senator Coleman.

Senator Allen.

Senator ALLEN. Thank you. Thank you, Mr. Chairman. I have a statement for the record that I'd like to have entered.

The CHAIRMAN. It will be inserted in full.

[The prepared statement of Senator Allen follows:]

PREPARED STATEMENT OF HON. GEORGE ALLEN, U.S. SENATOR FROM VIRGINIA

Thank you, Mr. Chairman. I am pleased you have convened this hearing. I also serve on the Senate Energy and Natural Resources Committee and discussed this issue both during committee and floor consideration of the energy bill. The Congress needs to consider how the substantial and growing demand from China and India for energy resources is going to affect our own requirements and the implications that will have for our economic and national security.

China's surging demand for energy is impacting the world. China has now emerged as the second largest consumer of energy and demand could double by 2020.

According to the U.S. Energy Information Administration, China is consuming 7.2 million barrels of oil per day and this is expected to rise to 7.8 million barrels of oil per day by next year. China alone has accounted for 40 percent of growth in oil demand over the last 4 years.

According to recent studies, China's growing demand for oil is one of the significant factors driving oil prices to record high levels. With such growth in the Chinese economy, it is understandable why there is greater demand for energy in the form of coal, oil, and nuclear power as well as materials ranging from cement to steel.

China in the past year has signed deals for oil reserved in Africa, Iran, South America, and now Canada. Most recently, one of China's largest state-controlled oil companies made an \$18.5 billion unsolicited bid for Unocal, a United States oil company.

It is important to note that this unsolicited bid came from a government-owned company that does not operate under free-market conditions, thus does not experience the same risks or make decisions based on the same motivations as a private sector firm.

Strong economic growth in India has also substantially increased that country's demand for global energy resources. It is the sixth largest global energy consumer and has experienced annual economic growth of 6.5 percent in recent years.

India imports approximately 70 percent of its oil, accounting for 2.5 million barrels per day, and its consumption of natural gas is growing rapidly.

Taken individually, the recent increases of energy consumption by China and India would be reason for further study from the United States. However, these are the two most populous countries in the world. Further, they have recently entered into discussions to cooperate on issues of energy security and conservation.

This does not necessarily provide a direct threat to the United States, at least not immediately. But it is a significant development that should draw the attention of our Government and prompt a review of how we plan on meeting our energy needs in the future.

The ability to procure energy resources at a reasonable price is vital to our economy. From transporting products across our highways, to powering manufacturing

plants, to flying passengers and cargo around the world, our economic well-being largely depends on the price of oil, natural gas, and to a lesser extent, coal.

We need to recognize the impact Chinese and Indian energy demands are having on global supply and be ready with policies that mitigate the affect on our economy.

Specifically to China: It is important that we have a comprehensive review which would include a full assessment of the types of investments China is making in international and United States-based companies; a better understanding of the relationship between the Chinese energy sector and the Chinese Government; and what we can do to ensure a level playing field and flexibility in the global market.

Perhaps most importantly, we need to understand how we can better work cooperatively to pursue energy interests as well as work together on conservation, energy efficiency, and technology.

I am hopeful we will pass an energy bill before we recess at the end of this week. That legislation provides a comprehensive roadmap to how we will satisfy our energy needs in both the near term and the future.

This hearing highlights another challenge to our energy policies, and one the U.S. Government and private sector need to take notice of. China and India are growing at an incredible rate. If this continues, their energy consumption will also grow, placing a greater demand on the global market and affecting how we meet our energy needs.

Senator ALLEN. Let me just paraphrase some of my salient concerns on this issue. Both Secretaries have made very cogent, understandable, logical comments. And it is clear that, with growing economies in India and China, they're going to need more oil, more natural gas, more coal. We see it in the steel and cement prices worldwide, as well. This is so timely, Mr. Chairman, that you're holding this hearing, in the midst of the energy bill. One of the proposals is to study the impact of India and China on our national future energy policy. So, this is very timely and clairvoyant, maybe, on your part, as usual, Mr. Chairman.

Now, you all mentioned China is signing deals in South America, even Canada, India, and Africa, and trying to claim those reserves of energy. Hopefully American companies are doing the same. Most recently, one of China's largest state-controlled oil companies made an \$18½ billion unsolicited bid for the United States-owned oil company, Unocal. I think it's important to note that this unsolicited bid came from a government-owned company that does not operate the way that a private company would. And so, private companies competing, who may want to acquire that asset, whether it's Unocal or any other, would have to compete against the overwhelming resources of a large, government-owned company. And it's a large government, as well. It's not as if it's some small country of 1 million people.

You mentioned how much China's grown and India, as well. This whole issue, though, is one of our security and our competitiveness. Our economy—for transportation, for aviation, for electricity, for manufacturing—all rely on an affordable and predictable and reliable source of natural gas and oil. That's most important. And, to some extent, coal. The energy bill, which we are going to pass this week, while long obstructed, I think will be helpful in increasing our competitiveness, increasing domestic production, but also looking at new technologies, greater efficiencies for the future. We need not think that the internal combustion engine will be the only means of propulsion from here on out, whether they're hybrids, whether they're fuel cells, whether it's other approaches—clean coal technology, advanced nuclear—others—solar photovoltaics, biofuels, and others—are part of the mix.

Now, let me ask you, both you gentlemen. In view of the Chinese Government oil company trying to buy Unocal—just as a matter of reciprocity and fairness—could a United States private company purchase a controlling interest in a Chinese oil and gas firm?

Mr. WAYNE. Senator, first, you raise a number of very important points. To answer some of your specifics: In China, a foreign investor must partner with one of China's four state-owned oil companies.

ExxonMobil, British Petroleum, Shell, Total Elf Fina, ConocoPhillips, and Chevron, are present there, and have working partnerships. These, however, are minority shares made available in China's largest oil and gas firms.

There are some very active partnerships going on. For example, I know that Chevron-Texaco is involved in two major offshore projects. ConocoPhillips is involved in developing some prospects. Earlier on, ARCO, before it was bought by BP, had developed some very profitable natural gas reserves off China.

We do regularly, in our dialog—and my colleague, I'm sure, will say more about this—try to explain to the Chinese the value of having a purely private-sector approach. I think there are signs that they have taken some steps in that direction, but, as of right now, as you correctly point out, their major oil companies are government-owned, and foreign companies have to partner with them.

Senator ALLEN. Secretary Garman.

Mr. GARMAN. You're correct, Senator, that it is unlikely that a United States energy firm could take a controlling interest in a Chinese oil company; that is correct. But, generally, the United States does not condition foreign investment on reciprocity, given our traditional open investment policy.

Senator ALLEN. If I may just briefly follow up. The question on trade and trade agreements, there should be fair trade, there should be reciprocity, in my view. I think it is difficult for a private company to compete against a big government. Moreover, the answer is no, that a United States company could not buy a control—purchase a controlling interest in a Chinese oil and gas company. When one cares about our security, as well as our competitiveness, it would seem to me that we need to be cognizant of that inequality and that unfairness and the fact that China's markets are closed. At the same time we hear them, saying, "Oh, gosh, this is unfair. Why are you treating us this way?"—when you might say, "Well, why do you treat everyone else in the world that way, yourselves?" And, maybe, if they reformed themselves, we wouldn't be any more concerned about this than if it was a German or a French or a British or a Dutch company wanting to purchase Unocal. But it is not fair competition, and I think we have a responsibility to make sure there's a level playing field, as well as be concerned about our security and competitiveness in the future.

Thank you, Mr. Chairman. Thank you, gentlemen.

The CHAIRMAN. Thank you, Senator Allen.

Senator Kerry, let me mention that we commenced the hearing early, because of the rollcall votes. I would like to recognize you.

Senator KERRY. Thank you, Mr. Chairman. I appreciate that. And I understand the complications of the votes. I'm sorry, though, to have missed some of the testimony.

Secretary Wayne, you mention in your testimony that—you say a more troubling aspect of the recent surge in overseas energy deals by China and India is their willingness to invest in countries that are pursuing policies that are harmful to global stability. Both Chinese and Indian firms have reportedly been involved in oil and gas sector deals in Iran, and that raises concerns. And you also point out that additional sources of oil and gas in the market has promoted the reduction of barriers to energy trade, et cetera.

Share with us, if you would: What is the United States policy on the decision by China and India to invest in energy regions such as Venezuela, Myanmar, Iran, and Sudan, where that investment, obviously, undermines our interests in those particular regions?

Mr. WAYNE. Well, of course, Senator, as you well know, broadly, we try to encourage open investment regimes around the world. However, in certain countries, as you well know, there are other overriding serious concerns. In the case of Iran, we have serious concerns about their nuclear policies, their support for terrorism, their human rights practices, and democracy—or lack thereof. We have a law in place, in the case of Iran: The Iran Libya Sanctions Act, which we implement, which encourages—

Senator KERRY. That's unilateral, right? That's a—

Mr. WAYNE. That's a unilateral action.

Senator KERRY. Which most people believe, you know, just pushes other people toward those other markets; it doesn't really affect them.

Mr. WAYNE. Well, we have, in line with that, used it to engage in very serious policy dialog, not just with the Chinese and the Indians, but with several other countries, as you implied, that have undertaken interest in exploring the opportunities of the Iranian energy market.

In the case of Sudan, we also engaged in serious dialog with the Chinese, both in a bilateral sense, and in the U.N. Security Council, where we all worked together to encourage a north-south peace agreement in Sudan, which is now going forward. We also continue to work seriously on restoring peace and security and well-being to the Darfur region.

In all of these cases, we have worked very hard to explain to the Chinese and others why we believe it is troubling. It undermines the international community's efforts.

Senator KERRY. Is there a policy? I mean, in the 20-plus years that I've been here now, you know, we've been watching a lot of explanations being made to the Chinese, but the policy just continues and continues and continues, whether it's in trade, piracy, intellectual property, market violations. You know, you can explain until you're blue in the face. The question is: What's the policy? Is there a policy? Does it matter?

I mean, let me ask you, fundamentally—you said, it's of increasing concern, but it is clear that India and China's rapidly growing economies are absolutely going to make up the majority of the increase in global energy demand in the future. Is that not clear, that it will?

Mr. WAYNE. They will be significant contributors to the increase over the next—

Senator KERRY. Well, their economies are growing at the most rapid rates and they're the largest, in—

Mr. WAYNE. Right.

Senator KERRY [continuing]. That sense. People. Not largest economies.

Mr. WAYNE. Right.

Senator KERRY. But China is about to surpass Japan, within the next few years, and be the world's second-largest economy, and, within about 25 years, will be equal to ours.

Mr. WAYNE. Right.

Senator KERRY. So, that demand is going to continue. Now, that's the most overpowering—I mean, that energy need is critical to any economic future and to current stability, correct?

Mr. WAYNE. Correct.

Senator KERRY. So, is there a policy that can prevent them from going to every available market? And how does that play into the Unocal purchase? And what's the policy of the administration with respect to that?

Mr. WAYNE. We do have an overall approach to energy relations with China, and that is embodied in a series of bilateral, regional, and multilateral dialogs on very concrete energy challenges faced by China.

The Energy Department leads the most comprehensive of those, but we have a very active dialog going on in APEC. We also have an important relationship with China through the International Energy Agency aimed at breaking down their needs in various different sectors and helping to address them in a responsible way.

Senator KERRY. Well, I'm still—

Mr. WAYNE. As for—

Senator KERRY [continuing]. What the policy is, specifically, other than, as you said, a dialog.

Can I just ask one last question, Mr. Chairman?

With respect to this question; China is obsessed with the Strait of Malacca, through which over 80 percent of China's oil imports from the Middle East are transported. President Hu Jintao has called the vulnerability of China's oil supply lines from the Middle East and Africa the "Malacca dilemma." That's their term. Other key strategic chokepoints include the Sunda, Lombok, and Makassar Straits, and the South China Sea. An internal DOD report called energy futures in Asia—it says that China is building strategic relationships along the sealanes from the Middle East to the South China Sea in ways that suggest defensive and offensive positioning to protect China's energy interests, but also to serve broad security objectives.

Question: Given that the majority of Unocal's resources are located in Asia, are any of them located in places of strategic interest to China or its Southeast Asian neighbors that play into the Malacca dilemma, so to speak, and these other chokepoints?

Mr. WAYNE. Sir, if I could, I know that the Unocal-CNOOC merger is potentially being considered by the CFIUS Committee, and that puts restrictions on what any of us can say about that in this—

Senator KERRY. I understand that.

Mr. WAYNE [continuing]. Hearing, but I'd be happy to take your question on the straits—

Senator KERRY. Take it in general terms, in terms of the straits.

Mr. WAYNE [continuing]. And get back to you on the straits. I mean, the most—in most general, just, response, certainly China is interested in improving its energy security. That's why it has been reaching out to a number of places where other major oil companies had not reached out as vigorously as they have. But perhaps I could get back to you in writing on the specific question about the various straits.

Senator KERRY. Fair enough. All right.

Mr. WAYNE. Thank you.

[The submitted written answer of Secretary Wayne to the question by Senator Kerry follows:]

Question. China is obsessed with the Strait of Malacca through which the vast majority of China's oil imports from the Middle East are transported. Chinese President Hu Jintao has called the vulnerability of China's oil supply lines from the Middle East and Africa the "Malacca Dilemma." Other key strategic chokepoints include the Sunda, Lombok, and Makassar Straits and the South China Sea. An internal DOD report titled "Energy Futures in Asia" says that "China is building strategic relationships along the sealanes from the Middle East to the South China Sea in ways that suggest defensive and offensive positioning to protect China's energy interests, but also to serve broad security objectives."

- Given that the majority of Unocal's resources are located in Asia, are any of them located in locations of strategic interest to China or its Southeast Asian neighbors?
- Other than the physical presence necessary to access Unocal's oil and gas resources, what strategic benefits would China gain in Southeast Asia or elsewhere by owning Unocal?

Answer. The Strait of Malacca is a key sealane through which passes approximately 35 percent of the world's cargo traffic and about half the world's oil shipments—about 600 ships per day. Approximately 90 percent of Japan's, and 80 percent of China's, oil imports pass through the international strait. Maintaining free and unfettered access, to and through it and other straits, is of considerable concern to the United States as well as all nations dependent upon international seaborne trade.

Unocal's oil and gas assets are widely dispersed throughout Southeast Asia on both sides of the straits. While the productivity of some of these assets would be affected by an interruption of flow through the straits, others would not. Most of the gas produced by the Unocal assets is under long-term contract to the host nations from which it is sourced and is consumed locally. For example, all of Unocal's gas production in Thailand is committed to a single Thai buyer, and gas sourced in Bangladesh is generally reserved for Bangladeshi consumption.

The CHAIRMAN. Thank you, Senator Kerry.

Senator KERRY. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Coleman.

Senator COLEMAN. Thank you, Mr. Chairman.

First, Mr. Chairman, thank you for holding this hearing. First, a statement, and then I want to follow up on a question that Senator Kerry asked that I don't think he got the answer to, and I have a similar question.

My hope is that what happens here with the reality of the increased demand is that it simply spurs our own efforts. We have an energy bill now. I was in Brazil not too long ago. Fifty percent of all the new cars in Brazil run on flex fuel. The major manufacturer of cars in Brazil is General Motors—an American manufacturer producing flex-fuel cars. And we, in the United States, just have a long way to go. So, I hope we start to get there with renewables, with some of the technologies that my colleague, Senator

Allen, mentioned. In this energy bill, we've got a coal gasification technology. There's a project in Minnesota. Clearly, India has long-term needs with coal, and perhaps things that we're doing here will spur them on. So, I think we know where we have to go, and hopefully this will spur us to move a little more aggressively.

Let me ask the question that Senator Kerry asked, that was mentioned, Secretary Wayne, in your testimony, about the concerns about, particularly China, investing in countries that are pursuing policies harmful to global stability. In particular, I have a question about Venezuela, in Latin America. And I'm not sure that I heard the response. One, what kind of tools do we have available to us, the United States, to deal with this concern that you raise? In particular, I know we're deeply concerned about where Venezuela is heading politically. Do we have tools at our disposal to have any impact on the Venezuelan oil situation, investment issues that, in the end, certainly raise a lot of concerns here?

Mr. WAYNE. Well, we do certainly have the traditional tools of dialog. And, of course, we have a significant commercial presence in Venezuela. A number of major and minor U.S. companies are involved there, and Venezuela does have a commercial presence in the United States. We do retain a discussion of energy issues with Venezuela.

I think it's important to keep in mind that Venezuela sells primarily heavy oils that sell at a very steep discount in Asia. There are very few Chinese refineries that are properly tooled to take Venezuelan crude. And, to date, the volumes going to China are quite small.

It's a very long way from Venezuela to China. There would have to be work done to expand or bypass the Panama Canal in order to make that a better prospect and this would take a lot of investment.

The Chinese are still relatively minor investors in the Venezuelan oil sector. It is possible that that, of course, may increase. I can't predict in which way it will go.

We do benefit in Venezuela, as elsewhere, from an open, transparent, and fair investment regime. Venezuela has benefited from investment by U.S. companies and from its own investments in the United States. And we continue to believe that this is the way that, not only Venezuela, but other countries should maintain their oil regimes.

Therefore, we're going to continue to give this, not only close attention, but it will be an important part of our ongoing dialog with Venezuela, on both the commercial front and in other official discussions.

Senator COLEMAN. Mr. Chairman, I believe, at an earlier hearing, you had indicated you were going to ask the GAO to look at the possibility of Venezuela cutting off its oil exports to the United States. And I don't know where we're at in that, but I would hope that we would see that report, at some point in time.

What I'm hearing from you, Secretary Wayne, is that the prospect of Venezuela diverting significant amounts of oil exports from the United States to China is still in, kind of, an early stage, that there are economic factors that make that, at least for the short term, somewhat difficult. Is that a fair assessment?

Mr. WAYNE. Yes, sir.

Senator COLEMAN. When I was in Venezuela, I had a long conversation with President Chavez. At one point, he said to me—he said, “I could close down CITGO tomorrow.” My response to him was, “You could also cut your left arm off tomorrow. Would that feel good?”

What are the prospects of Venezuela closing down CITGO or cutting off oil exports to the United States?

Mr. WAYNE. Well, I think the best response is the fact that the United States market allows Venezuela to place some 1.4 million barrels of oil a day here with refineries that can accept that oil and can pay the market price for it. And—but I can’t predict the actions of decisionmakers in another country.

Senator COLEMAN. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator Coleman.

Senator Obama, we’re having a 5-minute round. Please proceed.

Senator OBAMA. Thank you. Thank you, Mr. Chairman.

Why don’t I restrict myself to two questions? They’re both relatively broad, and—answer them as you will.

The first, I guess, is, in terms of China pursuing its energy strategy, it strikes me that, at times, it operates as a conventional market player; at other times, it is pursuing, sort of, a neomercantilist strategy of trying to capture and corner certain energy sources. And I guess, as you project out China’s energy demand in the future, can you give me some sense as to whether it is going to feel obligated to take the latter approach in order to meet its energy needs, or is it going to be in a position where, as just one additional player in the energy market, that it’s going to be able to buy what it needs in order to maintain its current growth?

Mr. GARMAN. It is my view, Senator, that, over time, China will see the value of open markets, stable regulatory regime, transparent business practices, and a global, liquid oil market. I don’t believe any nation has the capacity to corner the market. And I’m not so sure that equity oil really helps a nation enhance its own security in the face of the prospect of the global oil market.

In a sense, I guess I would say that we have an oil dependency codependency, of sorts. We’re all more or less in the same boat, where we must invest in new supply, new technology, alternatives to oil over the long term. And I don’t think there’s any other way to proceed. And I think most all the nations of the world, once they garner further experience in the oil markets, will come to the same conclusion.

Senator OBAMA. Are there any ways that we can encourage cooperation with the Chinese to move in that direction, beyond what, I think, at least should be apparent, and that is the need for us to get a handle on our own energy usage? Beyond that, though, are there specific steps that you think we might take, in working with China, so that they recognize that, rather than engaging in a fierce competition that could put strains on our relationship, that we cooperatively try to figure out how to reduce overall consumption?

Mr. GARMAN. I’ll cite just one example, and then, I’m sure Under Secretary Wayne will jump in. But something that—where I’m personally involved in a multilateral activity that includes the Chi-

nese, as well as India, is the International Partnership for the Hydrogen Economy. China and India are both charter members of this multilateral effort, which is designed to get us to affordable hydrogen fuel-cell vehicles that need no petroleum and emit no pollutants by 2020 or so. They've signed up to that vision, and we are working fervently with them to—on these technologies and methods of producing a common hydrogen fuel that every nation of the world could produce from a variety of domestically available primary energy resources. That would make, ultimately, these issues and concerns that are expressed here today moot, which has got to be our vision and our approach, going ahead. That's just one example. There are many, many others that we're engaged in.

Senator OBAMA. Okay. Thank you.

Mr. WAYNE. I might just add another specific example: It is the ongoing work in the carbon sequestration and clean coal technologies. If we think that both China and India will continue to obtain 50 percent of their energy from coal, it's very important that they have clean technologies, and then that they invest, also, in transmission lines and in other infrastructure that make the energy system more efficient. And we're working with them on these questions, both bilaterally, and through organizations such as in APEC and the International Energy Agency. And it's through this network of involving them in the broader discussions—helping them see ways forward to meet their own energy needs—that we can encourage a more responsible approach to energy security. And that's part of our broader approach, economically, with China. As you know from working through the WTO membership, to implementation of the WTO commitments, to the Joint Commission on Commerce and Trade that we have, through the dialog that the Department of State has with the NDRC on broader economic development and reform questions, what we're trying to do, in fact, is point out the advantages of having a private-sector-based approach, not just in the energy sector, but in their whole economy. And I think we have seen significant changes. It's not yet as much as any of us would like to see, but they are rethinking the way they're doing things.

Senator OBAMA. Thank you.

The CHAIRMAN. Thank you very much, Senator Obama.

Gentlemen, we thank you very much for your testimony. There are so many more questions we would like to ask, and perhaps we'll do so at future hearings. But thanks for your papers, and we'll proceed now to the second panel.

And if the panel members would approach and be seated: Mr. Mikkal Herberg, Mr. Randall Schriver, and Professor Sumit Ganguly.

[Pause.]

The CHAIRMAN. Gentlemen, we thank you for coming today. Let me mention, as I addressed the first panel, that your full statements will be included in the record, and we will ask you to summarize your testimony prior to questions from Senators.

Mr. Herberg.

STATEMENT OF MIKKAL E. HERBERG, DIRECTOR, GLOBALIZATION AND ASIAN ENERGY SECURITY PROGRAM, NATIONAL BUREAU OF ASIAN RESEARCH, SEATTLE, WA

Mr. HERBERG. Thank you, Chairman Lugar. It's a pleasure and honor to be here, and thank you for inviting me. This is a subject I've spent a lot of time thinking about and working on, so it's a pleasure to get a chance to talk about it with such an important audience.

In the interest of time, I'm going to skip some of the broad issues of Asia's energy demand, because they've been mentioned quite a bit. Just a few metrics, I think I'll mention, and then shift to some of the geopolitical issues that are being raised by Asia and China and India's energy demand, particularly oil demand.

I think you can capture some of this by looking at the fact that Asia's oil demand is likely to grow by 20 million barrels a day over the next 15 to 20 years. All of that, effectively, will be imported from outside the region. Today, Asia already imports, depends on two-thirds of its total oil consumption, on oil imported from out of the region. Two-thirds of that import today, roughly, comes from the Persian Gulf, alone. So, for perspective, that 20-million-barrel-a-day increase in Asian oil demand is equivalent to today's total production from the Persian Gulf—Saudi Arabia, Iran, Iraq. The entire Persian Gulf today produces about 20 million barrels a day. So, the incremental demand equals Persian Gulf demand.

So, I think that has created—and add to that a fact that Malacca Straits—today, 11 million barrels a day goes through the Malacca Straits. In 15 years, that'll be 22 million barrels a day—double—aggravating their sense of insecurity, as well.

They're worried, as we are, about unstable supply regions. They're worried about scarcity in world oil supplies that we see today, with \$50 and \$60 oil prices, terrorism aimed at oil production facilities. And that's all animated, also, by regional mistrust within Asia and the lack of institutions regionally on a whole range of geopolitical issues. So, we see a series of geopolitical rivalries in Asia, and that's being overlapped, or overlaid, onto energy insecurities.

To talk for just a second about China and India in the context of the United States and their perception of the United States in that insecurity.

China sees the United States—and if I can generalize for a minute—but I think much of the leadership sees the United States as an obstacle to its efforts to securing its future energy security in a whole series of—way. And that really relates to the overall sense of rivalry, antagonism that we see today, and tensions that we see today, in United States/China relations. They see that as part and parcel of their vision of their energy security, in that the United States has the ability to frustrate their efforts to secure the sealanes, to secure their supplies in the Taiwan crisis, for example, and to frustrate their activities in places like Sudan and Iran and other places where they believe commercial relations makes sense.

So, for China, the United States is potentially a major obstacle. For India, they don't see us as a serious obstacle to their energy security, except insofar as collateral policies affect that. And that would be, most importantly, our sanctions policy.

India is already involved in the oil and LNG side, potentially, in Iran, they're a partner with China in Sudan, but a couple of recent examples show how they're concerned. Proposals for an Iranian gas pipeline across Pakistan to India. India desperately needs gas supplies for the future. It'll be 100 percent dependent on imported LNG for imports, with a series of issues there. They also are talking about a Burma pipeline from Burma, for natural gas, to India, as well. Burma has large supplies of gas. It makes good commercial regional sense to have a pipeline. The United States is obviously opposed to those kinds of measures, because those two states are involved in our policies of problem states. So, for India, it's more a matter of collateral damage to their efforts, as opposed to seeing the United States as an obstacle.

Some of the other speakers have talked about what the Asian states are doing to try to secure those supplies. Equity oil deals. They've taken this mercantilist, antique view of the oil market. And as much as we talk to them about markets, open markets, prices, it's simply their—the prism through which they look at these issues convinces them that equity oil is more secure than contract oil. And, frankly, it's a delusion. There's no more security in an equity barrel than a contract barrel. But it still is deeply part of their vision of the way this process works. A series of other things, which I won't mention.

I think, for Asia—and I'll just talk about a couple of these issues—for Asia, energy is spilling over into the geopolitical rivalries in the region. And the geopolitical rivalries are spilling over into preventing regional energy solutions. And the most obvious case of this is Japan/China. They're in shoving matches over East Siberian oil pipelines. They're in shoving matches over East China gas field. And that's the kind of thing that's likely to worsen over time. So, that, in itself, is also aggravated by Russia's erratic policies on supplying Asia. Policy is being centralized, nationalized, but, in fact, it's becoming more inexplicable, more erratic as Kremlin infighting influences policy more than rational commercial decisions.

The risk, I think, for the United States over time, energy will become a destabilizing force in Asian politics at a particular critical time of China's rise and a very delicate 20-year period we're facing in Asia. That's one key issue. Destabilizing oil markets. Asian demand will drive oil markets in the next 20 years. There's no doubt about that.

The problem I have, or I think the key issue, is their tendency to horde, taking oil off the market. We've been talking about this, equity barrels that they want to stream directly to their own economies. Their demand impact, overall, can be managed, it's the investment and supply side we have to worry about. But, to the extent they try to effectively horde barrels, which is what they're doing with these kind of equity policies, that creates rigidity in the marketplace, it creates the potential for competition for barrels when the markets are tight, and I think it's particularly pernicious. We need to try to discourage that kind of thing. It's going to feed into naval strategies, sealane issues in the Indian Ocean, South China Sea. We've already had a little bit of commentary on that.

And we are going to face a great deal more competition, particularly from China, in influence in places like the Persian Gulf in the future. China is going to be a major player in global energy geopolitics, particularly in the Persian Gulf. There's no doubt about it. So, the only question is whether they work at cross-purposes to the United States or whether we can work collaborative. That's the key question. Clearly, they impact U.S. sanctions policies. And they're changing the competitive landscape for big U.S. oil companies. There's been some discussion of that, as well.

What should we be doing? I'll just mention a couple—what I think are the key things here.

We need to engage at the very highest level with each of these governments, bilaterally. We're beginning to do that. But it has to be raised—at the level of the Premier in China, Prime Minister in India—repeatedly. I think that's the only way we can begin to have some influence.

Second, we need to be helping to encourage regional energy cooperation institutions. Asia has nothing like that. Particularly, China and India feel excluded from the major institutions of global oil management, like the IEA. They are excluded. And they feel excluded. And they feel that they're very weak in position, vis-a-vis the global oil industry. They've got these—they feel like they're the 98-pound weakling facing Exxon, Chevron, Total, some huge companies with 50 and 80 years of experience out there. So, they feel like they're behind the curve having to play catchup. We need to pull these Asian states into a regional cooperation energy institution, or encourage that, which will help relieve a lot of these other issues—a sense of competition over supplies, competing for barrels, and other sets of problems.

So, I have other things, but in the interest of time I think I'll just leave it at that and let the others speak.

[The prepared statement of Mr. Herberg follows:]

PREPARED STATEMENT OF MIKKAL E. HERBERG, DIRECTOR, GLOBALIZATION AND ASIAN ENERGY SECURITY PROGRAM, NATIONAL BUREAU OF ASIAN RESEARCH, SEATTLE, WA

Senator Lugar, members of the committee, thank you for this opportunity to appear before the committee today, to discuss energy security concerns in China and India and the implications for Asia and the United States. It is an honor to be here.

Energy demand in Asia is mushrooming to fuel the region's dynamic economic growth. As a result, dependence on energy imports is rising, particularly for oil, and governments are scrambling to meet booming consumption and to prevent energy from becoming a bottleneck undermining economic growth and social stability. Looking forward, there is every indication that Asia's import dependence will accelerate over the next two decades.

The result is a deepening sense of energy insecurity in Asia that promises to have important implications for the region and for the United States. China and India are the two largest energy consuming economies in the region and have the fastest growing energy demand. In the case of oil, most of China and India's rising future oil imports must inevitably come from politically turbulent and unstable regions, most importantly the Persian Gulf, and be transported along potentially vulnerable sealanes and/or complex pipeline routes crossing several national borders. Although both China and India have traditionally been self-sufficient in natural gas, a growing volume of their future gas supplies also is likely to come from the Persian Gulf, Russia, Central Asia, and, in India's case, South Asia. And the need to satiate relentlessly rising electricity demand in the face of oil and natural gas supply constraints is forcing heavy reliance on coal and growing reliance on nuclear power in both China and India that is aggravating future environmental and nuclear proliferation risks.

For China and India both, as well as the other Asian powers, energy is becoming a matter of “high politics” of national security and no longer just the “low politics” of domestic energy policy. Governments in both countries have decided that energy security is too important to be left entirely to the markets as their economic prosperity increasingly is exposed to the risks of global supply disruptions, chronic instability in energy exporting regions, and the vagaries of global energy geopolitics. Both governments are responding to their growing sense of insecurity with a broad range of similar strategies, regionally and globally, to try to guarantee greater supply security and reduce their vulnerability to potential supply and price shocks. These efforts are growing in scale and scope and they range from largely cooperative and market-oriented strategies to those that are deeply neomercantilist and competitive. Both China and India are accelerating their efforts to gain more secure national control of overseas oil and gas supplies by taking equity stakes in overseas oil and gas fields, promoting development of new oil and gas pipelines to feed their booming markets, developing broader trade and energy ties, and following up with diplomatic ties to cement relations with the major oil and gas exporting countries.

The events of 9/11, the Global War on Terrorism, and the wars in Afghanistan and Iraq have heightened both China and India’s sense of insecurity and vulnerability. Both governments are increasingly concerned about the risks of possible terrorist attacks on oil production and export facilities in the Persian Gulf and attacks on key maritime transit points, such as the Straits of Hormuz and the Straits of Malacca.¹ Both governments are concerned that the aggressive U.S. response to the attacks on America risks further destabilizing the Persian Gulf and Central Asia and increasing the risks of supply disruptions, worsening Islamic extremism, and political instability. And both governments sense they are excluded from the major institutions that govern global oil cooperation, such as the IEA, and feel largely excluded from the global oil industry they feel is dominated by the large oil companies from the industrial countries. Both feel they are playing “catchup.”

Nevertheless, the difference in each country’s relationship with the United States defines their different perceptions of how U.S. policies might impact their efforts to secure their future energy needs. China views the United States largely as an increasingly aggressive strategic competitor and, therefore, the deeper extension of U.S. military power and influence in Central Asia and the Persian Gulf aggravates underlying fears of “encirclement,” fears over U.S. global “hegemony,” and increases Beijing’s sense of vulnerability to U.S. control over oil and gas flows vital to China’s strategic room for maneuver, its economy, and its social stability. India’s views toward the United States are more ambivalent reflecting the gradual improvement in traditionally contentious United States-India relations since the end of the cold war but also the controversial issue of India’s nuclear weapons program. Unlike China, India does not view the United States as a fundamental obstacle to its search for energy security but there are elements of U.S. foreign policy that collaterally impact India’s energy efforts. For example, U.S. opposition to India’s nuclear program and its links to its nuclear weapons program has been seen by India as an obstacle to efforts to meet booming electricity demand. In addition, recent Indian discussions about possible future large natural gas pipelines from Iran and Burma to meet rapidly expanding natural gas demand, have run up against U.S. pressure to isolate these two unsavory regimes.

As the traditional guarantor of stability in Asia, the United States has major strategic stakes in how China and India respond to their energy insecurity and how this impacts the region and global energy geopolitics. Energy needs will transform both countries into major players in the world’s major oil and gas exporting regions and global energy geopolitics. This is likely to fuel a much more complex web of diplomatic ties and alliances that could either complicate or complement the United States own energy and security interests. For example, both countries’ rapidly growing involvement in helping Iran develop its energy sector is already helping to undermine U.S. efforts to isolate Iran. Moreover, as both countries court Russia in hopes of accessing its large energy supplies, they are inexorably drawing Russia back into Asia as a key strategic and commercial player with a range of potentially important implications for U.S. interests in Asia and for future U.S. relations with Russia.

¹The two major chokepoints for Asia’s supplies are the Straits of Hormuz exiting the Persian Gulf and the Malacca Straits between Indonesia and Malaysia entering the South China Sea. In 2003 roughly 16 million barrels of oil per day (MMBD) passed through the Straits of Hormuz, with around 11 MMBD of that headed to Asia through the Straits of Malacca. Another one MMBD passes through the Straits of Malacca from Africa. As a result, more than 50 percent of Asia’s daily oil supplies must transit the narrow Malacca Straits.

Second, the growing potential for an increasingly mercantilist competition between China and India over control of energy supplies and transport routes risks fueling tensions between the two. Although Sino-Indian relations have improved recently, each country clearly sees the other as a major long-term regional rival and potential future strategic threat. Moreover, as a region, Asia lacks institutions to manage regional conflict and already faces a sensitive transition to accommodate China's rising power over the next several decades. There are several recent examples where China and India came head-to-head over energy supplies. Moreover, each is warily assessing the other's future intentions regarding building naval power and control of the vital sealanes in the Indian Ocean and control of the Malacca Straits. Nevertheless, competition doesn't necessarily have to dominate the energy relationship between China and India. Some recent developments and trends suggest that energy needs may have the potential to reinforce cooperation between the two.

It is vitally important for U.S. policymakers to understand the linkages between China and India's energy insecurity and a much broader range of important U.S. geopolitical, energy, and environmental interests. The balance of my testimony will discuss China and India's energy security dilemmas and the potential for impacting U.S. long-term geopolitical and energy interests in the post-9/11 era. First, will be a survey of the linkages between each country's energy situation and its energy security strategies and assess prospects for future cooperative or competitive efforts. This will be followed by suggesting a range of potential implications for the United States, in terms of future oil markets and prices, Asia's geopolitical future, and U.S. strategic interests in key energy exporting regions of the world. I will conclude with a series of policy recommendations.

ENERGY INSECURITIES AND STRATEGIES

Asia's overall regional energy dilemma reflects a set of consistent trends, but conditions vary substantially in each country depending on a variety of resource, energy policy, and historical factors. These individual circumstances and policy frameworks largely shape the evolution of national energy security strategies. China and India represent a large share of Asia's current and future energy needs, future import needs, and both will also be major actors in the region's future geopolitical evolution.

CHINA

China is the second largest energy consumer in the world, after the United States, and has traditionally been largely self-sufficient in energy supplies. Large domestic supplies of coal have dominated domestic energy use and coal continues to account for two-thirds of China's overall consumption. However, strong economic growth since the early 1980s has fueled oil demand growth and the government's decision to expand the use of natural gas promises to boost future gas consumption. These developments will boost China's future energy import dependence and fuel growing energy security concerns.

China has been Asia's largest oil producer since the mid-1960s, in recent years producing well over 3 MMBD. However, the acceleration in oil demand during the economic boom of the 1980s and early 1990s rapidly outran production during the 1990s. Oil demand doubled between 1985 and 1995 from 1.7 million barrels per day (MMBD) to 3.4 MMBD and doubled again by 2005 to reach an expected 6.8 MMBD for 2005. By 2003 China surpassed Japan to become the world's second largest oil consumer behind the United States and the third largest importer. China now imports roughly 40 percent of its total oil needs and this import share is rising rapidly.

China's leadership has responded with both domestic reforms and aggressive global energy security policies. Nevertheless, given limited resource prospects and high costs, domestic oil production is unlikely to rise significantly while oil demand and oil imports are very likely to continue growing relentlessly. The IEA forecasts that China's oil imports will rise five-fold by 2030, from slightly less than 2 MMBD in 2002 to 10 MMBD, when imports will account for 80 percent of China's total oil needs. China's leadership now faces the long-term realization that oil import dependence is unavoidable and will grow. Moreover, China will become heavily dependent on the Persian Gulf for future supplies and its oil will increasingly have to transit a series of vulnerable maritime chokepoints. It is likely that by 2015, 70 percent of China's oil imports will come from the Middle East. Other significant shares of China's oil imports will come from Russia by pipeline and rail, from Central Asia by pipeline, and from Africa.

Government policies aimed at substantially increasing the use of natural gas, while indispensable in environmental terms, promise to accentuate China's import dependence and long-term energy security concerns. Beijing has embarked on an ag-

gressive policy to increase gas use to help replace coal to generate electricity, diversify overall energy use, and provide cleaner burning fuel for environmental needs. Current plans call for gas to make up 8 percent of total energy demand by 2010. But, although China does have significant domestic gas reserves, beyond 2010 demand is likely to begin to outrun domestic production and a growing share of gas needs will need to be met through imports. The DOE forecasts that imports will account for 40 percent of China's gas needs by 2025.

While China's gas use will grow, rising electricity demand will also force continued growth in coal consumption along with efforts to expand nuclear and hydroelectricity production. China is the largest producer and consumer of coal in the world and coal still makes up roughly two-thirds of total energy use. Driven by relentlessly rising electricity demand, China's coal consumption is expected to double over the 2001–2025 period. As a consequence, China is also expected to account for one-quarter of the world's CO₂ emissions over that period. China may become a net importer of coal as early as 2015. Electricity needs also are driving China's future nuclear power development. China has the largest planned increase in nuclear power globally over the next two decades, with plans to add 40 large new nuclear powerplants by 2020. Electricity demand will also drive strong hydroelectric development although, ultimately, this can only meet a small fraction of China's electricity needs.

In sum, despite wide-ranging and strenuous efforts, China faces an inevitable trend toward greater energy import dependence to fuel its dynamic economic growth. This trend will be most acute for oil but will become a growing concern over the longer term for natural gas supplies. Hence, energy security has become a central concern for Beijing and the thrust globally to secure future energy supplies has taken on great urgency.

In response, China has launched an aggressive strategy to secure its future energy supplies globally and regionally. With economic growth becoming the central focus of China's national agenda, the country's leadership increasingly fears that exposure to energy shortages and volatile world energy prices could threaten social stability and undermine the main claim to authority and legitimacy of the Communist Party. China's strategy has become increasingly coherent and wide-ranging over the past decade and is growing in reach and sophistication. For China's leaders, energy security clearly is too important to be left to the markets and so far its approach has been decidedly neomercantilist and competitive.

Globally the program has been dubbed the "Going Out" strategy and it is based on three major concerns. First, has been the fear that sudden global oil supply disruptions could trigger serious energy shortages and sharp price spikes, that would be difficult to insulate the economy from, as was possible in the past when China was self-sufficient in oil. Second, China faces a growing vulnerability for the majority of its oil needs on tanker flows from the chronically unstable Persian Gulf and other potentially unstable exporting regions such as Central Asia and Africa. Third, China has felt increasingly threatened by U.S. strategic dominance in the Persian Gulf and other key oil exporting regions and U.S. control of critical transportation routes giving the United States the power to deny vital oil supplies to China in the event of a confrontation, particularly over Taiwan. These concerns have been further aggravated by deeper extension of U.S. power into the Persian Gulf and Central Asia in the wake of 9/11, the GWOT, and the Afghanistan and Iraq wars.

China has pursued its energy security on a wide range of fronts. First, it has sought to strengthen its supply relationships in key areas, such as the Persian Gulf, while diversifying the geographic distribution of its crude oil suppliers and transportation routes. For example, Chinese state oil companies have broadened their crude sources by increasing imports from West Africa, and even Latin America, to offset a heavy dependence on the Persian Gulf and Southeast Asia. In the Persian Gulf the Chinese have rapidly expanded their role in various phases of Iran's oil industry while boosting long-term crude supply contracts with Saudi Arabia, Oman, and Yemen. In the longer run, China is seeking to increase pipeline supplies from Russia's East Siberia and Western Kazakhstan through long-distance pipeline projects, which would have the added advantage of reducing vulnerability to disruptions in tanker flows from the Persian Gulf and Africa. Second, state oil companies CNPC, Sinopec, and CNOOC have been aggressively buying equity stakes in many existing or prospective oilfields around the globe. In the mid-1990s China scrambled to buy stakes in a mixed bag of fields and countries, including Kazakhstan, Sudan, Venezuela, Iraq, and Peru. Inexperience led to overpayments in some cases but buying has become more selective and competitive with later experience. China has now established fairly strong positions in its largest operation, Sudan, including production, pipelines, and refineries, as well as a growing position in western Kazakhstan. They recently are focusing on broadening their equity stakes into North Africa,

Southeast Asia, especially Indonesia, Latin America, and most recently in North America, where they have acquired stakes in Canada's western oilsands developments, and in the controversial bid by CNOOC to acquire Unocal. Small stakes have been acquired in the Caspian Sea area in Azerbaijan and Turkmenistan. Another element of this equity strategy is to target countries subject to unilateral U.S. sanctions which improves the competitive landscape and offers China better opportunities, but also works to undermine U.S. sanctions policies. Current estimates are that the three companies have managed to establish control over about 300 MBD of crude production, which could reach up to 600 MBD by 2008. China has also pursued a similar equity strategy, regarding natural gas imports, by demanding and getting upstream equity stakes in LNG projects destined to bring LNG to China beginning in 2007 from Australia and Indonesia.

The third leg of the strategy involves extensive cross-investment and commercial ties between China and key exporting countries in order to cement stronger long-term ties. China's state oil companies and related construction and oil services companies have aggressively bid for oil field development contracts, pipeline contracts, and refinery projects in Iran, Sudan, Kazakhstan, Kuwait, and a growing list of countries. Conversely, the Chinese Government and oil companies have invited the state oil companies in key exporting countries to invest in downstream oil and petrochemical projects in China. For example, China recently finalized plans for a large joint refining investment in Fujian province in partnership with Saudi ARAMCO and ExxonMobil.

The fourth leg of the strategy involves Beijing's active oil and gas diplomacy, which serves to strengthen the oil supply contracts, equity stakes, and cross-investments with deeper and broader diplomatic and trade ties. China now has signed some form of "Strategic Energy Partnership" with nine countries, including Russia, Sudan, Iran, Venezuela, Brazil, Angola, and Kazakhstan. Beijing's leadership has followed up with a long list of high-level diplomatic visits to cement stronger diplomatic, energy, and trade ties. China has also used state diplomacy to secure future LNG supplies in contracts with Australia, Indonesia, and Iran. China's leadership sees the development of broader diplomatic and trade ties and alliances as a key element in securing its access to future oil and gas supplies. This also includes military sales and cooperation, sales of nuclear equipment, and other potentially problematic trade ties.

A fifth strand of the strategy has been China's continuing active pursuit of its territorial claims in the maritime region surrounding China, both to assert Chinese sovereignty more generally, but also to assert China's control over potential oil and gas resources in these areas. China has repeatedly asserted its maritime territorial interests in disputes over control of exploration and licensing blocks with Vietnam, Indonesia, and Japan over the past decade. Increasing military and fishing activity in the South China Sea in staking China's claims to the Spratley and Paracel Islands goes hand in hand with these energy interests. China also continues to assert its sovereignty over the Senkaku/Diaoyu Islands in the East China Sea against Japanese claims and is embroiled in a bitter dispute with Japan over an East China Sea gasfield. China has no "Blue Water" naval capability to secure these areas in the face of U.S. naval supremacy in the region but it has begun to realign its naval strategy to these needs by emphasizing submarine development and port-access agreements in the South China Sea and along the coast of the India Ocean.

Finally, China has recently decided to follow the example of the industrialized countries and neighbors, Japan and South Korea, in beginning construction in 2004 of a Strategic Petroleum Reserve to establish state-controlled stocks of crude oil that would be available in the event of a supply disruption. Supplies will begin to flow to the first of these locations in August 2005.

Beyond this, China's willingness to promote regional solutions to Asia's energy security concerns has been very limited. It has been involved in discussions with Russia, led largely by South Korea, on proposals to build a large regional natural gas pipeline from East Siberia, southeast through China and across the Yellow Sea to South Korea, to link Russian gas supplies to both markets. It also has been involved, as a member of APEC, in recent discussions and proposals to improve Asia's energy security.

In sum, China's energy security strategy is wide-ranging and increasingly sophisticated. It is deeply state-centric and mercantilist, built on coordination between senior government policymakers and China's state oil companies and it is increasingly linked to broader diplomatic relations and alliances. Through its search for energy security China also is on the way to becoming a major geopolitical player in the Persian Gulf, Central Asia, and Russia, with a growing capability to complement or complicate U.S. interests in these regions.

INDIA

India is now the sixth largest energy consumer in the world. Much like China, coal dominates the energy picture in India accounting for 51 percent of total energy use with most of that going into the production of electricity where demand has been growing at extremely high rates. India has large indigenous supplies of coal, most of it relatively low in heat value and high in sulfur and ash, and given limited domestic availability of oil and natural gas, coal is likely to remain the dominant fuel in the economy for the foreseeable future. The DOE expects Indian coal consumption to rise by 70 percent over the next 25 years to meet booming electricity demand which is expected to rise by 150 percent. India alone is likely to account for over 106 of the entire world's increase in coal consumption.

As in the rest of Asia, oil is looming as the key import concern. Oil demand in India grew by over 6 percent annually during the past decade, more than three times the world average, while at the same time oil production rose barely at all. Consequently, imports jumped from 500,000 barrels per day to 1.3 million barrels per day by 2004, or from 42 percent of consumption to 62 percent of total consumption. Roughly one-half of India's current oil imports come from the Middle East. Over time India's import dependence will grow. Both the DOE and IEA expect Indian oil demand to be among the fastest growing in the world, along with China, at nearly 4 percent annually to 2025, rising from 2.1 to 5.3 MMBD. Combined with essentially flat or declining oil production, this suggests that imports will account for 85 percent of total oil demand by 2025, most of which will have to come from the Middle East, with the balance from Central Asia and Africa.

India has been self-sufficient in natural gas, historically, but given limited domestic gas resources and rising demand, this will change rapidly in the future. Gas demand is expected to continue increasing making India a major importer in the form of LNG and possibly pipeline supplies. The DOE expects Indian gas consumption to triple from 0.8 trillion cubic feet (TCF) in 2001 to 2.5 TCF by 2025 driven by the growing need for electricity and the need to substitute for dirty coal. At the same time domestic gas production is likely to rise more slowly, meaning that 40 percent of India's gas needs are likely to be imported by 2025. India is already moving to develop the infrastructure to boost imports. India's first LNG import terminal Petronet, a joint venture between India's state oil and gas companies ONGC, GAIL, and IOC, along with Gaz de France, began operation in late 2003 and is importing gas from Qatar. Another Shell-sponsored terminal is planned for 2005 in Gujarat to bring LNG from Oman. In all, the government has approved plans for 12 possible import terminals in the future. Recently, there has been new progress on natural gas pipeline proposals to bring gas from Iran via Pakistan, and from Burma via Bangladesh. Each of these proposals has serious geopolitical problems and the outlook for pipeline supplies will depend on resolving key regional geopolitical rivalries and constraints. The large majority of India's future gas imports will necessarily come as LNG from the Persian Gulf, with some increment possible from Burma and Iran.

Like the other Asian energy importers, India is also looking to nuclear power development as an important source of electricity generation. Nuclear now accounts for less than 5 percent of electricity needs in India but five to eight new plants are planned which would triple nuclear generation from 3 to 9 gigawatts (GW). Even so, nuclear will only be able to meet a small fraction of India's energy and electricity needs.

India's rapidly growing dependence on imported oil supplies has recently catalyzed a more aggressive strategy to secure supplies overseas and India seems to be emulating China in its overseas energy security strategy. ONGC, India's major state-owned oil exploration and production company, is beginning to stake out new overseas oilfield investment plans through its international subsidiary, ONGC Videsh Ltd. India's largest oil stakes, to date, are its 25-percent share in the Greater Nile Oil Project in Sudan, ironically in partnership with China's CNPC, which it bought into for \$750 million and its 20-percent share of the ExxonMobil-led Sakhalin 1 project in Russia, which it bought for \$1.7 billion. ONGC is also beginning to source large supplies of LNG from the Persian Gulf through deals with Qatar and Oman. ONGC also recently signed a preliminary deal with Iran to buy LNG later in the decade for which ONGC would get the option to develop a large Iranian oilfield. Videsh has been bidding for Cairn Energy assets in Bangladesh, been awarded exploration blocks in Syria, and has been negotiating with Myanmar, Iran, Iraq, Libya, Kazakhstan, and United States for exploration blocks. With more than 50 percent of its total oil supplies now sourced from the Middle East, India has announced plans to build a strategic oil stockpile but has not moved very far in doing so yet.

GEOPOLITICAL ISSUES

Both China and India are scouring the globe to secure better access to oil and gas supplies and are building broader diplomatic and trade ties that serve to strengthen these energy links. While they are ranging widely around the globe, their most important efforts have been focused largely on three key petroleum rich regions where growing energy ties are likely to have a significant impact on future geopolitical developments.

Not surprisingly, the primary area of focus for both China and India is the Persian Gulf. The region holds two-thirds of the world's proven oil reserves and already accounts for two-thirds of India oil imports and more than one-half of China's. In the longer run, the gulf is likely to account for 80 percent of each country's oil imports and 50 percent of their natural gas imports. Both countries are building long-term energy ties but also are rapidly building diplomatic, trade, and military ties in the region. The main focus so far has been on Iran and, to a lesser extent, Saudi Arabia. The rapid development of ties between China and India and the Persian Gulf also is a two-way street and both countries are taking on great importance from the gulf oil and gas exporters' perspective. Currently, two-thirds of the gulf's oil exports go to Asia and this will grow sharply in the future. The growing nexus of diplomatic, trade, and military ties with China and India appeals to the gulf producers who are looking to diversify their economic and geopolitical base beyond traditional dependence on the United States and European markets and diplomatic relationships. All these trends suggest that energy will propel China and India into becoming major players in the Persian Gulf and broader Middle East in the future.

Russia is the second key area where China and India are jockeying for position and where energy will have important geopolitical implications. The natural complementarity between Russia's huge surplus supplies of oil and gas with China and India's huge deficit contains the seeds of a growing set of energy, trade, and geopolitical relationships. Russia's importance to China and India arises from its potential to, at least, partly offset reliance on the Persian Gulf and other tanker supplies that must transit a vulnerable series of maritime chokepoints. The ability to diversify supplies sources, as well as diversifying transport routes, is vitally important in their respective energy security calculations. India has a big position in the Sakhalin 2 oil and LNG project, while China is deeply involved in proposals to bring East Siberia oil and gas supplies to China. Both are busy upgrading and broadening their political ties with Russia to support future energy ties. This complementarity extends to the Russian side as well. Vladimir Putin and the Kremlin would like to diversify Russia's growing energy export base away from total dependence on European markets for both oil and gas exports. The Kremlin has become quite explicit under Putin's newly statist orientation toward the energy export sector about their desire to use oil and gas as strategic diplomatic and commercial tools to return to becoming a major player in East Asia. Interestingly, China and India's heavily mercantilist approach to energy security concerns matches well with Putin's increasingly mercantilist objectives for Russia's energy sector.

The third key area of energy resource competition and growing ties and where the geopolitical overlay is likely to take on increasing importance, is in the Central Asia and Caspian Sea region. The attraction of diversifying imports away from the Persian Gulf and toward overland pipeline supplies is irresistible. China is in the best geographical position to benefit and is moving to make Kazakhstan a key oil supply source for the future through its growing equity investments in oilfields in western Kazakhstan and promises to build a long-distance pipeline to western China. A pipeline would also give the Kazakhstan Government stronger incentives to help stabilize the potentially restive Islamic region along China's border, something that China is increasingly concerned about in the wake of growing Islamic unrest on the Chinese side of the border. As part of this effort, China has been active in developing broader diplomatic alliances with Kazakhstan and in the broader region. The Shanghai Cooperation Organization, which China has spearheaded to build broader ties with Central Asia and Russia clearly also is aimed at boosting energy cooperation. India has fewer options to access Central Asian resources due to geographical limitations, although they have been involved in long-running proposals to bring oil and gas from Central Asia via pipelines across Afghanistan and Pakistan.

GEOPOLITICAL AND ENERGY MARKET IMPLICATIONS FOR THE UNITED STATES

China and India's responses to their deepening energy insecurity have a range of important implications for the region and for the United States across a broad swath of geopolitical, energy, and environmental issues.

First, as the key stabilizing and balancing force in Asia, the United States has a vital stake in how energy insecurity impacts future relations between China and

India, whether energy issues aggravate and reinforce Sino-Indian rivalries or provide a basis for greater cooperation. The Sino-Indian relationship is one of the most critical dimensions in Asia's future geopolitical architecture. The marked inclination toward a relatively narrow, zero-sum, neomercantilist approach to energy security by both China and India clearly holds the risk that energy could become a major source of future tension between the two countries. There have been several cases of direct competition for the same oilfield assets, for example in Angola, that have provoked a sense of direct competition between the two. India has been very vocal, recently, about having to compete with China for oil and gas resources and has, at least publicly, appealed to China for discussions to promote greater bilateral cooperation on energy. Moreover, both China and India are relying on bilateral approaches that link energy, trade, strategic, and often military, cooperation rather than multilateral and regional approaches to linking energy and security interests. Bilateral approaches clearly risk reinforcing the potential for competitive outcomes.

Also, zero-sum approaches to energy security increase the risk of spillover into competition over maritime energy transport routes in the Indian Ocean and Straits of Malacca. China is increasingly wary of India's naval capabilities in the Indian Ocean and its ability to interdict tanker traffic headed for China. This has been heightened recently by India's improving naval cooperation with the Southeast Asian states and the United States. India, on the other hand, is increasingly wary of China's growing efforts to acquire port access along the Indian Ocean coast, with new port-access arrangements in Pakistan, Bangladesh, and Myanmar.

A second set of issues for the United States, concerns the impact of the growing long-term role of China and India in key oil and gas exporting regions. Their role will inevitably grow in these regions. The only question is how this could impact U.S. interests and policies. Foremost here is the Persian Gulf and Middle East. On one hand, China and India's growing dependence on Persian Gulf oil suggests that their growing interests in Persian Gulf stability will converge with our own. Consequently, it would seem unlikely that China or India would see it in their interest to do things likely to seriously destabilize the region, such as stepping up arms and missile sales or contributing to nuclear proliferation, and would be more likely to free ride on U.S. efforts to maintain stability in the region. Moreover, while the conservative Persian Gulf states may welcome the opportunity to diversify their strategic, energy, and trade relationships with the growing presence of the Asian players, only the United States can provide the military and strategic umbrella to protect them in this very volatile region and provide the strategic naval and air power projection to protect vital tanker routes and chokepoints like the Straits of Hormuz. From this perspective, it seems unlikely that the United States will see a wholesale challenge to its traditional military hegemony in the Persian Gulf.

However, conflicting visions among China and India, on the one hand, and the United States on the other, over the conditions that are conducive to long-term stability in the gulf and Middle East are likely to introduce a more complex and challenging situation for the United States. One telling example is the willingness of both China and India to become deeply engaged with Iran in energy and broader economic and diplomatic ties despite the U.S. embargo and the U.S. contention that Iran is a major source of regional terrorism, nuclear weapons development, and a threat to its neighbors. China has seen it in its interest to be a major arms supplier to Iran consistently over the past decade, frequently including potentially very destabilizing missile sales, much to the chagrin of the United States. Neither has supported the U.S. war in Iraq, which was strongly opposed by China. Depending on how the Iraq post-war transition goes, there may be new and potentially divisive issues regarding how to deal with an unstable and potentially fractured Iraq as China and India step up their efforts to access Iraqi oil supplies. Asia has not been particularly supportive of U.S. policy on the Palestinian-Israeli conflict, historically. So, as the Sino-Indian-Middle East nexus grows rapidly over the next two decades, it seems inevitable that the range of potentially significant disagreements over how to ensure the stability of the gulf region will grow and with it will grow the complications for U.S. policy in the region.

There is a potential for some of the same issues regarding U.S. energy diplomacy and influence in the Caspian Sea/Central Asia region but they do not look to be as pointed at as the case in the Persian Gulf. In many ways, United States, Chinese, and Indian energy interests in the region converge somewhat more closely. The United States has reason to support pipeline proposals to move Central Asian oil and gas to China and India to promote the Eurasian states' independence from Russian control and to promote regional energy cooperation. The one potential source of problems from this perspective is the U.S. effort to isolate Iran. The most commercially viable means to get Caspian and Central Asian oil and natural gas to India and the rest of Asia is by pipeline south through Iran. For both China and

India, Central Asian/Caspian oil represents a potentially important alternative to Persian Gulf oil, whether it moves by pipeline or by tanker. In fact, China has already been instrumental in building pipeline infrastructure that currently allows oil swaps to occur between Turkmenistan and Iran that effectively allow exports through Iran. United States opposition to Indian proposals for a major natural gas pipeline from Iran across Pakistan to India is already a source of friction in United States-Indian relations. Similarly, Indian proposals to build a gas pipeline from Burma to India would create problems for U.S. efforts to isolate Burma.

China is concerned about the increased U.S. presence and power in Central and Southcentral Asia in the wake of the Afghan war because it aggravates their broader worries about security along a key border region in Central Asia. This is part of the thrust behind the Shanghai Cooperation Organization to reorganize its security space to the West in the post-cold-war era. Clearly China desires to get the United States to leave the region as soon as possible but it is not clear how and whether this could affect their policies toward energy development in the region.

Another set of future issues are related to how growing energy ties with China and India could feed Russia's reemergence as a major player in Northeast Asian geopolitics. On the one hand, there is a strong argument that development of an extensive regional network of oil and gas pipelines and energy trade linking Russia with the major powers in the region could expand all the players interests in broader regional cooperation and stability. It could also help support Russian economic development in this thinly populated part of Russia and reduce the Kremlin's fears of eastern Russia being overrun by dynamic economic and trade forces and population momentum emanating from China. However, the Kremlin also is trying to use energy as a key instrument of diplomacy and influence with China and India. The impact of Russia's growing energy role will depend heavily on how Russia, China, and India manage their energy ties, either fueling competition or cooperation.

Another area of concern involves a range of impacts of China and India's booming oil demand as well as the impact of their implied strategy of "locking up" national control of certain oil supplies to fuel their own economies, in effect, "taking oil off the market." Both countries clearly aim to lock up their own national oil supplies with many of their investments in places like Sudan and this practice is likely to contribute to higher oil prices and price volatility by reducing global market flexibility to handle tight markets, shortages, and supply disruptions. The recent controversy over CNOOC's bid to acquire Unocal is partly driven by concerns among many U.S. politicians that China is attempting to "steal" U.S. oil supplies to send to China. Second, many in the United States feel that China and India are "competing" in open global oil markets with the United States for scarce global oil supplies and driving up world prices. Nevertheless, the fact is that growing U.S. demand for imported oil has been as important in driving global prices as China or India. A more important problem revolves around Asia's lack the regional institutions to manage supply crises on a regional cooperative basis and key buyers in the region are prone to panic buying during crises, fueling market instability. Both China and India were key factors in panic buying globally in the runup to the Iraq war in January and February 2003. The lack of effective demand policies or policies to manage supply disruptions makes the combined demand impact of the two a growing potential source of instability in global oil markets.

It is also quite apparent that China and India's growing consumption of coal and the air quality impact of booming transportation consumption have grave environmental implications regionally in terms of air quality and health, and globally in terms of raising the risks that carbon emissions could be fueling global warming. Concerns over long-term global carbon emissions simply cannot be effectively addressed without greater involvement from China and India. This needs to be addressed both on the demand side, by slowing the rise in electricity demand growth in Asia, as well as improvements in clean coal technology and government policies regarding the preparation, handling, and transportation of coal.

A final serious and obvious area for concern is the growing role for nuclear energy in both China and India and the resulting risks of nuclear proliferation and safety problems. This will create strong pressures for improving the global regime to contain proliferation pressures and research on improving safety and disposal technology. The recent agreement between the United States and India on nuclear technology and proliferation shows the importance of these issues. As in the case of coal, there is vital need to improve the electricity demand side and pricing reforms to slow the rate of growth in electricity demand.

POLICY RECOMMENDATIONS

China and India's growing energy insecurity has broad ramifications for the region and for the United States across a wide range of geopolitical, energy, and environmental issues. There is a high degree of interconnectedness between energy and these other issues. Booming energy demand is likely to deeply impact the roles of China and India in Asia and globally.

There are several general policy areas that U.S. policymakers need to begin thinking about. First, U.S. policymakers need to step up efforts to help both China and India improve energy efficiency and slow the rise in consumption which is driving their insecurity. Each government needs to be engaged at the highest level on the importance of managing energy demand to reduce the near panic emphasis on acquiring global supplies that is likely to be the source of serious future geopolitical problems. Second, the United States needs to look for ways to bring China and India into the global emergency oil-sharing system currently dominated by the IEA, which, since it can only include members of the OECD, by definition excludes them. Both China and India feel excluded from these global energy management institutions and this aggravates their zero-sum view of global energy trade and politics. This again requires senior policy-level engagement. China is presently beginning to build its own strategic oil reserves in four locations along the eastern coast. India has announced plans to do the same. But it is vital that their efforts to build and use strategic reserves be coordinated with IEA and Western strategic reserves to maximize their effectiveness during any supply crisis. At a minimum, the United States should be encouraging some form of regional Asian oil-sharing mechanism. Third, the United States needs to aggressively seek ways to encourage building regional energy cooperation institutions in Asia, that would include China and India, in order to facilitate multinational energy projects and encourage cooperation and markets over competition and mercantilism. APEC is not an effective forum for this; it is too large and heterogeneous and India is not a member. Nor is the ASEAN Regional Forum (ARF) likely to be effective in this regard. New institutions need to be built, but without U.S. involvement. The risks are rising that nationalistic competition for energy supplies and naval control over transit routes could lead to serious political and military tensions among Asia's key powers, especially China and India. Fourth, related to the issue of cooperation, U.S. policymakers need to find ways to discourage China and India from seeking to "lock up" global equity oil supplies in a futile, mercantilist effort to monopolize those supplies for their own economies, i.e., "take oil off the market." Global oil markets and long-term supply contracts can provide as much security as any equity oil supplies, i.e., markets work. At the same time, the United States cannot preach markets convincingly while at the same time blocking CNOOC's possible acquisition, Unocal, in what is largely a market-driven transaction. Fifth, U.S. policymakers need to begin planning for managing and channeling China and India's growing diplomatic and economic influence in the world's key energy exporting regions, most importantly the Persian Gulf and Middle East. A dialogue on forging some consensus on the fundamentals of stability in these key regions is vital to avoiding problems in the future. Sixth, the United States needs to become more active in helping both China and India find alternatives to rising coal consumption to meet their electricity needs. There needs to be strong U.S. support for clean-coal technology development and the transfer of this technology to China and India to burn coal more efficiently and cleanly. Moreover, assistance in developing natural gas-fired power generation and safe nuclear generation are vital in the electricity equation.

Asia's booming energy consumption will be the driver for a number of interrelated energy, environmental, and diplomatic challenges in the future for the United States. It is vital that U.S. policymakers at the highest level begin to engage China and India on these issues and seek creative ways to avoid a growing set of looming challenges outlined here.

The CHAIRMAN. Thank you very much, Mr. Herberg.

The CHAIRMAN. Mr. Schriver.

**STATEMENT OF RANDALL G. SCHRIVER, PARTNER, ARMITAGE
INTERNATIONAL, ARLINGTON, VA**

Mr. SCHRIVER. Good morning, Mr. Chairman and Senators. Thank you for giving me the opportunity to appear here today.

I think previous witnesses in the previous discussion well covered the energy trends in China, and the surge in demand for oil,

in particular. What I'd like to do, given the time limitations, is talk more directly about the implications on Chinese foreign policy and then what I believe are, therefore, the implications for the United States, and maybe a few thoughts on policy for the United States.

Given this incredible surge in demand from China and what will likely be a trend line that will continue out, for the foreseeable future, of extreme appetite for energy resources, China perceives that it has energy vulnerabilities and risks, and it's taking steps to mitigate those risks. In the most straightforward terms, they're seeking diversification of its sources of energy, as well as trying to, as others have pointed out, obtain equity share assets and decision-making equity shares in assets abroad.

With regard to the first point, in diversification, I'd offer one data point. As recently as 1996, China imported roughly half its oil from two countries, Oman and Indonesia. And if you add a third country, Yemen, close to 70 percent of its oil was imported from just three countries. By 2004, they had significantly expanded their commercial relations to a point where they were much more diverse. Saudi Arabia is now their largest source of oil, at roughly 16 percent; Iran is right behind it, 15–16 percent. And so, they've, in a very short period of time—that's an 8-year period—have diversified to a point where I think they have mitigated their risk, to some extent. Certainly, a major disruption with a country like Saudi Arabia, it would have an impact on the Chinese economy, but they've been fairly successful at this goal of diversification.

In terms of acquiring assets and equity shares abroad, this has been addressed. I would offer a couple of data points. China began investing in Sudan in the mid-1990s. The oil was—the oil that is now reaching China wasn't even pumping until 1999. By 2004, Sudan had become the sixth-largest source of oil for China. So, again, a very short period of time. And, in this case, this wasn't solely a commercial relationship; this relationship began with China investing in the infrastructure, sending engineers, sending construction teams, and owning a lot of that infrastructure as assets. In Uzbekistan, we're seeking a similar development underway right now with a very significant Chinese investment in infrastructure there in associated oil deals equaling, roughly, about 700 million U.S. dollars.

So, these two trends are very much a part of Chinese foreign policy. Their exploration and investment is not only onshore, it's on the seas. The bulk of this is in territorial waters, but, as was previously mentioned, they are interested in exploring other areas where there could be territorial disputes involved. In some cases, this could actually lead to greater stability. They've reached agreements with some countries for joint exploration; notably, Vietnam. But, in other cases, we see this as a potential source of great tension. And I think Japan was already mentioned.

There are also, I think, more subtle linkages we need to think about, in terms of Chinese foreign policy. This notion of having a secure logistics train involves not only pipelines, but secure ports, maritime security. I think the previous discussion about the Malacca Straits was on point with respect to this point. And so, this will also animate and motivate Chinese foreign policy.

And, finally, I think another subtle effect, but extremely important, is how this will motivate the People's Liberation Army in its modernization efforts. Even owning oil, owning assets, even having secure commercial contracts doesn't ultimately guarantee the energy will arrive in the time of a crisis, so the PLA has included in its future projections the mission of trying to secure the delivery of energy resources from abroad. And this has a whole range of implications for their military modernization and for the United States.

So, let me briefly touch upon what I see are the major implications for the United States

As has already been mentioned, of course, this will be a major driver in increases to oil prices. That affects our economy directly. As also was previously mentioned, given that this is a national-level goal from the Chinese Government, their willingness to subsidize commercial deals puts, potentially, United States companies and those of other countries at a disadvantage.

But I think what concerns most in the United States would be under the header of complicating our foreign policy and security interests abroad in some key areas, and I think three countries leap to mind. I'll just touch on them briefly, because I think they've all been mentioned—Sudan, Iran, and Venezuela.

In Sudan, as we and others were working on the humanitarian situation in Darfur, the Chinese were concluding major commercial deals, but also selling arms to the Government in Khartoum, I think, very much complicating our efforts to address the humanitarian situation there.

In Iran, a similar kind of dynamic as the EU-3 and others were working on the nuclear challenge there. Again, very lucrative commercial deals being cut, possibly some political assurances delivered, as well, in saying that China would protect Iran's interests in equities in the United Nations if the EU-3 or others decided to take action there.

And then, of course, in Venezuela—this has already been addressed—as Chavez has promoted his anti-Americanism and this ideology in the region, China is working to secure, for Chavez, what he most desires, and that is lesser dependency on the United States market for Venezuelan oil. So, again, this could complicate our foreign policy.

Again, with respect to offshore exploration—this has already been touched upon—if there are major tensions between China and Japan in this regard, Japan is a treaty ally, and the United States has serious obligations there, and, if forced to take a position, we will stand with our treaty allies, so there are major implications for the United States if that were to go in an adversarial direction.

I didn't mention coal. I think, in terms of implications for the United States, China continues to be the largest producer and consumer of coal in the world. At this juncture, although the numbers are changing, it still accounts for about 65 percent of their energy consumption. This has major implications for the environment. And these are problems that will not be contained within China's borders. The environmental degradation is extreme in China. I think the WHO says 7 out of 10 of the most polluted cities in the world are in China. But these problems are of a nature that they won't

be contained within China's borders, and they'll quickly become problems for all of us.

And then I think the—again, to shift to some of the more subtle implications—we're not sure how our relationship with China will unfold. We hope that China chooses a path of benign integration and peaceful competition, but there is a potential future out there where China makes a different kind of choice and we end up in a different kind of relationship, not where we want to be. So, I think these questions related to competition over energy are playing into this larger question, about the direction of our relationship. Are we veering toward competition or even an adversarial relationship, depending on the choices that China makes? And so, this is something that would also need to be considered as we look at these questions.

And, finally, if I might, just very briefly, a few thoughts on policy, and I'll make four very quick points.

First of all, we do need to continue our broad and comprehensive engagement of China. Our relationship is broader than this burgeoning competition over energy. There are plenty of things we need to continue to work on with China. And so, this should not be a disruption to that engagement policy.

Second, I think it's also the case that China's growing demand for energy could also drive us closer together in some important ways. And I can think of a few. I think this should make China see our point of view on nonproliferation and export controls, I think, on maritime security, stability in key oil-producing regions. So, I think there's an opportunity here, if it's nurtured and brought along by U.S. policymakers, to actually promote these aspects of what is happening in China and these energy trends.

Third, I do think, as has been discussed, there is a need to talk about this in a multilateral environment, but at a sufficiently senior level so that it's meaningful. This could be in existing multilateral fora, such as APEC, but some consideration might be given to creating new modalities to talk about these issues. They are serious enough that it may merit some creative thinking and perhaps a new initiative to look at these questions. Again, it has to be at a senior level.

And then, finally, I think the United States does need to be prepared for a relationship with China that goes in the direction we don't want. And so, there's a range of implications with that. I think, as we're trying to work cooperatively with China, we still need to strengthen our bilateral alliance with Japan, we still need to work on our relationships in Southeast Asia, we still need to have a military presence that is appropriate in Asia for 21st-century challenges. And China's uncertainties, I think, are very much included in that.

So, these are a few thoughts on the policy side, as well. Thank you, again, for the opportunity to be here.

[The prepared statement of Mr. Schriver follows:]

PREPARED STATEMENT OF RANDALL G. SCHRIVER, PARTNER, ARMITAGE
INTERNATIONAL, ARLINGTON, VA

INTRODUCTION

Chinese foreign policy has changed dramatically over the course of the last decade. China pursues its interests today through a more creative and proactive diplomacy. In addition, China has greater capabilities and a widening “tool box” available as the means to pursue its foreign policy goals. The net effect is that China is choosing deeper engagement and involvement with the outside world, and is increasingly effective at promoting its interests—even in the cases where its interests clash with the United States and other established powers.

One of the key drivers to Chinese foreign policy is a requirement to establish secure, reliable access to energy resources that lay beyond China’s borders. China’s domestic economic growth has led to a surge in demand for energy. The increased demand is primarily for oil, and it well-exceeds China’s domestic production capacity. Sustaining China’s economic growth is a vital to the regime, and thus there is a growing perception among Chinese leaders that increasing reliance on foreign energy creates vulnerabilities and risks. In order to secure the energy required to support China’s domestic demand, China has embarked on an effort to promote supply diversification as well as overseas equity investment.

The United States will be impacted by China’s surging demand for energy. Some of the impact will likely be negative—higher prices for foreign crude, for example. It may also be the case, however, that China’s increasing reliance to the outside world presents the United States and our friends with foreign policy opportunities. My statement will address the following: Observations on energy trends in China; impact on China’s foreign policy; consequences and opportunities for the United States; and thoughts on U.S. policy response.

OBSERVATIONS ON ENERGY TRENDS IN CHINA

The top priorities for Chinese leaders are to continue to develop the country and to increase comprehensive national power. The largest element associated with those goals is to sustain China’s domestic economic growth. This reality links China to the outside world in a variety of ways, but none more evident than China’s need to import oil for the purposes of literally fueling economic development at home.

China became a net oil importer in 1993. It is now the second largest importer of petroleum in the world, surpassing Japan in 2003. The demand continues to surge. As recently as 1996 China imported 22.8 million tons of crude. By 2004, the number reached 122.7 million tons of crude. In all, China accounts for over 40 percent of world oil demand growth over the last 4 years.

Equally important, economists and energy specialists forecast that China’s requirements for importing crude will continue to grow at a fast clip. The International Energy Agency predicts that China may need to import close to 80 percent of its oil by 2030. The primary driver will continue to be individual energy consumers (more and more cars on the road), and energy required to support industrial growth.

China has embarked on an effort to mitigate its risks associated with its growing reliance on foreign sources for energy. Efforts aimed at developing supply diversification and acquiring equity investments abroad are driving China’s foreign policy and diplomacy in tangible ways. It should be noted here that China is also pursuing efforts to reduce demand (e.g., new vehicle efficiency standards, national fuel tax), develop alternate sources (natural gas and nuclear), as well as to develop a strategic petroleum reserve. None of these efforts, however, change the fact that the Chinese economy and associated infrastructure are being developed in a manner consistent with a 20th century, petroleum-based development model. In other words, China will continue to need more and more oil if it continues on its current growth and development path despite other attempts to mitigate risk.

Coal deserves special mention. China is the world’s largest producer and the world’s largest consumer of coal. Coal still accounts for 65 percent of China’s primary energy consumption. Its coal consumption is roughly 27 percent of the world total. What is important to understand, with respect to future needs, is that although coal’s share of overall Chinese energy consumption is projected to fall (replaced primarily by oil), coal consumption will likely continue to grow in absolute terms. This links China to the outside world in a different way as compared to oil. China’s coal burning takes a heavy toll on China’s environment. But, in fact, the environmental degradation will not be contained within China’s borders as there will be increasing fallout in the region, and in the global environment if the trend lines continue.

IMPACT ON CHINESE FOREIGN POLICY

In the simplest and most straightforward terms, China's surging demand for oil imports lead China to seek diversification in its supply sources, and greater ownership of overseas assets that relate to energy production and export. However, there are other foreign policy implications as well. The logistics train also needs to be secure to ensure minimal risk of the delivery of energy to China. And China is also aware that even owning oil and pipelines does not completely mitigate risk of disruption unless China has the military capability to protect assets abroad—thereby requiring power projection capability.

The goal of greater source diversification has led China to develop not only stronger commercial relations with a greater number of oil producing countries, but stronger political relations as well. As recently as 1996 (3 years after becoming a net oil importer), China imported roughly half its oil from two countries—Oman and Indonesia—and nearly 70 percent from three countries combined (add Yemen to Oman and Indonesia). A short 8 years later, by 2004, China had developed significant import sources from Iran, Sudan, Angola, Russia, and Saudi Arabia. While a disruption, associated with one of its major sources of crude oil (its largest being Saudi Arabia at 16 percent), would still have a major impact on the Chinese economy, it's fair to observe that in less than a decade China has succeeded in spreading its risk through diversification efforts.

China is also acquiring assets, and becoming decisionmaking equity investors in oil producing countries overseas. According to a Jamestown Foundation China brief in April 2005, China enjoyed early success on the African Continent in Sudan. Initial investment in the mid-1990s included sending large numbers of Chinese engineers and construction teams. The oil began pumping in 1999, and by 2004 Sudan was the 6th largest supplier of oil being imported by China. These efforts are mirrored globally in other developing countries. In Central Asia, according to the Eurasia Daily Monitor, China has made initial investments in Uzbekistan of approximately 106 million U.S. dollars. Chinese investments may reach 600 million U.S. dollars in Uzbekistan over a longer period.

China's increasing demand for oil lead to greater exploration efforts at home, as well as investment in exploration in developing countries. However, they are not limited to onshore exploration. China is also investing in offshore exploration which carries potential foreign policy consequences. Although major efforts, to date, have occurred in Chinese sovereign waters (the Bohai Sea in the largest project funded by China), others in the region have concerns that China's appetite might be larger. In some cases a larger appetite for offshore exploration may lead to greater stability in Asia (e.g., China and Vietnam reached agreement for joint exploration in areas previously under dispute), but it may also tempt China to push its claims on other disputed territories. Understandably, this makes some in Japan feel uneasy after several incursions by Chinese vessels into Japanese territorial waters.

In addition to the aforementioned linkages between China's growing dependency on foreign oil and its foreign relations, there are additional effects on Chinese approaches to the outside world which, though perhaps more subtle, are nonetheless significant. China not only needs oil, it needs assurance that the oil can be delivered efficiently and safely to China. This means pipelines, secure port facilities, and maritime security. But it also means stability on China's periphery. China has secured a stunning number of border agreements on its periphery over the last decade. This also helps explain China's treatment of President Karimov a few days after the bloody crackdown in Andijon. China values stability in its neighborhood even when achieved by virtue of heavy-handed tactics.

Finally, even owning oil and pipelines does not completely mitigate risk of disruption unless China has the military capability to protect assets abroad. Thus some in China may believe that the ultimate guarantor of energy security is the People's Liberation Army. China's military modernization has been aggressive, and quite effective. Chinese military leaders have placed an emphasis on developing a "blue water navy" and associated power projection capability. The U.S. Department of Defense report on China's military capabilities released this month states, "China's military modernization remains ambitious. In the recent past moreover, military responses, in support of Chinese claims of disputed territory or resource rights, have produced crises and conflicts with China's neighbors including India, Japan, the Philippines, the then-Soviet Union, and Vietnam. In the future, as China's military power grows, China's leaders may be tempted to resort to force or coercion more quickly to press diplomatic advantage, advance security interests, or resolve disputes."

IMPLICATIONS FOR THE UNITED STATES

The trends associated with China's development, its surging demand for energy, and its more proactive foreign policy, all carry implications for the United States—some direct, some more subtle, and probably some yet to be determined.

The most direct impact on the United States and our friends and allies relates to world oil prices. The health of the U.S. economy does bear some direct relationship to the price of crude. As China accounts for over 40 percent of world oil demand growth over the last 4 years, they are part of the reason we are facing high costs for oil imports in the global market. Though world reserves and production capacity suggest the market can account for China's surging demand, in the near term we are unlikely to see significant reduction in oil prices.

There may also be direct effects on U.S. and other foreign oil companies. A national-level goal to secure foreign access to oil for China will likely motivate the Chinese Government to support the efforts of "semiprivate" Chinese companies in their respective commercial dealings. If the net effect is subsidized commercial bids, U.S. companies could be greatly disadvantaged.

There are other direct effects that are likely negative for the United States in the near term. These effects may fall under the header of "complicating U.S. foreign and security policy interests." In this regard, three countries leap to mind—Sudan, Iran, and Venezuela. China typically does not address human rights and nonproliferation in its relations with other countries. But the net effect in the three aforementioned countries is not simply benign neglect where irresponsible behavior is concerned. Rather, China is likely engaged in relationship-building that enables continued irresponsible behavior, and complicates the efforts of the United States and other countries to promote different outcomes. In Sudan, as we've worked with other countries to address the genocide in Darfur, China has continued to support the regime in Khartoum with lucrative oil deals and even arms sales. In Iran, as the EU-3 have attempted to address the nuclear challenge through diplomacy, China has continued to support Tehran with oil purchases and assurances that China won't support action in the United Nations against Iran. And in Venezuela, as Chavez has endeavored to spread anti-Americanism throughout the hemisphere, China has given Chavez what he so desperately needs in order to sustain his efforts—lesser reliance on the U.S. market for Venezuela's oil exports.

The growing interest in exploring disputed offshore areas could certainly impact U.S. interests in a direct way. Many of China's existing disputes are with friends of the United States, but in some cases, with treaty allies. If tensions continue to mount between China and Japan (and surely energy would only account for a part of the story), the United States may very well be placed in a position where we must stand up for our treaty ally. While our generic response to matters of maritime territorial disputes is legalistic and noncommittal, it's not inconceivable we could choose a more robust response if our ally were faced with more aggressive actions from China.

The special mention of coal in the previous section should be mirrored in this section addressing impact on U.S. interests. According to the World Health Organization, 7 out of 10 of the world's most polluted cities are in China. China already accounts for 13.5 percent of world carbon dioxide emissions. While we, in the United States, remain the greatest contributor to greenhouse gas emissions, as a developed, modern economy, we also have a greater likelihood of implementing policies and developing new technologies to make ourselves greener. China's stated interest in sustainable development has not seen associated national level efforts to deal with a growing problem of severe environmental degradation in China. And these problems, as mentioned above, will not be completely contained within China's borders.

The more subtle impact on the United States relates to how China's emergence as a more proactive and influential global player—very much driven by growing energy needs—will affect United States-China bilateral relations in the general. In other words, if the United States and China are lurching toward a classic great power rivalry, how will China's activities in oil producing regions and oil producing countries impact our overall ability to get along with one another? As the U.S. Department of Defense report on the Chinese Military states "China faces a strategic crossroad. It can choose a pathway of peaceful integration and benign competition. China can also choose, or find itself upon, a pathway along which China would emerge to exert dominant influence in an expanding sphere . . . the future of a rising China is not yet set immutably on one course or another." This is distinct from the point above about China's potential to impact discrete foreign policy goals. This is to say, China's activities—even if viewed as negative on their own merits—will be viewed in a completely different light if we believe China is determined to choose an adversarial, competitive course with the United States.

There are many uncertainties and unknowns associated with China's energy trends as well. It is not inconceivable that China's growing reliance on the outside world for energy, could actually drive us toward closer cooperation rather than competition. I would argue that China should come closer to our view on nonproliferation and export controls, closer to our view on maritime security, and closer to our view on the need to promote stability in key oil producing regions. The United States and China may be singled out as the greatest culprits in global greenhouse gas emissions, and may find common ground in addressing global concerns in ways that aren't too burdensome to our respective economies. All of this remains to be determined, however, as it is not clear that China has developed sufficient trust that the United States will be a reliable partner in these efforts. Instead, China seems to have adopted a zero-sum mentality with respect to foreign energy at this juncture. Perhaps this is temporary as they work to improve their position in the near term.

Finally, the United States may ultimately see advantage in China's efforts to develop alternate sources for energy. There is likely a lucrative market awaiting those clever enough to exploit the openings. Some opportunities are closer at hand—such as the chance to build nuclear power plants in China. Some may be in the near future as China will be compelled to seek greener technologies.

U.S. POLICY RESPONSE

From a U.S. perspective, I believe our orientation to the challenges associated with China's energy trends should consist of several elements. First, the United States should continue to promote comprehensive and sophisticated engagement of China. Energy is a major determinant of Chinese foreign policy, but it is not the only one. Second, we should begin to address energy security challenges in a direct, head-on manner in our bilateral relationship. There are genuine opportunities for the United States to use these trends to promote better United States-China relations—but the opportunities need to be harvested. Third, we should explore the creation of new modalities to address energy security at a sufficiently senior level in multilateral fora. And finally, the United States must hedge against the potential for a negative, adversarial relationship with China if the Chinese leadership chooses such a course.

Regarding the first element mentioned, it should be noted that although this statement primarily addresses energy, United States-China relations are much broader than the burgeoning competition over energy. The core elements to the policy chosen by every administration over the course of the last 35 years are sound. To critics, a policy of broad engagement of China is more descriptive of a "process" rather than an actual "policy." But it remains true that broad, comprehensive engagement of China allows the United States to pursue our interests in areas where the United States and China agree, while minimizing the chance of conflict resulting from areas where we disagree. There is also sufficient evidence that our broad engagement of China has contributed, on the margins, to internal change in China for the better. Finally, China is not only reliant on the outside world for energy—the health and well-being of the Chinese economy is absolutely tied to foreign direct investment and for ready markets to which it can export. These are potentially sources of stability even if the drive for energy causes unease.

With respect to the second element, as stated before, China's growing reliance on the outside world for energy could actually drive us toward closer cooperation rather than competition. But this framework needs to be nurtured, and it requires proactive efforts to build confidence, and build a productive dialogue. A senior-level global dialogue with China—as envisioned by the U.S. State Department—should include energy security. This topic was not on the Chinese wish list for the global dialogue, but the State Department should insist upon its inclusion. Areas such as non-proliferation, maritime security, and stability in the Middle East should be on the agenda.

Third, it is insufficient if the United States and China are cooperating on energy security, but China is still experiencing tension with Japan and the rest of Asia. These issues by their very nature require multilateral consultation and cooperation. The United States should seek to promote an energy security agenda, either in an existing multilateral forum, such as APEC, or seek the creation of a new forum for this purpose. Some have suggested that a Northeast Asia energy security dialogue should be constituted and sustained at a senior official level. I believe there is great merit to this proposal.

Finally, the United States must be sufficiently prepared to operate in an environment of growing competition with China. Our approach to China should be rooted in a clear vision for Asia, and a commitment to sustaining a strong bilateral alliance

with Japan. It is essential that the United States adopt a force posture that is appropriate for 21st century challenges in Asia—the uncertainties related to China’s strategic direction very much included. It is also essential that others in Asia, and in particular, Southeast Asia, see us as a dependable, reliable friend. We would make a mistake if we treated China as an enemy today, but we’d be equally negligent if we weren’t adequately prepared to deal with the consequences of a Chinese decision to choose an adversarial path.

The CHAIRMAN. Thank you very much, Mr. Schriver.
We will hear from Professor Ganguly.
Professor.

STATEMENT OF PROF. SUMIT GANGULY, PROFESSOR OF POLITICAL SCIENCE AND DIRECTOR OF THE INDIA STUDIES PROGRAM, INDIANA UNIVERSITY, BLOOMINGTON, IN

Mr. GANGULY. Thank you, Chairman Lugar. I am delighted at this opportunity to be able to testify on this important subject. And thank you, Senators, for this opportunity, also.

In the interest of time, I will not read my formal remarks. I would simply summarize and highlight some of the more contentious areas in my remarks. And let me turn to those directly.

To begin with, as several speakers have already alluded to, there is little question that India’s energy needs over the years are going to burgeon. With the growth rate averaging between 6 to 7 percent annually, one can expect that India’s energy needs are not going to shrink anytime in the foreseeable future. Currently, just to highlight a few figures, India imports more than 60 percent of its oil needs, or slightly more than 1.4 million barrels of oil a day. At current rates of economic growth, this figure is likely to rise as high as 5 million barrels per day by the year 2020. Unless India obtains or develops alternative sources of energy in the next 15 years, it will have to import close to 90 percent of its petroleum needs, obviously having a significant impact on the global oil market.

India is not only in competition with the United States for oil, but also with the People’s Republic of China and the relationship—the Sino-Indian relationship still remains acutely fraught. India sees China as its principal competitor in this global quest for energy. Indian officials are loathe to publicly admit the existence of such competition, to avoid possible political friction with their behemoth northern neighbor.

This public silence, however, masks a number of private misgivings that persist despite an apparent improvement in bilateral relations in the past decade. India is investing in very much the same places that China has been investing in, and the competition is quite acute. And it is outlined in some detail in my formal remarks, which I shall not go over at this stage.

Let me turn to two of the more contentious issues, particularly as far as the United States is concerned.

India is in the midst of extensive discussions with Iran and with Myanmar, formerly Burma, for the development of oil—of gas pipelines from both these two countries. As has been alluded to by previous speakers, this brings India into conflict with the United States, particularly in the case of Iran, where there is actually American legislation which India would run afoul of.

I would submit that it is highly unlikely that American job-owning is going to make a fundamental difference to Indian policy.

Indo-American relations have dramatically improved in the last decade, particularly after India abandoned its failed policies of import substituting industrialization and also has, for the most part, at least in practical terms, abandoned its hoary commitments to nonalignment.

The transformation of Indo-United States relations has been nothing short of dramatic in the last several years, and the current administration deserves considerable credit for having taken it to a new stage.

Under these circumstances, it strikes me as being rather parochial to focus inordinately on these two relationships that India has with Myanmar and with Iran. The Indian leadership has little or no fondness either for the regime that is in Iran or the regime in Myanmar. These are purely pragmatic relationships geared toward ensuring India's energy security. It has little or nothing to do with an embrace of these two regimes, or any particular regard for the character of these two regimes. This point is elaborated in considerable detail in my presentation; and so, I shall not go into it any further.

Let me turn to a couple of other contentious areas, particularly the most recent decision of the administration to provide India with civilian nuclear technology, which is, obviously, an extraordinarily fraught question in American politics, given that India is not a formal member of the nuclear nonproliferation regime. But, as everyone on this committee is more than well aware of, India was never a part of the regime to begin with, and, consequently, to harp on India adhering to the terms of the regime strikes me as being, at least, mildly unfair. More to the point, India has already agreed to full-scope safeguards; thereby ensuring that any technology that is transferred to India will be confined to the civilian sector and will be carefully sequestered from India's nuclear weapons program, which we—about which we can discuss with India on a separate basis and need not conflate these two issues.

Turning to another extremely contentious area—I could say much more about the nonproliferation issue, but I will not, in the interest of time—let me turn to a domestic impediment which India has to confront, and confront rather forthrightly, something that a series of Indian regimes have shied away from doing, and this is where an American role is critical, and this has to do with what are called the state electricity boards in India. These are the most antiquated systems for the production and the delivery of electricity. They are corrupt, they are venal, they are poorly run, they are subject to rampant political interference, and they are a tragic legacy of India's strategy of state-led economic growth.

Since 1991, India has taken important strides, in terms of embracing the market, but the state electricity boards—and if you'll forgive the poor pun—constitutes the third rail of Indian politics. Most regimes would suffer electrocution if they tried to forthrightly tackle this particular nettle, to mix my metaphors. But this nettle has to be tackled over the long term, because it constitutes a critical drag on India's economic growth and contributes to significant power losses within India.

To turn to another area where the United States can play an important role is—that has to do with coal, which supplies India close

to 70 percent of its current energy needs. India is the third-largest producer of coal. But much of Indian coal is of extremely poor quality and, thereby, contributes to significant amounts of pollution. Here, as the individuals from State and Energy pointed out, American technology can make a world of difference, in terms of ensuring that the coal that is utilized in India is used in a more efficient fashion and also does not contribute to global pollution, not merely to the pollution of India's atmosphere, because this is not a national problem, but, indeed, a global problem.

To summarize, one is at the threshold—the United States is at a threshold of a significant breakthrough, in terms of its relations with India. It would be unfortunate, and most infelicitous, in my view, if the minor contentious issues that exist in the energy sector were to hold hostage the overall relationship with India, which is poised for a breakthrough which has been carefully nurtured for the last several years. And my plea to you is to see if one could work, in terms of a constructive dialog with India, to address the more contentious issues that exist, and not let these issues come to the fore and, thereby, torpedo a relationship with a growing Asian power.

Thank you very much.

[The prepared statement of Mr. Ganguly follows:]

PREPARED STATEMENT OF PROF. SUMIT GANGULY, PROFESSOR OF POLITICAL SCIENCE AND DIRECTOR OF THE INDIA STUDIES PROGRAM, INDIANA UNIVERSITY, BLOOMINGTON, IN

Senator Lugar, Senator Biden, and distinguished members of the Senate Foreign Relations Committee, it is an honor and a pleasure to be asked to testify before this committee today. The following constitutes my prepared remarks. I will be happy to address other issues or elaborate further on these points during the question-and-answer session.

BACKGROUND

As a rapidly developing country, India's energy needs are likely to balloon over the coming decades. How and in what areas these needs materialize will depend on five major factors. First, these energy needs will be driven by India's quest to maintain the high levels of economic growth (around 6 to 7 percent annually) that it has enjoyed since 1994. Second, much will depend on India's ability (or lack thereof) to locate and use existing domestic gas and petroleum reserves. The third factor will be the ability of the Indian political system to address certain structural inefficiencies which contribute to significant loss and wastage. Fourth, it will also depend on its ability to adopt new and more energy efficient technologies. And fifth, much depends on India's ability to secure external sources of energy.

Already India is the world's sixth-largest consumer of energy. Most estimates suggest that to sustain its current average annual growth rate it will need to increase its energy consumption by about 4 percent annually.

Currently, domestically mined coal meets close to 70 percent of India's total energy needs; after China and the United States, India is the world's third-largest producer of hard coal. Oil supplies about another 30 percent of the country's energy. Currently, India imports more than 60 percent of its annual oil needs, or slightly more than 1.4 million barrels of oil per day. At current rates of economic growth, this figure is likely to rise to as much as 5 million barrels per day by the year 2020. Unless India obtains or develops alternative sources of energy, in 15 years it will have to import close to 90 percent of its petroleum needs.

India is working on securing alternative sources of energy in cooperation with other countries. These efforts are focused on oil, natural gas, and nuclear energy. But each of these potential sources presents complicated geopolitical challenges.

China

As India has entered the global energy market, it has encountered an important competitor: The People's Republic of China, one of the fastest-growing economies in the world, a rising military power with a vast appetite for oil and other raw materials—and the financial resources to satisfy that appetite.

India sees China as its principal competitor in this global quest for energy. Indian officials are loath to admit, publicly, the existence of such competition, to avoid possible political friction with their behemoth northern neighbor. This public silence, however, masks a number of private misgivings that persist despite apparent improvement in bilateral relations in the past decade. First, despite significant efforts, the two sides have made glacial progress on their long-standing border dispute. Second, Indian policymakers remain wary of China's close ties to India's *bete noire*: Pakistan. Third, the Indians have become increasingly concerned about China's significant diplomatic and military relations with Myanmar (Burma) in recent years. Fourth, and finally, both India and China see themselves as great powers in Asia and would like to extend their influence beyond their respective shores. Although some analysts in India's strategic community do harbor hopes of potential cooperation between India and China in their global quest for energy resources, these hopes represent the triumph of fond wishes over harsh realities. India is in a fundamentally competitive, if not conflictual, relationship with China.

China is already well ahead of India in the search for new energy sources. Since 2000 the China National Petroleum Corporation (CNPC) has invested \$45 billion in this search, while India's Oil and Natural Gas Commission (ONGC) has invested just \$3.5 billion. The vast foreign-exchange reserves available to China's state-owned oil firms have enabled them to undercut India's efforts to obtain oil beds. For example, in 2004, the Chinese firm SINOPEC edged out ONGC Videsh (the international arm of ONGC) to acquire an oil-exploration block from Shell Oil in Angola. Furthermore, as recent events underscore, the Sino-Indian competition for new energy sources in Central Asia is well underway. In early July 2005, India was granted observer status in the Shanghai Cooperation Organization (SCO)—a forum for meetings and consultations between China, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. New Delhi was keen on obtaining this status to increase its access to, and influence in, the oil-producing states of Central Asia. Kazakhstan, the host of the 2005 meeting, is one of the states in which New Delhi has considerable interest, not least because of the vast Tengiz and Kashagan oilfields and the Kurmangazy and Darkhan exploration blocks. ONGC Videsh has formally bid for participation in all four areas. Yet, just as India was granted observer status in the SCO, the group, at China's behest, also invited Iran and Pakistan to participate as observers. The inclusion of Pakistan, in particular, is fraught with considerable significance for India, as it gives Pakistan further ability to exert influence in the region.

Iran

India's emergent role in Central Asia may lead to an intensification of the Sino-Indian rivalry, but it is highly unlikely to bring India into conflict with the United States. India's attempts to obtain natural gas from Iran, however, are far more contentious from the American perspective.

India has had extensive discussions with Iran about the construction of an undersea and overland pipeline to carry natural gas to India from Iran's South Pars field. This pipeline would be about 2,700 kilometers long (about 1,687 miles) and would cost about \$4 billion to build. Some 760 kilometers (475 miles) of this pipeline would pass through Baluchistan in southern Pakistan. Once operational, it could transfer as much as 90–95 million standard cubic meters of gas per day.

Despite strong interest by both Iran and India in building this pipeline, it is by no means a done deal. Indian security analysts have expressed misgivings about having such a strategic asset pass through the territory of a long-standing adversary: Pakistan. Moreover, it is far from clear that Pakistan is going to acquiesce to the construction of the pipeline through its territory. In an effort to address these concerns, India has proposed that Iran and Pakistan be responsible for the construction, maintenance, and safety of the pipeline until it reaches the Indo-Pakistani border. That way, both countries not only would stand to gain from its operation but would lose, substantially, from any sabotage or cessation of its operation. In any event, India and Iran have yet, even, to reach an accord on the unit price of the gas to be delivered.

Even though this project is only under discussion, the United States had made its displeasure about it known to India. The U.S. concern, it appears, is that Iran

would use the substantial gas revenues generated to fuel its ongoing nuclear weapons program. Such a concern, though reasonable from the American standpoint, will have little or no resonance in India, especially if the United States cannot offer India a viable alternative. In the end, the Indians may choose not to pursue the pipeline but to, nevertheless, import natural gas from Iran using tankers. At this stage, it is for U.S. policymakers to decide whether it is worth making this issue so prominent as to impede the steady and dramatic improvement that has taken place in Indo-U.S. relations over the past few years.

Burma and Bangladesh

The other contentious issue in Indo-U.S. relations related to energy involves the possible construction of another natural gas pipeline—this one bringing gas from Myanmar (Burma) and Bangladesh into the Indian State of West Bengal. India has sought to build this pipeline not merely to address its energy needs but also to counter Beijing's growing influence with the military junta in Yangon (Rangoon). For well over a decade India chose to isolate the Burmese junta, but faced with a growing Chinese presence in Burma, India has begun to reverse its course. This change does not imply any fondness for the State Peace and Development Council's brutal form of rule in Burma; it is merely a pragmatic attempt to ensure that the Chinese presence in Burma does not seriously impinge, any further, on India's regional strategic interests. India, however, has yet to persuade the paranoiac Bangladesh Nationalist Party-led regime in Bangladesh to allow this pipeline to be built. Bangladesh's anxieties stem from its overall distrust of India and its obsession with husbanding its one major natural resource, natural gas.

Once again, it would behoove the United States not to hobble the construction of this pipeline. Bangladesh desperately needs the revenues that the pipeline would generate, and the project might grant India some leverage with the Burmese. That said, it is far from clear that the current government in Bangladesh will be able to break its mindset and agree to the development of its natural gasfields and the building of a pipeline across its territory. In the face of this attitude, and after years of negotiation, the American energy firm, Unocal, recently withdrew its proposals for the development of Bangladesh's gasfields.

DOMESTIC BOTTLENECKS AND IMPEDIMENTS

In addition to handling these international difficulties about energy, India will also need to address a series of domestic bottlenecks that place constraints on meeting its energy needs. These bottlenecks are the unfortunate legacies of India's erstwhile economic policies of state-led development, which the state began to reform only in 1991. In the intervening years, India has sought to unknot the labyrinthine regulations that so strangled its economic growth for nearly 5 decades. However, some of these regulations and government-run entities have proven more difficult than others to dismantle.

In the energy sector, this problem is most manifest in the State Electricity Boards (SEBs), which are responsible for the production and distribution of electricity in all but 3 of India's 28 States. (The States of Delhi, Orissa, and Maharashtra have moved to privatization of electricity.) The SEBs preside over antiquated equipment and are bloated with huge numbers of inadequately trained personnel. Worse still, they are subject to rampant political interference. Thanks to choices based on politics rather than sound economics, households, and the agricultural sector are provided electricity at rates well below cost. Ironically, the industrial sector pays the highest electricity rates. These skewed political priorities have led to overconsumption on the part of the subsidized sectors, contributing to widespread fiscal indiscipline.

The reform of these bodies, a critical economic priority, still lacks political momentum. Thanks to the power of organized labor in India and their links to all the major political parties, reform of the SEBs has been limited and fitful. The situation is so dire that a range of industries has chosen to build independent, proprietary (captive) powerplants because of the endemic unreliability of state and national power grids. The SEBs, in their current state, not only constrain economic growth but pose a significant fiscal drag on the Indian treasury.

Whether the present coalition regime can tackle this ongoing, but longstanding, problem remains unclear. However, without fundamental reform of the SEBs, India is likely to face chronic energy shortages, thereby hobbling its economic growth.

Electricity

India's future economic growth, among other factors, crucially depends on the formulation and implementation of a coherent energy strategy. One component of that strategy must involve the reform of the electricity sector, the problems of which I have just described. India's success in securing supplies of oil and natural gas, as well as in expanding the role of hydroelectric power and nuclear energy, will all be undermined if the electricity sector remains in a shambles. Without external prodding, however, it is unlikely that India's policymakers will tackle the structural problems of the SEBs. Domestic politics plays too great a role in the electricity sector. To that end the United States could influence major multilateral lending institutions to stipulate that all further investments in the Indian power sector conform to market norms. Additionally, American companies seeking to invest in the electricity sector would also be wise to avoid the temptations that enticed Enron—which sought substantial counterguarantees from both the state and the central governments in India during its negotiations to build the largest ever foreign-built electricity-generating plant in the country. Enron's experience has made both foreign firms as well as state-level governments in India, wary of large-scale foreign investments in the energy sector.

Nuclear Power

As the visit of Prime Minister Manmohan Singh to Washington last week made clear, India's policymakers are keen on expanding the role of nuclear power to meet the country's growing appetite for energy. India's unwillingness to accede to the nuclear Nonproliferation Treaty (NPT) has long constrained its ability to upgrade and expand its nuclear-power infrastructure. Consequently, at the present time, nuclear energy contributes a paltry 3 percent of India's power needs.

Without significant international cooperation, the situation is unlikely to improve. In light of this situation the decision of the administration to pursue civilian nuclear cooperation with India is of enormous significance. Although deliberation on such a change in policy is appropriate, I urge you, your Senate colleagues, and your colleagues in the House of Representatives, to pass the necessary enabling legislation to make such bilateral cooperation possible.

The arguments against supplying India with civilian nuclear equipment are well known. Briefly stated, they hold that if the United States makes an exception for India, the fabric of the nonproliferation regime is likely to start unraveling; that such an action would encourage both North Korea and Iran to speed up their nuclear weapons programs, possibly to the point of testing; that Pakistan, now a major non-NATO ally, is likely to make similar requests for access to civilian nuclear technology; and that such cooperation would reward a state that is not a formal member of the carefully constructed nonproliferation regime. Though seemingly compelling, all of these arguments merit more careful scrutiny and reexamination.

Such scrutiny reveals each of these arguments to be flawed. First, since India was never part of the global nonproliferation regime, the question of India's unraveling that regime is really moot. Even before the NPT went into effect in 1970, India had made clear its explicit reservations about its lopsided expectations. Second, the choices that Iran and North Korea are likely to make about their ongoing nuclear weapons programs will be made regardless of what the United States does or does not offer India. Their leaders will make choices based on assessments of what is best for their own countries. Furthermore, it needs to be underscored that both Iran and North Korea blatantly violated the solemn international obligations inherent in their membership in the NPT—and thus if that regime is on the verge of unraveling, it is because of their actions, not those of India. Third, despite Pakistan's present robust relationship with the United States, it cannot be allowed to constrain American policy toward India. More to the point, India, unlike Pakistan, has an excellent export-control system and has not allowed technology seepage. It has also maintained a strict and effective separation between its civilian and military nuclear establishments. And fourth, India has stated that it is willing to accept full-scope safeguards on all its civilian nuclear reactors; thus it will be submitting to the requirements of the NPT regime even without being a formal member—a stark contrast to existing signatories that refuse to submit to the requirements of the regime. Finally, as a practical matter, nonproliferation must be seen as just one of the many interests that the United States has in its dealings with India. A single issue, however important, should not become the determinant of American policy toward one of the most significant states in Asia and a potential global power.

ENVIRONMENTALLY SOUND ALTERNATIVES

Apart from investing in and upgrading its nuclear infrastructure, India will have to continue to tap its substantial coal reserves. Interestingly, this sector offers another important avenue for Indo-U.S. cooperation. Indian coal is extremely high in ash content and thereby highly polluting. The United States has developed clean-coal technology that could be used to alleviate the environmental effects of this crucial source of energy, and this technology should be made commercially available to India.

Finally, India has a modest renewable-energy program, and the plans for its expansion are ambitious. According to the government's Policy Statement on Renewable Energy, India hopes to obtain as much as 10 percent of its new power capacity from renewable sources—wind, biomass, hydroelectric, and solar—by 2012. If the country even hopes to approximate this goal, however, it will require both external funding and technological expertise. Once again, American firms, which have considerable expertise in the development of alternative and renewable energy sources, could play a vital role in energizing the Indian market.

CONCLUDING REMARKS

Despite some ongoing differences, Indo-U.S. relations have rarely been as cordial as they are today. In the present climate, it behooves both sides to try and circumvent the remaining differences and broaden the arenas of cooperation. The rapidly expanding Indian energy market offers substantial opportunities for Indo-U.S. cooperation. Much of this cooperation could be accomplished under the aegis of the newly initiated India-U.S. Energy Dialogue.

India's appetite for energy is unlikely to be curbed anytime soon. That said, it lacks the necessary technological expertise, financial resources, and global reach to address its energy needs. Cooperating with the United States in a gamut of energy-related projects offers the possibility of addressing these critical needs.

The CHAIRMAN. Thank you very much, Professor Ganguly.

We thank the panel. Your full statements, as well as this dialog, will be made part of the record and made available to our colleagues. We thank you so much for coming.

And the hearing is adjourned.

[Whereupon, at 11 a.m., the hearing was adjourned.]

 AN ADDITIONAL QUESTION AND ANSWER SUBMITTED FOR THE RECORD

RESPONSE OF ASSISTANT SECRETARY GARMAN TO A QUESTION BY SENATOR LUGAR

Question. India's nuclear power generation currently accounts for less than 3 percent of the country's total. Given this sector's current small contribution to India's aggregate energy needs, is it realistic to expect that New Delhi will rely on nuclear power in a significant way within the next 10–15 years?

Answer. Since nuclear power's share of the energy mix in India is currently quite small, it will take many years for nuclear power to garner a sizable share of their energy market. In the Energy Information Administration's "International Energy Outlook 2005," nuclear power's share of India's total energy consumption is projected to increase from about 2 percent in 2002 to 5 percent in 2025.