

**CHINA'S ENERGY CONSUMPTION AND OPPORTUNITIES FOR  
U.S.-CHINA COOPERATION TO ADDRESS THE EFFECTS OF  
CHINA'S ENERGY USE**

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**HEARING**

BEFORE THE

U.S.-CHINA ECONOMIC AND SECURITY  
REVIEW COMMISSION

**ONE HUNDRED TENTH CONGRESS**

FIRST SESSION

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JUNE 14-15, 2007  
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WASHINGTON : SEPTEMBER 2007

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**THURSDAY, JUNE 14, 2007**

**U.S.-CHINA ECONOMIC AND SECURITY REVIEW COMMISSION**  
*Washington, D.C.*

The Commission met in Room 385, Russell Senate Office Building, Washington, D.C. at 9:07 a.m., Chairman Carolyn Bartholomew, Vice Chairman Daniel A. Blumenthal, and Commissioners Richard D'Amato, Dennis C. Shea and Peter Videnieks (Hearing Cochairs), presiding.

**OPENING STATEMENT OF CHAIRMAN CAROLYN  
BARTHOLOMEW**

CHAIRMAN BARTHOLOMEW: Good morning, everyone. We'll go ahead and get started. We are waiting for one of our other witnesses to arrive, but we thought we would do our opening statements.

Welcome to the fourth hearing of the U.S.-China Economic and Security Review Commission's 2007 reporting cycle. We are very pleased that you could join us today.

At today's hearing, we are continuing the Commission's assessment of U.S.-China relations by exploring a topic that has been at the forefront of recent bilateral dialogues--energy--one of the areas Congress mandated the Commission to explore.

Today's hearing will assess the impact of China's rising energy consumption on U.S. security and access to energy supplies. We will examine this issue of energy security from strategic and environmental perspectives that we hope will allow the Commission to gain a broader understanding of the implications of China's growing energy consumption.

The deteriorating state of China's environment has consequences for people around the world. During this hearing, we hope to hear

suggestions of strategies for mitigating any negative effects of China's energy use on U.S. energy security and to the environment and for exploring new opportunities for U.S.-China cooperation on energy.

Later today and tomorrow, key officials from executive branch agencies, a representative of the Lawrence Livermore National Laboratory and expert witnesses from the private sector and academia will offer their views and advice on energy and environment issues.

I am looking forward to the testimony of our witnesses and to the insight they will provide.

Commission Vice Chairman Dan Blumenthal is serving as one of the four cochairs for today's hearing. I'll turn the proceedings over to him for his opening remarks. But first I want to express appreciation to him and to the other three hearing cochairs, Commissioners Richard D'Amato, Dennis Shea, and Pete Videnieks, for their work in assembling this important hearing.

Welcome again to all of you. Thank you for your interest in the Commission's work.

[The statement follows:]

### **Prepared Statement of Chairman Carolyn Bartholomew**

Good morning and welcome to the fourth hearing of the U.S.-China Economic and Security Review Commission's 2007 reporting cycle. We are pleased that you could join us today.

At today's hearing, we are continuing the Commission's assessment of U.S.-China relations by exploring a topic that has been at the forefront of recent bilateral dialogues—energy, one of the areas Congress mandated the Commission to explore. Today's hearing will assess the impact of China's rising energy consumption on U.S. security and access to energy supplies. The Commission will examine this issue of energy security from strategic and environmental perspectives that we hope will allow the Commission to gain a broader understanding of the implications of China's growing energy consumption. The deteriorating state of China's environment has consequences for people around the world. During this hearing, we hope to hear suggestions of strategies for mitigating any negative effects of China's energy use on U.S. energy security and the environment, and for exploring new opportunities for U.S.-China cooperation on energy.

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Commission Vice Chairman Daniel Blumenthal is serving as one of the co-chairs for today's hearing. I'll now turn the proceedings over to him for his opening remarks. First I want to express appreciation to him and the other three hearing co-chairs, Commissioners Richard D'Amato, Dennis Shea, and Peter Videnieks, for their work in assembling this important hearing.

Welcome again to all of you and thank you for your interest in the Commission's work.

**OPENING STATEMENT OF VICE CHAIRMAN DANIEL A.  
BLUMENTHAL**

VICE CHAIRMAN BLUMENTHAL: Thank you very much, Madam Chairman. Good morning to all and welcome to the U.S.-China Commission Hearing on Energy Consumption and Opportunities to Mitigate the Effects of China's Energy Use.

As the chairman mentioned in her remarks, this hearing will address the trends and impact of China's energy consumption, the strategic and environmental consequences of that energy use and strategies for addressing these effects, as well as U.S.-China cooperative programs on energy and on the environment.

It is important as we begin to assess the impact of China's energy use that we remember that a stable energy supply is inextricably linked to economic development. As China continues its migration from a subsistence agrarian economy to a global industrial powerhouse, it can do so only with a stable energy supply and adequate energy infrastructure.

Although most of China's energy comes from domestic coal supplies, its reliance upon oil imports has been growing quite rapidly. Chinese leaders view this dependence as a source of energy insecurity, especially as China must rely upon the U.S. protection of sea lanes to ensure the safe transport of oil supplies from Africa and the Middle East.

To mitigate this insecurity, China appears to be using a whole host of its national power, diplomatic, political, economic, as well as military, to ensure a stable energy supply.

China cultivates relationships with Central Asia, African, and Middle Eastern nations and uses development aid and economic policies to help open doors, as well as investing in countries with unfavorable international reputations where Western companies are either prohibited from investing or choose not to invest.

Most disturbing today is China's continued promise and continued provision of aid and support to Sudan where the human rights situation is quite atrocious.

Energy not only has affected China's foreign relations, but also appears to be affecting the course of its military modernization. The Commission was pleased with the openness of the People's Liberation Army when we went to China to discuss issues of military modernization. We were very pleased with the Chinese military's openness about its role in the future in protecting the Chinese oil supply.

I look forward to hearing about the environmental and strategic

consequences of China's energy use and any suggestions for how the U.S. can best address these issues in ways that avoid conflict and confrontation.

Thank you today to our witnesses for appearing and for providing your insights and expertise to the Commission and thank you very much to my fellow commissioners who are cochairing this hearing, and I'm going to pass it on to Commissioner Videnieks for his opening remarks.

[The statement follows:]

### **Prepared Statement of Vice Chairman Daniel A. Blumenthal**

Good morning, and welcome to the U.S.-China Commission hearing on “China’s Energy Consumption and Opportunities to Mitigate the Effects of China’s Energy Use.” As the Chairman mentioned in her remarks, this hearing will address the trends and impact of China's energy consumption; the strategic and environmental consequences of that energy use; strategies for addressing these effects; and U.S.-China cooperative programs on energy and the environment.

It is important as we begin to assess the impact of China’s energy use that we remember a stable energy supply is inextricably linked to economic development. As China continues its truly remarkable migration from a subsistence agrarian economy to a global industrial powerhouse,, it can do so only with a stable energy supply and an adequate energy infrastructure that supports the entire country. Although most of China’s energy comes from domestic coal supplies, its reliance upon oil imports has been growing rapidly. Chinese leaders view this dependence as a source of energy insecurity, especially as China must rely on U.S. protection of sea lanes to ensure the safe transport of its oil supplies from Africa and the Middle East. To mitigate this insecurity, China appears to be using both soft power and hard power strategies to ensure a stable supply.

China is cultivating relationships with Central Asian, African, and Middle Eastern nations and using development aid, debt relief, and other instruments to open doors. Chinese national oil companies are actively seeking equity stakes in oil production, often in countries with high political risk and unfavorable international reputations where Western companies either are prohibited from investing or choose not to invest. Most disturbing is China’s continued promise of aid and support to Sudan, where China has a significant oil investment, despite the genocide occurring in the Darfur region.

Energy not only has affected China’s foreign relations, but also appears to be affecting the course of its military modernization. During a Commission meeting with officers from the People’s Liberation Army Academy of Military Sciences, officers acknowledged the role of the military in protecting China’s development, and specifically its energy supplies. China’s military modernization has the objective not only of preventing Taiwan from declaring independence, but also of ensuring that China’s development stays on course. This goal can be linked to the development of a blue water navy, a reluctance or refusal to resolve territorial claims in the South China Sea and East China Sea, and the expansion of China’s military presence in Asia and around the world.

In addition to the concerns about the environmental effects of China’s energy use that will be highlighted at this hearing, I believe it is just as important to consider the impact that energy has on China’s relationships around the world in places that affect U.S. security interests, namely Iran, Sudan, and Venezuela, and the effect of China’s energy use on its military modernization and strategy. I look forward to hearing about the environmental and strategic consequences of China’s energy use and any suggestions for how the United States can best address these issues in ways that avoids confrontation.

Thank you to our witnesses today for appearing and for providing your insights into the questions raised by the Commission. At this time, I’ll turn the microphone to Commissioner and Co-chair for today’s session Peter Videnieks for his opening remarks .

## **OPENING STATEMENT OF COMMISSIONER PETER VIDENIEKS**

HEARING COCHAIR VIDENIEKS: Thank you, Vice Chairman Blumenthal, and please let me extend my welcome to all of the people who join us today. Your remarks focused on the strategic and military impacts of China's energy use. I would like to highlight in my opening statement the energy security vulnerability of the U.S. resulting from its dependence on oil and gas imports.

This dependence can be mitigated by developing fuels that offer alternatives to oil and natural gas, one of those being clean coal produced with clean coal technology.

The U.S. has the largest amount of coal reserves in the world, 27 percent of global supplies. Currently, coal provides 23 percent of our energy consumption compared to nearly two-thirds that China consumes. Almost 92 percent of all coal consumed in the U.S. fuels the electric power sector. Our reliance upon oil as a fuel source is still significantly greater than China's oil consumption--I'm saying it is and probably will stay so--both in absolute and per capita figures.

The U.S. consumes approximately 20 million barrels of oil per day. In 2006, China consumed approximately a third of that, or 7.4 million barrels per day. The majority of the petroleum consumed in the U.S. is imported, approximately 60 percent of our net imports in 2005.

If the U.S. supply were to be interrupted, the nation could tap into our Strategic Petroleum Reserve, but although it holds almost 700 million barrels, that is equivalent to only 35 days of current consumption and provides only 56 days of current import protection.

Once this reserve were to be exhausted, we would be faced with a challenge how to supply our energy needs. Some even estimate that in the event that the U.S. had to rely totally on domestic petroleum reserves, at the current rate of use, we'd be out of oil in four or five years.

In China, in addition to energy security concerns, there's a great and growing concern about environmental effects of China's coal consumption, concerns about public health, air quality and carbon dioxide emissions that contribute to global warming.

China relies on coal for domestic and industrial electricity production, but to date, environmental controls have been ineffective in controlling pollution. The problems resulting from China's increased energy intensity and inefficient coal burning and a U.S. increasing dependence on imported petroleum provide the U.S. and China with a unique opportunity to engage in the joint development and use of clean coal technologies that utilize coal supplies available in great quantities in both countries.

But the emphasis here should be on clean. This approach could make a significant contribution to addressing our own domestic strategic concerns about the possibility of our oil supply being cut off during a crisis and also to the reduction of the pollution produced by China's current methods of coal consumption.

This Commission is mandated by Congress to investigate and provide an advisory report regarding the effect of the large and growing economy of the People's Republic of China on the finite world fossil energy supplies and the role we could play, the U.S., including joint research and development efforts and technological assistance in influencing the energy policy of the PRC.

I hope that through the course of this hearing, we will hear the opinions of experts on how to positively influence the energy policy of the PRC and what types of joint research and development projects can be pursued to reduce our dependence on oil and gas.

And of course we welcome the comments of today's witnesses.  
[The statement follows:]

### **Prepared Statement of Commissioner Peter Videnieks Hearing Cochair**

Thank you, distinguished panelists and Vice Chairman Blumenthal, and please let me extend my welcome to all who join us today. Vice Chairman Blumenthal's remarks focused on the strategic and military impacts of China's energy use. I would like to highlight in my opening statement that the energy security vulnerability of the United States resulting from its dependence on oil and gas imports can be mitigated by developing fuels that offer an alternative to oil and natural gas—one of those being clean coal produced by clean coal technology.

The United States has the largest amount of coal reserves in the world—27 percent of global supplies. Currently, coal provides about 23 percent of energy consumed by the United States, compared to nearly two-thirds of the energy China's consumes. Almost 92 percent of all coal consumed in the U.S. fuels the electric power sector. U.S. reliance upon oil as a fuel source is still significantly greater than China's oil consumption, both in absolute and per capita figures. The United States consumes approximately 20 million barrels per day and in 2006 China consumed approximately 7.4 million barrels per day. And the majority of the petroleum consumed in the United States is imported – approximately 59 percent in net imports in 2005. Were the U.S. supply to be interrupted, the nation could initially tap into the U.S. strategic petroleum reserve. But, although it holds almost 700 million barrels, that is equivalent to only 35 days of current consumption and provides only 56 days of current import protection. Once that supply is exhausted, we would be faced with a daunting challenge of how to supply America's energy needs. Some estimate that in the event that the U.S. had to rely on domestic petroleum reserves only, at the current rate of usage, we'd be out of oil in four years.

In China, in addition to energy security concerns, there is great and growing concern about the environmental effects of China's coal consumption – concerns about public health, air quality, and carbon dioxide emissions that contribute to global warming. China relies upon coal for domestic and industrial electricity production, but to date environmental controls have been ineffective in controlling pollution. The problems resulting from China's increasing energy intensity and inefficient coal burning and U.S. increasing dependence on imported petroleum provide the U.S. and China with a unique opportunity to engage in the joint development and use of clean coal technologies that utilize coal supplies available in both countries but also greatly reduce air emissions and other pollutants. This approach could make a significant contribution to addressing our own domestic strategic concerns about the possibility of our oil

supply being cut off during a crisis and also to reducing the pollution produced by China's current methods of coal consumption.

The U.S.-China Commission is mandated by the U.S. Congress to investigate and provide an advisory report regarding the effect of the large and growing economy of the People's Republic of China on world energy supplies and the role the United States can play, including joint research and development efforts and technological assistance, in influencing the energy policy of the People's Republic of China. I hope that through the course of this hearing we will hear the opinions of experts on how to positively influence the energy policy of the People's Republic of China and what types of joint research and development projects can be pursued to reduce our dependence upon oil and gas.

## **PANEL I: ADMINISTRATION PERSPECTIVES**

VICE CHAIRMAN BLUMENTHAL: Thank you. We'll begin with Ms. Ayres.

We're going to ask you to keep your comments to seven minutes each and then we're going to have ample time for questions and the discussion.

I'm very happy to introduce the first panel: Assistant Secretary of Energy for Policy and International Affairs, Karen Harbert; and Assistant Administrator of International Affairs at the EPA, Judith Ayres.

Ms. Harbert is the Assistant Secretary for Policy and International Affairs at the Department of Energy. Her office is the primary policy advisor to the Secretary and the Department on domestic and international energy issues, new policy initiatives, and implementation of the National Energy Policy.

In that capacity, she negotiates and manages bilateral and multilateral agreements with other countries and international agencies to further energy security and research and development activities. She is also Vice Chairman of the International Energy Agency. We've very pleased to have her today.

Judith Ayres is the Assistant Administrator of the U.S. EPA for International Affairs. She was unanimously confirmed by the U.S. Senate in August 2001. In her capacity, she serves as the advisor to the EPA Administrator on international affairs and oversees programs in over 50 countries as well as initiatives on trade and investment pursuant to the Trade Promotion Authority Act.

Thank you both for joining us and, as I said, we'll begin with Ms. Ayres and move on to Ms. Harbert.

**STATEMENT OF THE HONORABLE JUDITH E. AYERS,  
ASSISTANT ADMINISTRATOR, OFFICE OF INTERNATIONAL  
AFFAIRS, U.S. ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C.**

MS. AYRES: Good morning. Madam Chair, Mr. Vice Chair, members of the Commission, thank you for the invitation to appear today to discuss the United States environmental policy approach to China, specifically EPA's approach to collaboration with China to address air pollution emissions.

I shall first address environmental concerns regarding air quality resulting from rapid economic and energy generation in China. I shall then discuss the work EPA is doing with China in an effort to alleviate the consequences of the resulting pollution which impact both China and parts of the rest of the world.

I shall then comment upon EPA's plans to enhance its cooperation with China and finally on the necessity to coordinate within the international community.

The steady expansion of China's economy has been well documented. The Chinese economy today is roughly ten times larger than it was in the early '80s. Since 1988, China's gross domestic product growth has averaged 8.5 percent with an estimated GDP of 2.5 trillion in 2006. China ranks in the world behind the United States, Japan and Germany only.

Since 2000, electricity generation from fossil fuels has increased over 14 percent annually. China's economy is becoming more, not less, energy intensive. This rapid growth and the corresponding demand in energy consumption has increased emissions of priority air pollutants and greenhouse gases.

One of EPA's closest partners in China, the State Environmental Protection Administration, or SEPA, estimates that environmental degradation costs China eight to 13 percent of its annual GDP. Air pollution alone is estimated to cause economic damage equivalent to two to four percent of annual GDP.

China relies on coal-fired power plants to generate approximately 70 to 75 percent of its electricity. It is often reported that China expects to commission a new coal burning power plant every week over the next two to three years.

These plants have limited control for sulfur dioxide and nitrogen oxides. In addition, based on projections by China's Ministry of Communications, the numbers of vehicles on China's roads will increase from roughly 25 million today to 140 million by 2020.

As a result, air quality in many cities in China is poor and the Chinese face major challenges in reducing pollution to healthy levels.

The average concentration of fine particulate pollution in Beijing is seven times the ambient standard set by the U.S. EPA.

The World Health Organization estimated in 2002 that current outdoor air pollution levels could be responsible for over 300,000 premature deaths in China.

Due to heavy reliance on uncontrolled coal-fired power plants, China is one of the world's largest emitters of sulfur dioxide and mercury. These emissions affect the environment within China and have significant implications throughout the East Asia region and even in the United States due to the long-range transport of air pollutants.

According to the International Energy Agency, China will in the near future surpass the United States as the world's largest emitter of greenhouse gases.

Indeed, China would appear to have no easy solutions to its environmental challenges, but its leaders are looking to international partners for help. EPA has collaborated with the Chinese government on innovative approaches including those of market mechanisms to address both energy and environmental concerns.

Productive collaboration has been achieved through agency to ministry agreements, multilateral efforts such as the Asia Pacific Partnership on Clean Development and Climate, or more broadly, through the U.S.-China Strategic Economic Dialogue.

Many of EPA's programs in China are conducted within the framework of a 2003 Memorandum of Understanding with China's State Environmental Protection Administration. The MOU established a mechanism for the U.S. and China to determine strategic environmental objectives and to coordinate environmental activities.

Among the many initiatives EPA has undertaken under this MOU is one working to develop and disseminate solutions to reduce air pollution from home cooking and heating.

A second is a partnership with the Shanghai Port to assess air quality management. This science-based air quality technology will allow the people of Shanghai to be made aware of air quality within the environs.

In November 2006, working in partnership with the Beijing Environmental Protection Agency and SEPA, EPA jointly launched a project on the retrofit of city buses. It is hoped that this project will carry over, not only within the city of Beijing with possible positive ramifications for the Olympics but also throughout the country.

Last summer, EPA and the Asia Development Bank signed a letter of intent which both sides expect will enhance our mutual work in China.

Multilateral efforts are important. I have mentioned the Asia Pacific Partnership. You may be familiar with this. The Asia Pacific

Partnership is a public-private partnership of six nations--China, Australia, China, India, Japan and the Republic of Korea, and of course the United States--committed to exploring new mechanisms to meet national pollution reduction, energy security and climate change goals in ways that reduce poverty and promote economic development.

I shall move ahead in the time remaining to discuss the Strategic Economic Dialogue. At the last meeting of the Strategic Economic Dialogue which was held here in Washington about a month ago, EPA and the Chinese counterparts have collaborated on four projects.

The first is a joint study, which is designed to evaluate the environmental economic and human health costs of various policy approaches for saving energy and controlling emissions from the Chinese and U.S. power sectors.

This allows the United States to work with China in first coming up with a plan, which is, as we all are aware, a preferred way of doing business in China.

The second deliverable from the Strategic Economic Dialogue addresses energy efficient office products. The Energy Star Program we have at the Environmental Protection Agency last year alone saved the equivalent greenhouse gas emissions which equate to the emissions that would result from 25 million automobiles on the highway. We also found that there was a utility savings of \$14 billion. So this program is something we're working with with the Chinese.

The third is a coal mine methane project, a capture project. The fourth is a low sulfur fuel policy for China. A comment on low sulfur fuel--we here in the United States have adopted a low sulfur fuel policy and the data shows us that regarding the positive health and environmental benefits, it is probably the most singular positive action that EPA has been able to take over the years to improve public health and the environment. I see that the clock is ticking so I will--

VICE CHAIRMAN BLUMENTHAL: We're on the honor system since we have--

MS. AYRES: I shall abide by the rules, but I am compelled to make a comment on multilateralism. I will make two comments. One on enforcement and compliance and one on multilateralism.

Many critical environmental decisions in China are made at the provincial or local level by officials with little or no environmental training or responsibility. EPA's colleagues at SEPA are too few to oversee more than a handful of such decisions. EPA and the Asia Development Bank have been asked by SEPA to facilitate the establishment of six regional supervision centers that will create a new level of SEPA oversight.

These new centers may also serve as training platforms for which SEPA can build enforcement capacity at the regional level and local

levels while engaging more actively with important stakeholders outside the national government.

However, one must note that the institutional structure involved in ensuring compliance with China's energy and environmental goals is somewhat fluid. Our plans for environmental cooperation with China will need to adapt to new policies and structures. I refer here to China's June 4 announcement of measures to reduce greenhouse gas emissions, and last month's report of a new leading group to address energy efficiency and emissions reductions.

Next summer's Beijing Olympics will also affect China's willingness to prioritize progress on clean air initiatives.

Regarding multilateralism, China's environmental performance is being closely monitored both by other countries and international organizations around the world.

China has said they are engaged in some 80 international bilateral environmental agreements. But ironically there is scant coordination among the 80 nations outside of formalized international partnerships.

In conclusion, EPA believes that it is in the best interest of both the United States and China to work together to address the environmental challenges resulting from China's significant economic growth and energy consumption.

In fact, the common interests the United States and China share in promoting good environmental practices and sustainable energy policies make these amongst the most promising and important areas for collaboration.

Thank you.  
[The statement follows:]<sup>1</sup>

VICE CHAIRMAN BLUMENTHAL: Thank you very much, Ms. Ayres, and over to you, Ms. Harbert.

**STATEMENT OF THE HONORABLE KAREN A. HARBERT  
ASSISTANT SECRETARY, OFFICE OF POLICY AND  
INTERNATIONAL AFFAIRS, U.S. DEPARTMENT OF ENERGY  
WASHINGTON, D.C.**

MS. HARBERT: Good morning, Madam Chairwoman and Mr. Vice Chairman and members of the Commission. I'm pleased to be here today, to offer testimony. The last time we were here was in February 2007, and we also had the opportunity to testify here in August of 2006, and in light of the depth and breadth of that testimony

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<sup>1</sup> [Click here to read the prepared testimony of Assistant Secretary Judith E. Ayers](#)

which outlined in some detail our energy cooperation, I propose to do something a little bit different today which is to try and be brief and leave time for Qs and As.

I would like to submit my written testimony for the record and also a May 22 DOE report that summarizes our energy cooperation which should serve the Commission's interests very well.

I want to reiterate first our overall goal with China--why we have elected engagement versus isolation and it's principally why it is important and what areas specifically we think we can make a difference to enhance our energy security, our collective environmental stewardship and how to sustain economic growth.

Just a few facts, and I know you're well acquainted with it, but I think this is important as a backdrop to why we are actively engaging in China. As global energy consumption will increase by roughly 50 percent between now and 2030, 70 percent of that growth is going to come from the developing world and 30 percent of that growth will come from China.

China is the second-largest consumer of energy. China consumed 40 percent less energy than the U.S. in 2004, but by 2030, it will consume 11 percent more than the United States. Right now it consumes about 7.5 million barrels of oil per day and by 2030, that will double to 15 million barrels of oil per day.

Of that oil, industry uses 70 percent of that oil and the industrial sector in China is growing and will continue to grow. China only became an importer of oil 15 years ago. It imported about two percent of its oil in 1993. By 2004, it was importing 43 percent of its oil. It is becoming import dependent, just like the United States is import dependent.

It is the single-largest consumer and producer of coal and is the second-largest producer of hydroelectric power. As Ms. Ayres has said, China has 25 million cars on the road today, and by 2020, it's projected to have almost 150 million cars.

There are some estimates that as high as 300 million vehicles if you account for light trucks and heavy-duty vehicles. Where is that steel going to come from? Where is that fuel going to come from? Where is that infrastructure going to come from and the energy to actually construct that infrastructure?

In 1990, only 11.5 percent of the population had air-conditioners. By 2003, 62 percent of the population had air-conditioners. 40.5 percent of China's population lives in urban areas, and that will increase to about 55 to 60 percent by 2020. An urban dweller uses 35 times the energy than of a rural resident.

So those are some stark facts. That's why we elect to engage rather than isolate China. China is clearly heavily reliant on fossil

fuel as is the United States, and it will have a major impact on the global environment. By 2030, energy-related carbon dioxide emissions from China are projected to account for 26 percent of the world's total and projected to exceed U.S. emissions before 2010, and by 41.4 percent by 2030.

So what does this mean? It means that we must engage China and find ways to have them become a responsible stakeholder in the international economy and the global energy system.

That is why in the last two years, our Secretary has been to China once, I've been three times, my Deputy has been two times, is currently on her way back from China. The Chinese have been here four times. That is just on energy policy issues alone. That is not technical exchanges. It's at very senior levels. So we've had ten back and forths in just the last 24 months alone.

There are lots of different ways we engage. We've testified to those before, whether it's our Energy Policy Dialogue, the Strategic Economic Dialogue, and the Asia Pacific Partnership. We have a whole alphabet soup--IPHE, CSLF--I could go on and just daze you with acronyms, but I won't.

Our view is it doesn't matter under what chapeau, it matters that we're getting results, and we've chosen very specific areas to get results. The first is in coal, fossil fuels, fossil energy. It's a dominant player in their energy market; it's a dominant player in ours. We have to crack the code on advanced coal technology here in this country, and we want to partner with China to do it. It's in our interest; it's in their interest.

They have elected to join us in the FutureGen project here in the United States which will be the first emissions free coal-fired power plant ever built, and they will be part of the government steering committee and observing how we actually construct this. India, I'm pleased to say, as is Japan and South Korea.

But it's very important that they partner with us along the way. There's a huge market for American technology in advanced clean coal technology in China as they seek to build out their electricity infrastructure. We hope to capitalize on advanced coal technology to expand our markets for our companies, help them become environmentally responsible users of their coal and help them meet their electricity needs.

Energy efficiency and renewable energy. Biofuels can play an extremely important role in meeting their transportation fuel needs. It certainly is becoming a much more important player here in the United States. We have an interest in helping them define what type of a role biofuels can play in China.

I'm pleased to say that we just had a big delegation from China

out to our National Renewable Energy Laboratory out in Golden, Colorado, and they became acutely aware that there's a lot more work to be done to understand what role biofuels can play in China.

It has a very diverse agricultural environment in China, as we do here, and we're looking at different feedstocks so that we have different availabilities of biofuels. We're going to help them find out what is the probability of expanding the use of biofuels and what type of feedstocks they can use there.

We're going to help them look at industrial efficiency. As I said 70 percent of the oil they use is in their industrial sector. We have a program here in the United States where we have audited 200 of the most energy intensive industries here to help them understand how they can save energy. That is actually profit-motivating for them. It saves them money. And we want to do that with China, so that they will have a core of auditors that can go out to their industries and help them save energy so that they can actually become better users of clean energy.

That's an important theme that came out of the Strategic Economic Dialogue which is how we can work with China to actually lower tariff and non-tariff barriers to clean energy goods and services. We are only hurting ourselves by making these things, which are good for the environment and good for clean energy, more expensive, not just for ourselves and for China, but for the rest of the developing world as well.

So we in China will be helping to lead the way within the Doha round to actually get this at the top of the list and have this addressed in the negotiations upcoming.

Nuclear energy. China is embarking on a very aggressive expansion of nuclear power. We are very pleased about that. It is a clean source of energy. It is an opportunity for U.S. manufacturers, an opportunity for U.S. companies, and so we are very supportive of their expansion. We are also very supportive of their commitment now to join us in the President's Initiative on the Global Nuclear Energy Partnership.

We had a ministerial meeting of five countries here the day before the Strategic Economic Dialogue, and the Chinese have agreed to become full partners in this long-term vision of how we're going to transform the world's use of nuclear energy over the long term to make it proliferation resistant, to make the fuel available and to find ways to bring it back, recycle it and make it unattractive to potential terrorists.

I'd be remiss if I didn't talk about strategic oil stockpiles. I came in at the end of your statement, Mr. Commissioner, in which you were talking about the importance of the use of oil and what would happen in a disruption. We have been very intent on having China as

it becomes a central character in the energy market to build a Strategic Petroleum Reserve.

They have embarked on such a program; they have four sites that they have selected around China. They're building this in three phases. What we mostly are concerned about is the way they will use their Strategic Petroleum Reserve. It is very appetizing, very attractive to use such resources to mitigate price hikes.

We in this country use it to mitigate supply disruptions, which is a good thing for the global energy market, as we used it in the wakes of Hurricanes Katrina and Rita. So we are working with them very closely to help them understand the value of a Strategic Petroleum Reserve to be used only in the case of a supply disruption.

We just had them out to our SPR site in Bryan Mound, Texas. They were very interested in how to do this in underground salt caverns, and we will pursue that engagement with them in many different fora including in my capacity at the International Energy Agency and inviting them to participate with us in supply disruption scenarios and in the actual regulatory and legal framework to govern that.

My last point is on climate change. Climate change was a central point of the recent G8 meeting. Before the G8 meeting, the President made a very, very important announcement, an invitation to establish a new framework going forward after the Kyoto Protocol in 2012, a post-Kyoto framework for the world.

We are on an ambitious program here in the United States to reduce our greenhouse gas intensity by 18 percent by 2012. We've spent \$37 billion to actually achieve those technologies that will help us solve the climate change challenge. In 2006, we reduced our emissions by 1.3 percent in this country, despite having economic growth. We are proving to the world you can have economic growth and still be a good environmental steward.

However, us acting alone will not solve the climate change challenge. We must have countries like China and India at the table because over the long term, while the industrialized world is able and will take its share of the responsibility, we have to have the developing world at the table. Otherwise, all the steps we take will not succeed.

So the President has issued an invitation. He is excited about taking the leadership and involving China in an upcoming summit in the United States that will bring the largest emitters including China to establish a way forward over the next 18 months to address greenhouse gas emissions, to address the climate change challenge together, to establish a goal of how we're going to do that, and establish national commitments to meet that goal.

So China has to be a part of that and we will engage very intensely over the next 18 months to get this to a point where China and India and others can join us and not sacrifice economic growth, improve environmental sustainability, and certainly make a step forward on energy security.

So I leave all the alphabet soup of the different ways that we engage with China to questions and answers, but let me just say that it is unavoidable that our economies are intertwined, that our energy security is intertwined, and certainly that our environment is intertwined, which is why we will continue to engage and engage much more aggressively over the short and medium term to have China and the U.S. understand each other better, have more common policy frameworks, and to find ways for our scientists and our policymakers to increase their cooperation to solve common challenges.

Thank you.

[The statement follows:]<sup>2</sup>

#### **PANEL I: Discussion, Questions and Answers**

VICE CHAIRMAN BLUMENTHAL: Thank you very much to both of you. I'll take the first question. The first question I have is on the proliferation-resistant piece of the nuclear equation.

There seems to be two parts to that. One is China's own attempts to upgrade it, which they were very clear with us when we were there a few weeks ago. They want to be more serious about their own strategic weapons capability, and so obviously that's a concern for the United States. We're very interested in the fusion between the civilian nuclear sector and the military sector and any insights you'd have on how to make our cooperation proliferation resistant in that regard.

The other one is the outward proliferation problem. As China still has problems in that regard, that we've heard about in testimony over the last few years, I'd be interested in hearing how you are making safeguards since we're going forward aggressively on nuclear cooperation, with regards to outward proliferation as well of different types of civilian nuclear material?

MS. HARBERT: Let me first say we are, as I indicated, very supportive of the expansion of nuclear power around the world, with the caveat that it's done, as you said, in a proliferation resistant manner.

As China looks to build anywhere from 20 to 40 new nuclear plants, it's an opportunity to address our trade imbalance, but it is also an opportunity for our military complexes to greatly enhance their

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<sup>2</sup> [Click here to read the prepared testimony of Assistant Secretary Karen A. Harbert](#)

cooperation as well. That was noted in today's Washington Post, as a matter of fact.

There are those that would like to say that China's build-up is a direct threat; there are others that would like to say this is an opportunity to better understand each other so that we have deepened cooperation. I think it's unavoidable that we have to seek the path of deepened cooperation so that we can ensure the world and ourselves most importantly that the pursuit of nuclear power is being done in a way that is proliferation resistant.

We have to find a way over the long term to ensure this great expansion of nuclear power, which will greatly contribute to the climate change challenge is done in a way that addresses the reprocessing of nuclear fuel, which is why we invited China and they have accepted to join the Global Nuclear Energy Partnership. We have to separate the fuel into ways.

First of all, in a nuclear plant, you only use about ten percent of the available fuel and you ship 90 percent of it back. We'd like to find a way to recycle that, to separate out the bad parts and to be able to then continue to use the existing fuel we have in a more efficient way.

Having China at the table is very important. The other thing we did recently is that we have a thing called Generation IV. It's not a U.S. initiative. It's a worldwide initiative of 21 countries that are looking to find the next advanced really commercialized source of nuclear energy.

Right now people are using AP-1000, which is what China has just selected from Westinghouse, a Generation III and a Generation III Plus technology. Generation IV gets us to be even more efficient, even more proliferation resistant. They have joined the Generation IV Forum. It takes a high level political and financial commitment from China, but the countries themselves have to come to a consensus to invite them to the table.

We've decided that it is in our collective interest to have them there, to expose them to the next technology, so that we as a global nuclear community can be assured that they pursue this in a very responsible and safe manner.

As part of the SED, our Nuclear Regulatory Commission signed an agreement with China to improve our understanding and their understanding of the importance and the process of nuclear safety and nuclear safeguards. And so I'm pleased that the NRC and their similar body will encourage increased cooperation and I think over the long term that will bear us some significant fruit.

VICE CHAIRMAN BLUMENTHAL: Just a quick follow-up. These are obviously good initiatives and good obligations and so forth, but even with India, we're going through the problem of ensuring that

civilian nuclear use is not dual use and not translated to build up the strategic arsenal.

Do we have commitments by the Chinese? Do we have ways to verify that that's not going on within China?

MS. HARBERT: This is in some ways a little bit forward looking since they have only just agreed in this case on the AP-1000, which is obviously a technology born and bred here in the United States. It's been certified by the NRC as having appropriate safeguards in place. It's been certified for design and use abroad. So there are significant internal safeguards.

It is important that it is a U.S. technology that is being utilized. We feel very strongly about that, that that will provide us additional security, and it takes constant vigilance, and that's why we have the IAEA. That's why we have all kinds of different measures I think that we can pursue to ensure that.

But it is certainly not without a great deal of vigilance, that we don't go into this naive, but we do go into this knowing that the expansion of civilian nuclear power, whether it be in India or China or in other places, is to the world's advantage to meet the huge increase in demand, but doing it in environmentally sustainable ways.

So we have to build in those safeguards, and I think over time the nuclear framework that we have in place will only continue to get stronger because of the need to increase the use of civilian nuclear power. It's in our interest to ensure those safeguards are in place because one accident could doom the expansion of nuclear power, and that is not in anyone's interest and we are well aware of that.

VICE CHAIRMAN BLUMENTHAL: Thank you. We have Commissioner D'Amato.

HEARING COCHAIR D'AMATO: Thank you very much, Mr. Chairman, and thank you both for coming. It's important testimony, interesting testimony. There appears to be a sense of movement in the relationship. Whether or not that's going to result in tangible achievements I think is what we're all looking for.

I want to ask you both a question dealing with climate change. We now have a report from the Chinese in June of a national climate change program. What is each of your evaluations or your agency's evaluation of the strengths and weaknesses of that plan? Did the United States play a role in developing it?

And then you mentioned the question of a post-Kyoto framework. Would you be a little bit more specific about what the ingredients of that framework will be? You can start, Secretary Harbert.

MS. HARBERT: Sure. First of all, I think it's important that they actually have said something about climate change, that they've articulated a policy or a path forward on climate change. Are we

completely supportive of all the components? No. Would we like to see it more aggressive? Yes.

They have elected to reduce energy intensity in their Five-Year Economic Plan. In this part of it, they are looking to hydroelectric power, they're looking to nuclear power, and they're looking to energy efficiency, all good things to achieve a positive climate change benefit.

But we'd like to see it go further. I think the world would like to see it go further. We're going to work with them to see how we can bring them in to actually accept a greater responsibility in addressing the climate change challenge.

Four or five years ago when it became very apparent that China was going to have to use more renewable energy to meet its energy demand, they did not have a legal and regulatory framework to do so. We assisted in the actual drafting of that renewable energy law directly to say this is how it works in this country, this is how it works in other countries, this is how it works in other industrialized versus industrializing nations, and here's what you're going to need to attract the investment you're going to need to actually expand the role of renewable energy in your country.

They now are taking it a step further realizing that incentives and other types of things that we use in our market economy here may have a role to play in China. You can't just mandate things to happen, which has been previous practice in China. You actually have to incentivize some things to happen. So you're seeing the role of a market economy now transfer over to their energy economy.

We think that's a good thing that will incentivize the right capital, the right technology, the right American technology to flow in and help the renewable energy industry expand.

On the post-2012 Kyoto framework, as the President announced several days before going to the G8, it is clear that we, the largest emitters, have to do something very serious about climate change, and that he is very prepared to take a leadership position in helping the largest emitters come to agreement on what a post-2012 Kyoto framework would look like.

It has to look like something that we would agree over the long term where are we trying to get, what type of a goal are we trying to accomplish? The Canadians, the Japanese, the EU, they all have differing views, but it doesn't matter. We have to come to agreement on an overall goal and then each country has to have a national commitment, a national approach to actually accomplish a goal.

And we can't sit here in the United States or the EU can't sit there in the EU and say this is what it has to be for the world. Everybody's population growth is different. Economic growth is

different. Geographical distribution of industry is different. We have to find a way that each country can make a significant contribution that does not jeopardize economic growth.

We in this country are not willing to put arbitrary limits that will force our industries to move to places that are not subject to any sort of commitment or goal. We don't want to see our industry moved to China or India and have them be exempt under any sort of a post-Kyoto framework. We want to bring them into the solution, not leave them out of the solution.

And so we are going to work very hard over the next 18 months to bring those large emitters in to a framework that will allow us to establish a commitment and that we will seek to put in place a pledge and review system. If you pledge "x", we're going to look at you every year and say are you meeting your goal; are you meeting your commitment or not?

Maybe you want to call it the shame game, the blame game; it doesn't matter. At least there will be a way for us to be held accountable collectively in the world to address climate change.

MS. AYRES: Following on the Assistant Secretary's very thorough answer, I would make one more observation. By 2010, China has said that it will reduce energy consumption by 20 percent and reduce renewables by ten percent, and the language in the document says it expects targets will be met. Again, following on the Assistant Secretary's statement, EPA, along with the Department of Energy and other entities in the executive branch stand ready to work not only with China but also with other developing countries as we begin to address globally the whole issue of greenhouse gas emissions.

HEARING COCHAIR D'AMATO: Yes, thank you. While I think that those are all very well and good, I'm not sure how you accomplish setting national goals without relating it to an international baseline. I think that's difficult at most. I think this question of the Chinese committing to reducing their emissions by--what did you say--20 percent by 2010? That's a specific goal. That can be related to the U.N. Panel baselines. It seems to me you've got to get cracking on that kind of assessment. Otherwise, we can't understand what's happening to our integrated global ecological system in terms of temperature increases, both air and ocean.

If you're going to have a world ecological system, you can't have just national goals not related to a baseline. So it seems that's a problem we have to work on in terms of that post-Kyoto framework.

The projections in your testimony, Secretary Harbert, in terms of China's carbon dioxide emissions projected to exceed U.S. emissions by over 40 percent in 2030 and the comparison of that to the Chinese goal seems to be the kinds of specific scenarios that we need to engage

the Chinese on. Is it your understanding that the Chinese are prepared to start engaging us on these kinds of goals and numbers?

MS. HARBERT: There are two answers to your question. They both result in yes, but I'll tell you, first of all, they feel that they need the technology to address it. I think there is a role for the United States government and more importantly for the U.S. private sector to play in meeting that need. There is no way to put a framework on top of them that they are doomed to fail.

HEARING COCHAIR D'AMATO: Right.

MS. HARBERT: And if they are going to expand the use of clean coal in their country, they're either going to exacerbate the climate problem or they're going to contribute to its reduction. They have to have clean coal technology to use coal but do it in an environmentally sustainable manner. So that's in our interests, it's in their interests, to find a way to do that.

If we can collaborate on that, it actually will bring down the cost of clean coal technology worldwide. They have a huge market for it, and looking at efficiencies of scale and simple economics, it will then be more affordable for our country. So if we have more affordable clean coal technology and they do—since we're the two largest emitters--that will be a significant contribution over time to addressing the climate change objective.

Just to your comment on the baseline. I don't think anybody disagrees with that. I think what is important, that we should agree these figures alone show us that we can't leave China out. And that's why the problem with Kyoto is that it leaves the big guys that are coming down the pike out of the tent, and we can't afford that any longer. Maybe there is a different way for the more industrialized nations to help them along and find ways through technology cooperation and through less stringent goals and commitments at the early years, but a far more stringent goal later on, that we can actually come to over the next several hundred years a very, very solidified and comprehensive approach to climate change.

But they are going to need the technology; they're going to need the instruments; they're not going to just shut down their economy to address their environment. But they're feeling the pain. They realize it has an economic cost. Health costs in China are going up. They're not going up simply because they want better health care. It's because they've got environmental issues.

They've got water issues. They've got a number of issues. The energy use is challenging their environment and when it starts impinging upon their economy, they listen.

HEARING COCHAIR D'AMATO: Thank you.

VICE CHAIRMAN BLUMENTHAL: Dick, you've got five more

minutes because--

CHAIRMAN BARTHOLOMEW: Because I think this issue is so important I'm going to yield you my time and add my name to the bottom.

HEARING COCHAIR D'AMATO: My colleagues are loaning me their time, which is highly unusual.

CHAIRMAN BARTHOLOMEW: Yes.

HEARING COCHAIR D'AMATO: I think it's very important, very important, that you do acknowledge the need for a baseline. It seems logical obviously to get to that. We aren't there yet with the Chinese on such a baseline. That would be a tremendous achievement in terms of the dialogue that we're engaged in.

Now, I think it's very important also to have some specific achievements and successes with the Chinese on the big issues on the table because in many of the issues we've dealt with, this Commission has dealt with, over the last five years, the issues do not seem to be subject to be resolved.

We have a series of irresolvable issues. The currency problem, for example, is one of them. IPR is another one for which we don't have a strong record of achievement and success. Hopefully, now in this area we can.

Let me ask you one specific question in terms of some of these technologies that you mention and coal particularly. We're talking about the time frame for the possibility of full commercialization of capture and storage technologies, sequestration technologies.

What can you say about what you as Secretary would like to see in terms of the kind of time frame to put into place viable commercialization? Or, if it's not commercial from the private sectors, it at least works and we can be put into place, we can put it into place with regard to their new coal plants on a timely basis of carbon capture and storage technologies?

MS. HARBERT: Two different components to that. The project that we are actively working with them on which is the FutureGen project will actually be in our view and what our best estimates are, and our cost and schedule folks tell us, will be 2012. It will be constructed by 2012. Will it be commercially viable in 2012? No, this is a demonstration project that is showing how different technologies all along the chain can be integrated together and have, if successful, the first emissions free coal fired power plant.

Carbon capture and storage is something that we are working on. The sequestration of carbon has been used for many, many years in this country for enhanced oil recovery.

HEARING COCHAIR D'AMATO: Right.

MS. HARBERT: But it has not been used in such a way that we

have put sufficient CO2 underground and monitored it to make sure that there's no adverse effects to the environment or anything else. So we are looking, and we are at the Department of Energy and we have money, appropriated monies, to actually put a billion tons of carbon under the ground and actually observe it. And in seven different types of geological sequestrations in this country because we need to--the world has different geological formations as do we in this country, and it's not going to all go in one place.

So we need to put it under the ground and we need to observe it and see what happens. If we look at what's happening with carbon capture and storage or carbon capture and sequestration, we're looking at funding on the order of about \$100 million a year right now to be able to capture it and store it.

CO2 at the moment is a little expensive. So that's adding to our costs and we're trying to find ways to actually get some of the CO2 at reduced rates where there is a dedicated stream to this stuff so we can get and spend more of the money on putting it underground. But we have to do capture technology; we have to do storage technology.

And if you look at one of the ways to do that through the integrated gasification combined cycle plant, the way we are looking at it, we've got two of them right now in this country. They are at commercial scale; they're not at commercial cost. All of this, the challenge is not that the technology isn't ready--and carbon capture and storage, it's not quite ready--it's that it's not viable at a certain cost.

So we have to find ways to make this better and cheaper. If things were to go along as we look at it now, I don't see IGCC technology fully penetrated, fully developed into the market until 2040, and our job is to try and shave those years off. By cooperating with a country like China, which actually is very interested in this, and we can build these out at commercial scale and multiple times, rather than just the one or two we have here, then we actually could shave years off.

So it has a domestic benefit as well, that if we can utilize their big market to prove some technologies, then it will have a double bang for the buck, there and here, which is sort of our philosophy in going into this. It is important for the environment; it's important for our commercial interests' and it's equally important in trying to prove this technology and shave off our time frame. We don't want to wait until 2040.

HEARING COCHAIR D'AMATO: Right.

MS. HARBERT: We want to find ways that our multilateral work with other countries can directly contribute to our energy security here in the United States.

HEARING COCHAIR D'AMATO: Thank you. Do you have a comment, Secretary Ayres?

MS. AYRES: Thank you. Just a comment on methane. Methane, as we know, is also a greenhouse gas. It is 23 times more efficient than capturing carbon dioxide. Going to the whole issue of energy and certainly the issue of coal, it's important to note that the United States is collaborating with China on coal mine methane recovery projects.

The largest coal mine in the world is in China and this last year, EPA worked successfully with China with Caterpillar Corporation which secured a \$58 million contract from China to supply power generation equipment to this world's largest coal mine.

The figures are interesting. Once completed, an estimated 40 million tons equivalent of carbon dioxide emissions will be avoided over a 20-year period, and at this recent Strategic Economic Dialogue meeting, which Assistant Secretary Harbert and I both participated, China committed to constructing another 15 of these kinds of projects, with the goal of overcoming barriers to application of this technology on a nationwide scale.

So here is an example of capturing methane, 23 times more efficient than carbon dioxide at retaining heat, a \$58 million contract with Caterpillar Corporation, with the goal of expanding this technology around the country.

Thank you.

HEARING COCHAIR D'AMATO: Thank you. Just one comment. A quick comment, Mr. Chairman?

VICE CHAIRMAN BLUMENTHAL: Go ahead. Last comment, and then we'll lay him off you.

HEARING COCHAIR D'AMATO: In 2040, if current trends continue, we're going to be living on a different planet. Some people think we've got about 20 years to get this under control. During World War II, when we wanted to create a new spy plane, we put the U-2 from paper to takeoff on the tarmac in nine months.

So it seems to me that we need to be more aggressive and we can be more aggressive. We've done it in the past, and we can do it in terms of these technologies, too. Just the comment that I'd make.

VICE CHAIRMAN BLUMENTHAL: Thank you. Commissioner Shea.

HEARING COCHAIR SHEA: Good morning. I may be following up a little bit on what Commissioner D'Amato has said. Thank you for coming and it's really good to hear you talk about the importance of engagement with China on the issue of energy and environmental protection. If there is any area where we can cooperate, this seems to be it.

It was also good to hear what you are doing, what the

administration is doing, on the EPA side with Energy Star and the low sulfur project and the regional SEPA centers, and on the energy side with FutureGen and all the exchanges.

But I guess I'm echoing Dick's comment. Is the thinking here comprehensive enough, imaginative enough, urgent enough? The genie may be out of the bottle. Can we put it back in? Do we have a real sense of urgency on both the American side and the Chinese side in responding to this important problem? It's a tough question.

MS. HARBERT: I think that we certainly feel a direct sense of urgency and opportunity, quite frankly, as the trends are clear what the energy demand is, what will be happening in terms of the expansion of both their transportation and industrial sector.

It is incumbent upon us to engage much more aggressively with China, to help them understand the benefits of participating in a world energy market. I have said this before and I still believe it, that we define energy security as having access to an affordable, reliable supply of energy.

China still defines energy security differently. They define it as owning the access to an affordable reliable supply of energy. And if you're a market economy, you believe in having access to it because oil is a fungible commodity. It's out there, and if you don't get it from one place, you get it from another. It actually affords you a much more diversified base from where to get it.

If something happens in "x" place, you're going to get it from "y" place, and it is part of our discussions in helping them to understand the value of depending on the market, of not having to feel that they have to own it. They're never going to own the resources that they need to fuel their economy. They're going to have to rely on a market. And if you rely on a market, you actually have to have market principles in place at home. You have to respect them abroad and it requires you to become a very responsible market player.

So that's where we're going. It certainly is very true in the energy area. It is obviously true in the areas that we're not here to testify about in terms of their economy, but they're very much interrelated. They need the energy to fuel their economy, and as their economy continues to improve, expand and more increasingly rely on market principles, they have to do the same thing in energy.

If you do that on energy, it will afford them a more reliable supply of energy and force them into I think, and force is probably too strong of a word, but into a framework where they actually recognize the increasing value of a diversified source of investment in energy infrastructure and far more respect for the environment. Because the companies and the expertise that will flow into their country will certainly have respect for environmental regulations and there will be

opportunities for those technologies and those companies that are producing these clean energy technologies to grow and prosper there.

HEARING COCHAIR SHEA: Yes, but the fact is that China is going to build a coal-fired plant once a week for the foreseeable future. You mentioned, Ms. Ayres, that they set an energy reduction goal of 20 percent by 2010 but they missed the goal for 2006, and they've publicly admitted that.

Is there a sense of urgency on the Chinese side that we need a reverse course or a changed course on this issue?

MS. AYRES: I would suggest there are a variety of motivating factors on the part of China as it addresses environmental issues. It has become abundantly clear to the Chinese that a poor environment is affecting their economy and that the damage that they have done and the degradation that they now must suffer and attempt to remediate is having economic consequences.

The Chinese care about their economy. The Chinese also care about the Olympics. I think we have seen a great deal of motivation and had many positive conversations with measurable results regarding bringing the world to China for the Olympics and whether it's a retrofit of diesel buses or it's looking at areas of energy generation within the confines of the Beijing metropolitan area, we've had some very good conversations.

I think it's important to know that the U.S. approach to China, as our approach often with other countries, is from the Environmental Protection Agency, we are the premier environmental ministry in the world. We're the oldest and acknowledged not through our own adulation but through the world's, that we have technical capabilities which we are willing to share.

We also acknowledge that not only the United States but other developed countries, on the way to becoming developed countries, made egregious errors along the way. China and other developing countries would like not to repeat those transgressions. Unfortunately, in China, we see that the economic development has caused a variety of problems.

What the United States is doing as far as the question of being imaginative, being comprehensive, is that we are sharing those lessons and the Chinese are keen on learning those lessons, and this is one of the basic underpinnings of the Strategic Economic Dialogue. What have we experienced? What have we learned? What can we share?

And then the last comment would simply be that the world is watching. Not only is the United States engaging with China, but 79 other countries are also engaging with China, and China is very, very mindful that the world is watching how they are responding.

Thank you.

VICE CHAIRMAN BLUMENTHAL: Thank you very much. I wonder if, we have a number of questions remaining, I wonder if we can ask you both for some more time, some more of your time, if we can go a little bit longer than 10:15?

CHAIRMAN BARTHOLOMEW: Any chance you could stay till 10:30?

MS. HARBERT: Be delighted. I can.

MS. AYRES: A pleasure.

VICE CHAIRMAN BLUMENTHAL: Thank you very much. Chairman Bartholomew.

CHAIRMAN BARTHOLOMEW: Thank you very much. Thank you to our witnesses both for appearing today and also for your service to our nation. It's always wonderful, I'll say, to have a panel of women participating. We don't often get that so this is terrific.

A couple of comments and I have two different sets of questions which I probably won't have time to ask. When people say engagement with China, there's an implication that there are people out there who are saying we shouldn't be engaging with China on these things, and that's just simply not the case on these. So I always feel the need to correct the record on that.

I think the question becomes what is the nature of the engagement and what's happening, who's benefiting? The Chinese government has \$1.2 trillion in foreign currency reserves. The question that I would like to ask is in these joint programs that both EPA and DOE are doing, who's bearing the cost of that? Are the Chinese contributing financially to it? Obviously they need to be done, but are they expecting that the United States taxpayer should be bearing all of the costs of this?

And then, second, Ms. Harbert, you mentioned specifically, and I was going to ask you about the IEA and your capacity there, but the difference between the Chinese wanting to own the resource versus getting access to the resource, and it is unclear to me that they understand that they're not going to be able to own the resources.

There's a buying spree that's going on around the world. Just recently, the Chinese National Aluminum Company has bought a copper mine in Peru. So they're certainly trying to acquire ownership of these things, and I think if we're counting on their not being able to do it, that's going to be a difficult policy for us.

So in terms of the joint programs, who's bearing the cost of them, are the Chinese contributing, and then if there's any chance, Ms. Harbert, for you to talk a little bit about the IEA, what do we think that the Chinese role should be, what is it, and what's the potential? Thanks.

MS. AYRES: Regarding the age-old question who pays, one

would have to look at the programs we have with the Chinese from a bilateral perspective and from a multilateral perspective. From a bilateral perspective, there is shared financial responsibility. Yes, the Chinese do contribute. The United States contributes and there are international financial institutions that are contributing, specifically the World Bank and the Asia Development Bank.

Regarding multilateral contributions or multilateral programs, again, there's a shared responsibility amongst the members of those particular initiatives such as the Asia Pacific Partnership.

MS. HARBERT: There's a couple of different answers to your question. It is certainly a fact that I think there's a great desire on behalf of the Chinese to see an industrialized versus industrializing tech transfer framework where we would provide great sums of money or provide them great big construction projects.

This is not a wealth transfer arrangement that we're going to have with the Chinese. On the tech transfer side of things, we have very strict IPR standards in place. On the FutureGen project, for example, they are paying us \$10 million to join the project, as is India and will Korea and Japan, so nobody gets a free pass. If we're going to change the world, we're going to change it together and it costs things, and we all have to have some skin in the game.

There are things that we do with them that if we're helping them design laws, et cetera, it takes human time, but we're not actually transferring capital. We don't see that as an advantage in terms of the way that their economy is growing. They don't need capital; they do need technology. And why we focus so heavily in the Strategic Economic Dialogue of finding a way to reduce the costs of the existing technology to places like China in the developing world by reducing the tariffs and the non-tariff barriers.

We are hoping that the Doha round succeeds, that we can get these clean energy goods and services and clean equipment and get these costs down so they can penetrate a market like China and help them address their needs, and that's not tech transfer. That's commercial opportunity that will help them achieve their energy needs and our collective environmental needs, so they are paying their own way in some of these things.

Then there are things that actually cost nothing. When we get together and we talk and we explain to them about how you actually use tax incentives to create consumer behavior change. How we are using our current tax code and whether it be on hybrids or solar or this or that, and how that actually works and to get the people who are actually ministering it at the table so they can understand because, as you point out, they missed their target and they know they missed their target, and they know that they can't continue to push the mandates out

to the provinces and just say you will meet this or else.

They need new instruments and they need technology. We can help them show themselves what the instruments are, what the policy instruments are, but they're also going to need the technology.

CHAIRMAN BARTHOLOMEW: I'm afraid our time is up. Can I ask you to respond in writing on the--

MS. HARBERT: On the IEA?

CHAIRMAN BARTHOLOMEW: The IEA.

MS. HARBERT: Be delighted.

CHAIRMAN BARTHOLOMEW: Thank you.

VICE CHAIRMAN BLUMENTHAL: Okay. We have Commissioner Houston next.

COMMISSIONER HOUSTON: Thank you and thanks again to both of you for being here this morning. I have what I think is a really quick question, Ms. Ayres, for you. When we were recently in China, it was brought to our attention the problems of transportation pollution in China. Goods are coming out, materials going in all day long on freight cars as well as tankers.

And particularly in southern China, there's a huge problem with pollution coming from the tankers, and I wondered if there was any kind of dialogue or discussion of best practices from our agencies to China on some things that can be done both for the rail and as well as for the ocean tankers to reduce that pollution that's so prevalent from those?

MS. AYRES: The Environmental Protection Agency has identified precisely the same issue. At this time, we're within China looking at the transportation sector at this time. At this time, we're not looking at the rail sector, but we are looking at the port sector. And EPA has launched an International Ports Initiative.

The international ports are not only in China, but in other Asian cities and actually on our own Pacific coast, and we are working with the shipping industry and with various port facilities to look at fuel mixtures, look at kinds of engines that are being used and attempting to address this specific problem.

MS. HARBERT: Can I just add one thing because it also goes to another commissioner's question about nuclear safety? On ports specifically, there is because of the great activity in the ports, particularly in areas that you just pointed out, just this month, we in part of the Department signed an agreement with China to install equipment at some of these very busy ports.

We'll start with one and we'll move from there to detect illicit shipments of nuclear material, radiological material. We have done this in a number of countries with very busy ports. China has been an outlier. They realize it's in their interest not to actually participate in

the illegal trafficking of radiological materials. So that was a big breakthrough on June 6, and we're moving up very quickly to help them establish a much more secure port infrastructure.

It doesn't address the environmental components, but it does something that directly is of interest to our national security.

COMMISSIONER HOUSTON: Great. Thank you both.

VICE CHAIRMAN BLUMENTHAL: Thank you.

MS. AYRES: And possibly just as a follow-up, I had referenced in my remarks the project going on in Shanghai with this state-of-the-art air quality forecasting and public notification system. This is precisely the same system that is used in 300 cities here in the United States.

VICE CHAIRMAN BLUMENTHAL: Thank you very much. Commissioner Fiedler.

COMMISSIONER FIEDLER: Just a quick question. I read in your testimony, and both of you I think have repeated a couple of times, that the national government doesn't make any decisions on or make major implementation decisions on it, but local and provincial governments do. Major problem; right? We have illegal mines. Someone wrote or said that a fifth of the power plants are unlicensed. It's either in your testimony or somebody else's this morning.

There seems to be a huge implementation problem that just now establishing a regional level regulatory body might be quite insufficient to grab hold of the problem. Is there a province in China that is better, markedly better, than any other in its implementation or a couple?

MS. HARBERT: I will agree with you, and I said you can't simply issue an edict or a mandate and expect it to happen. There has to be the enabling environment for conforming to the mandates. One of the principal problems is enforcement. There is a lack of the ability of enforcement, and whether our coal plants actually meeting the expected environmental regulations or they are only meeting them when the auditors are present at the coal plant is an excellent question?

We're not there all the time to see. We're looking at trying to help them with remote sensing, and finding ways to actually have an enforcement capability. I have not looked at all the different, at each province, what everybody's comparative advantage is. But I will say that the Beijing Development Reform Commission--maybe it's because they're literally closer to the national government--has taken their mandate and looked at it very seriously of how they can be a model of improving their ability to implement the national government's expectations, and to do it in a way that actually has local accountability.

We have folks there working with the Beijing Development

Reform Commission now on helping them interpret, enforce, and execute these mandates because they feel instrumentless as they are given some of these mandates. So looking at how they can do things at the local level.

Our states do things at a state level, and so we're looking at trying to empower some of these commissions that are responsible for the execution of some of these regulations, but enforcement, regulation, uniformity, all of those are a problem, and we deal with it a little bit across the board in the SED on IPR, and it's all about enforcement, enforcement, enforcement.

It's not going to be solved overnight, but there is a recognition that without it, they're not going to, and I don't think that they enjoy coming in front of the cameras and saying we've missed our target again. They have to find ways. It's not by upping the mandate. It's by empowering people and giving them more policy instruments to actually achieve the mandate. And so I think that's an opportunity for us quite frankly to help them do that.

MS. AYRES: I would simply comment that the heart of a successful regulatory regime is compliance and enforcement and that the Chinese realize that this has been a weakness in their system and working with EPA, the Asia Development Bank and the Chinese government, these six regional centers are going to be set up, and that seems to be a positive start. They have acknowledged that.

Regarding the IPR issues, I would note that, in fact, EPA is engaged in discussions with the Chinese on various IPR issues having to do with consumer products and compliance with our standards for products that the Chinese would be sending here.

COMMISSIONER FIEDLER: Does any local government other than Beijing stand out as actor of responsibility here?

MS. HARBERT: I don't want to say no and I don't want to say yes. Would it be all right if we got back to you and sort of gave you a better view in that I'm not the best versed on every provincial government's capability, but I know there are others that would have a view?

COMMISSIONER FIEDLER: All right.

MS. AYRES: We'll join with the Energy Department on that.

COMMISSIONER FIEDLER: Okay.

VICE CHAIRMAN BLUMENTHAL: Commissioner Brookes and then Commissioner Reinsch.

COMMISSIONER BROOKES: I just have two quick questions-- one for Ms. Ayres. I looked through your testimony quickly, but to what extent is Chinese pollution reaching the United States and what effect is it having?

MS. AYRES: The ability of pollution particularly aerosols to

travel across vast distances is very well documented. The ability to discern within that mix what is coming from where is not. So the testimony comments on pollution coming from Asia, from South Asia, we know that is occurring. We know, but we don't know exactly what countries that pollution is coming from.

Technically anything under 100 microns, any particular, aerosol particle, under 100 micros has the ability to be transferred globally on air currents.

COMMISSIONER BROOKES: So we know that it's coming from outside the United States and not indigenous to the United States? But we can't isolate where in Asia it may be coming from?

MS. AYRES: At this time, we're unable with great assuredness keynote the source.

COMMISSIONER BROOKES: Okay. Thank you. Ms. Harbert, when we talk about Chinese energy, it's often said, and it may be myth--I am hoping you can distinguish that from fact--that China is often looking to lock up energy resources at the source, or that's a term that's used. Does China put any of the energy it gains from outside of China on the international market?

It's often said that these resources go directly to China, but is any of it put on the international market, and do you know to what extent overseas Chinese oil companies are putting energy on the international market?

MS. HARBERT: One of the things we're trying to do with China is to improve their data so that they can supply it to the international market, and I've got two specific answers, so I'm not dodging it.

One of the issues we have with their Strategic Petroleum Reserve is to urge China to tell the global world market what you're doing, how much are you taking off the market, where are you taking it from to put in your Strategic Petroleum Reserve. You don't need to increase the cost of oil just by not telling the market, and we're working through with the IEA and through the Joint Oil Data Initiative at the International Energy Forum to help them improve the reliability and the transparency of their data.

How much are they buying? What are they consuming, all of those types of things that are actually very important for global energy analysts, traders, buyers, sellers to understand. So we will continue to work on that over time.

The amount of oil that they produce--equity oil, as we call it--abroad is about 400,000 barrels per day. That's what they have in terms of their ownership of oil that they utilize. That's about two percent of U.S. consumption or about .5 percent of world consumption. So those that would ascribe to China becoming a huge energy competitor to us and buying up all the assets, the facts sort of don't

bear out.

We certainly don't want to encourage and we certainly discourage China from investing in places that we think those dollars are being used to prop up regimes that are either human rights violators or propagators of nuclear weapons.

We will continue to exert tremendous pressure on China not to do that because, going back to what we talked about earlier, there is value in the market and that you don't need to put your dollars into places where you are actually propping up regimes that are unfavorable with the world community. You do not have to force yourself into that position.

Secondly, we are trying to work with China about having them understand what a multinational independent oil company's principles and practices are as they invest overseas. Our oil companies, American oil companies, have a very high rate of corporate philanthropy, very high regard for environmental and labor laws, and that is something that we think Chinese oil companies could benefit from learning, and we will continue to do that.

So we don't see China as becoming a competitor and buying up all the resources, and that all of the oil that they're going to own is going to flow back directly through a pipeline dedicated to China, but there is growing demand for China, and so investments are being made around the world including and in Canada and other places where those supplies will go to China.

That doesn't mean that it's shorting our market.

COMMISSIONER BROOKES: Right. Can you just answer my question?

MS. HARBERT: If we don't get it from "x," we're going to get it from "y."

COMMISSIONER BROOKES: Yes. You didn't answer my question. Is the oil that China's oil companies are pulling out of the ground overseas going directly to China or is some of it being put on the international market?

MS. HARBERT: It's both.

COMMISSIONER BROOKES: Both.

MS. HARBERT: It's both, but in large--

COMMISSIONER BROOKES: Do you know what percentage is?

MS. HARBERT: --percentage, it's going back to China.

COMMISSIONER BROOKES: Excuse me?

MS. HARBERT: In large percentage it is going back to China.

COMMISSIONER BROOKES: Can you put a number on that or we don't have that number?

MS. HARBERT: Of their equity oil, of what's going back to China--

COMMISSIONER BROOKES: Right.

MS. HARBERT: --of the 400,000 barrels of oil per day, I can get you an exact percentage, but it would be fair to characterize that most of it is going back to China.

COMMISSIONER BROOKES: But some of it is being put on the international market.

MS. HARBERT: Yes.

VICE CHAIRMAN BLUMENTHAL: Thank you.

MS. HARBERT: Just simply because of the transportation costs. It would cost more to put it back into China. They can sell on the market and get something closer.

VICE CHAIRMAN BLUMENTHAL: Sure. Commissioner Reinsch, you have the final, final words.

COMMISSIONER REINSCH: Thank you. First, I want to thank the witnesses for being two of the most competent people the Administration has sent us. I wish they could clone you although that's probably against one of their other policies, but here we are. I have one question for Ms. Harbert and one for both of you. My question for Ms. Harbert is a continuation of what Mr. Brookes was just talking about. Looking out to 2020 or so, what do you see as the market effect in terms of price and supply of the increased demand by both China and India? You don't need to separate them.

In particular, I'd like you to comment on price because I don't think you've said anything about that yet, and on supply you said several times if they get it from "x", we can get it from "y." That assumes there's a "y," and that assumes that supply development is going to keep pace with demand development. Can you comment on that looking out ten or 15 years?

MS. HARBERT: Sure. One thing I have learned in the two and a half years in this job, and I've learned it from my boss, the Secretary, is never forecast price because invariably you're going to be wrong. I can't even forecast what's going to be at the end of the day today, much less 20 years from now, but--

COMMISSIONER REINSCH: Well, that's a trick question, but go ahead.

MS. HARBERT: But that being said, I will say that there is clearly a very, very tight market between supply and demand. We have very small spare capacity in the market right now. Right now it's about three million barrels, but it was as short as a million barrels earlier this year.

As we look out over time, it's going to get tighter, and then there's going to be some relief in the market in about eight years as new supply is being brought on in Central Asia and in the Middle East. The Saudis are certainly making a big investment and bringing new

capacity on line and making a great expansion of oil there. The Canadians are making a tremendous investment in the oil sands which will directly affect our market as we are their natural market for that.

So there is significant additional supply coming on, and that's not without saying that the demand won't also increase. So we're going to be for a long time in this razor thin market, which is why it makes it so important for diversification of our energy supply, not only where we get it from, but what types of energy we use, and expanding the use of nuclear, clean coal, renewables, becoming a more efficient user of energy, finding ways to exact more efficiency out of our transportation sector, out of our building sector.

China has the largest amount of construction going on in the world. We have to find ways for them to build buildings that are more efficient day one, not to go back and retrofit them, but to build those efficiency things in at the very beginning. So it's not going to get easier, but certainly with the high prices that we find ourselves in, there is a profit incentive now for alternative energies and efficiencies to be brought to market, which is what over the short and medium term is actually going to provide us the relief that we need.

COMMISSIONER REINSCH: Okay. Thank you. For both of you, I think, unless I missed it, we haven't yet mentioned coal to liquids technology. Is that something that you're discussing with the Chinese and is that a technological approach that's consistent also with your environmental goals?

MS. HARBERT: Coal to liquids is a technology, as you know, that has been around since World War II. It was developed in Germany when they had no alternatives and it's been used in South Africa quite expansively because they had few alternatives.

It is a proven technology. It has not found its way to the United States because it's not, while it's technologically viable, it's not commercially cost competitive. There have been some indications that there will be at least two coal to liquids plants being built in China. We have yet to see whether that will happen. The press reporting I think two weeks ago indicated that one of those projects was on the fringe of being canceled. For what reason, I'm not entirely clear. But these are commercial transactions that we certainly are not going to get in the middle of.

As we look towards what we, the Administration has put forward and what the Congress is currently debating today, we have energy legislation on the floor of the Senate, and the President has legislation he's put forward with an alternative fuels standard. There is a role for coal to liquids with carbon capture and storage.

There is room for this alternative fuel to be brought into the marketplace as long as it does conform to our environmental goals and

aspirations. The alternative fuels standard that the President put forward has a credit trading system and coal to liquids with carbon capture and storage gets a certain compliance value.

It does not contemplate coal to liquids plainly being considered part of the mandate, and so there is an explicit difference of having coal to liquids with carbon capture and storage and without carbon capture and storage. We haven't seen any big investments in coal to liquids in this country as people are looking to see what our environmental framework will look like, and I think we've been very clear in the alternative fuel standard where we see that technology fitting in. It has to have carbon capture and storage along with it in order to be a part of the mandate.

VICE CHAIRMAN BLUMENTHAL: Thank you. We're going to wrap up because--

COMMISSIONER REINSCH: Thank you.

VICE CHAIRMAN BLUMENTHAL: We want to thank you very much. You've been terrific witnesses in a long line of good Administration witnesses. We're very thankful to the Administration for sending witnesses. We're hopeful that in the future, the administration will send witnesses. And future Administrations will continue to send witnesses. Thank you very much.

MS. HARBERT: Thank you.

MS. AYRES: Thank you.

VICE CHAIRMAN BLUMENTHAL: We're going to take about three minutes. We're running late, and we'll be back in three minutes.

[Whereupon, a short recess was taken.]

## **PANEL II: U.S. NATIONAL LABORATORY PERSPECTIVES**

HEARING COCHAIR VIDENIEKS: In our next panel, we're pleased to welcome Dr. Jane C.S. Long from the Lawrence Livermore National Laboratory in Livermore, California.

Dr. Long is currently the Associate Director of Energy and Environment for the Laboratory. Prior to this appointment, Dr. Long worked at Lawrence Berkeley National Laboratory for 20 years. Dr. Long's current interests are in an adaptation and reinvention of the energy system in response to climate change.

Additionally, she has conducted research in nuclear waste storage, geothermal reservoirs, petroleum reservoirs and contaminate transport.

Dr. Long has been asked to present the Laboratory's perspective on the global energy future, exchanges between the Laboratory and China, and the impact of China's greenhouse gas emissions on U.S. air

quality.

Thank you very much for testifying today and taking the trip out here.

**STATEMENT OF DR. JANE C.S. LONG  
ASSOCIATE DIRECTOR, ENERGY AND ENVIRONMENT  
DIRECTORATE, LAWRENCE LIVERMORE NATIONAL  
LABORATORY, LIVERMORE, CALIFORNIA**

DR. LONG: Thank you, Commissioner. Thank you very much, Madam Chairman and Commissioners for the opportunity to testify. I'm going to give you a perspective from my laboratory, Lawrence Livermore National Laboratory, and as well I'll make a few remarks about our sister laboratory, Lawrence Berkeley National Laboratory. Mark Levine from Lawrence Berkeley was not able to be here, but he did submit some written testimony.

The National Labs support the Department of Energy's strategic goals for energy and energy security and climate, and our research efforts in partnership with industry and universities and international collaborations are going forward in that regard.

We are internationally known for our work in climate. Coming from our background in weapons testing, we began working on atmospheric events many, many years ago, and as a result, now, we have 50 atmospheric scientists and we are known for work in the attribution of climate change to human behavior. As well, we worked on underground testing and that has given us a very good perspective in earth sciences for containment of carbon dioxide and underground processes such as in-situ coal gasification.

You asked a question from me, what guides our research, We have looked at the entire spectrum of the energy and climate problem together and concluded that if we work to make a carbon free energy system, that that will automatically help to solve the energy security problem.

So we work on ways to improve efficiency, add renewable energy, sequester carbon, add renewable fuels, and overcome the difficulties of nuclear power, and in doing those things, we see that we will try to achieve a carbon free environment, emission free environment, and as well solve the energy security problem.

We do not have a lot of experience with China, but we have common interests with China. It's important to note that this collaboration is very important because the common interest in energy and climate that we have. The U.S. consumes about 25 percent of our energy through the use of coal, but coal accounts for about 40 percent of our CO2 emissions. We use 25 percent of the world's energy; China

uses 15. But about 60 percent of their use is coal and 80 percent of their emissions come from coal.

So China and the U.S. are both importing oil and we are both worried about oil security. With their expanding economy, they are accounting for 38 percent of the total growth in oil demand worldwide. So with these common vital interests, I would like to discuss three specific issues.

First is that the National Labs have been working with China over some time on energy efficiency, and here I'd like to mention, as I said I would, Mark Levine's testimony. Mark has worked extensively in China over many years with many of their agencies, focusing on energy standards for buildings, appliance standards, labeling and industrial energy efficiency, and for some 20 years, from about 1980 to 2000, they made a very successful energy efficiency program, and they limited their energy growth by half of what their GDP growth was during that period.

But since then they fell back and their GDP growth has not been less than their energy growth, and it's time now to reinvigorate an energy efficiency plan with China.

Secondly, I think it's really important that we work with China on reducing greenhouse gas emissions. As I mentioned, about 40 percent of our emissions and nearly 80 percent of their emissions are due to coal, and clean coal technology including carbon sequestration and underground coal gasification are important technologies for dealing with this.

My written testimony discusses this in detail, and I will just answer your questions here as you have them. These are important technologies if we're going to continue to meet our needs with coal and it really doesn't appear that there's a good way in the next ten, 20, 30 years to avoid the use of coal so it's really important that we change the way we use it.

There are many international collaborations in the area of coal and carbon sequestration, and there is a pressing need for large-scale experimentation. It was mentioned before that there are seven partnerships in the United States that are looking at large-scale tests of carbon sequestration. These tests are extremely important and, as well, they're needed in China. Both countries would benefit from programs to demonstrate underground coal gasification and sequestration.

Finally, I'd like to mention human-induced atmospheric changes that will affect the U.S. and China. Since about 1985, our laboratory and other laboratories have been involved in a DOE sponsored collaboration on global warming. This has had several parts. One interesting part is the Chinese are a very long civilization and so they

have through various government records, they have thousands of years of certain kinds of climate data which became very attractive to our climate researchers.

As well, the Chinese had a nascent climate modeling program which was the subject of our laboratory's collaboration with them, and they have moved forward very well with their climate modeling program, and we have been very involved in helping them do that. As part of what happened with that collaboration, it grew into an international program and the inter-comparison of climate models, which is now run at our laboratory, and that inter-comparison project contributed 35 terabytes of data--that's three-and-a-half Libraries of Congress--to the IPCC deliberations that resulted in the last 2007 report concluding 90 percent certainty that climate change was anthropogenically caused.

So the roots of this climate model intercomparison project came out of the China collaboration. In addition to that, recent work at our laboratory that is funded by the laboratory--laboratory directed research--has been using the climate models that we have to track back air pollution from the United States to China, and this very recent work just submitted to Science in the last couple of weeks has shown that 40 percent of the aerosols in a specific site in the Sierra were attributable to China, some of them coming from Africa across China into this particular site, and that on a day, on a period of time when there were no dust storms or any other way to say that it was especially high loading. So I think it might be a fairly typical number of 40 percent.

So in summary, I'd like to say that China is a vital area for us to continue to collaborate with and we have mutual interests. We have mutual problems, and we would benefit greatly from sharing technology and sharing some of the solutions.

Thank you very much.  
[The statement follows:]<sup>3</sup>

## **PANEL II: Discussion, Questions and Answers**

HEARING COCHAIR VIDENIEKS: I'll ask the first question, if I may, Mr. Blumenthal.

VICE CHAIRMAN BLUMENTHAL: Okay.

HEARING COCHAIR VIDENIEKS: In your prepared testimony you mentioned that China is the leader in the world in underground coal gasification.

DR. LONG: Yes.

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<sup>3</sup>[Click here to read the prepared statement of Dr. Jane C.S. Long](#)

HEARING COCHAIR VIDENIEKS: Is there reason why here in the U.S. apparently it's not taken off rapidly or either are there economic reasons why we're not doing it? Apparently there is low capital investment. There are equipment savings that could be made and the coal can be retrieved which is buried away in an unminable location and so forth. Would you please expand on that a little bit?

DR. LONG: I think it's a combination of the economics of it before there was the climate change imperative. So with the climate change imperative, it becomes much more interesting. We looked at this at our laboratory many years ago, ten or 15 years ago, and at that time, people wanted to get syngas out of underground coal gasification and hydrogen was produced at the same time, which caused a problem.

Now, we have the technology to separate these gases and I think that given the climate imperative, there should be a renewed interest in the United States as well.

HEARING COCHAIR VIDENIEKS: Just a follow-up question. Can you comment on or maybe speculate as to what proportion of the coal mines, the coal production facilities are owned by the petroleum people?

DR. LONG: In China?

HEARING COCHAIR VIDENIEKS: In the U.S. and China?

DR. LONG: No, I don't know the answer to that. I'm sorry.

HEARING COCHAIR VIDENIEKS: Okay. It's an interesting question to follow on.

DR. LONG: Yes.

HEARING COCHAIR VIDENIEKS: Thank you. Anyone else have questions?

COMMISSIONER HOUSTON: I do. Maybe we need to make a list.

HEARING COCHAIR VIDENIEKS: Yes, I'm starting to make a list here.

COMMISSIONER HOUSTON: I have a fairly quick question because I didn't go to mining school, and I don't know too much about coal, but I understand there's a difference between U.S. coal and Chinese coal in the nature of it. And what is that difference, and how does that affect both the energy production in China as well as the environmental problems that they have in China because of the coal burning that they do?

DR. LONG: I'm not the right person to ask about that, but I've heard the same thing, and I think it's dirtier coal, more sulfur, more--

COMMISSIONER HOUSTON: The Chinese coal is?

DR. LONG: Yes.

COMMISSIONER HOUSTON: So it's really more important in a way then, I guess, would be the conclusion for them to proceed with

clean coal technology? Would that be a reasonable conclusion?

DR. LONG: It's important for both of us. Some coal is worse than others for the purpose of emissions, but all coal is at the end of the spectrum for fossil fuel of producing more emissions, more carbon dioxide per unit of energy than any other form of fossil fuel.

So the differences between the coal, I think, are somewhat less important from the climate perspective than the fact that it's coal versus oil versus gas versus renewables versus efficiency in reverse order.

COMMISSIONER HOUSTON: Thank you.

HEARING COCHAIR VIDENIEKS: Commissioner Brookes.

COMMISSIONER BROOKES: Thank you. You were talking a little bit about a project in the Sierras, about being able to distinguish Chinese pollutants coming to the United States. Could you elaborate a little bit more on that and where that is and who's running that project and what's your finding beyond the sentence or two you gave in your statement?

DR. LONG: Okay. So it's a collaborative project with people monitoring aerosols in the state, and we collected the data from those aerosols and we actually looked at the chemical signatures and the isotopic signatures of the aerosols, but we're unable to draw any conclusions about where they came from by looking at the chemical signatures or the isotopic signatures of the aerosol particles that were collected over time in a site in the Sierras.

COMMISSIONER BROOKES: Where is this in the Sierras?

DR. LONG: I think it's near, I believe it's near King's Canyon, but I'd have to check.

COMMISSIONER BROOKES: Near where?

DR. LONG: I believe it's near King's Canyon, but I can check and let you know.

COMMISSIONER BROOKES: Where is that? What state is it in?

DR. LONG: California. I can get you that answer if you'd like it.

COMMISSIONER BROOKES: Okay.

DR. LONG: The data from this experiment has just been submitted to Science for publication. They were unable, as I said, to find a way to fingerprint the aerosols through a chemical match.

They were able through a mechanical analysis of looking at all the airstream data that is transported around the globe and being able to track back where packets of air came from and how much came from where, they were able to match the pattern of aerosol concentrations in the air, and so they were able to fingerprint it through a concentration analysis to show that 40 percent of it came from China, and some of

that came across Africa, up through China, to us.

COMMISSIONER BROOKES: So it's hard to distinguish whether it's African or Chinese?

DR. LONG: I think they can, yes.

COMMISSIONER BROOKES: They can.

DR. LONG: Yes.

COMMISSIONER BROOKES: What did they say--40 percent of these pollutants for this one specific sample may have originated in China?

DR. LONG: Came to us from China.

COMMISSIONER BROOKES: How valid is that as compared to the ability to identify chemical signatures or the other ways you were talking about? Is this a high level of validity?

DR. LONG: I think it has a high level of validity. As I said, it's hot off the presses. I've looked at the pattern correlation. It's very strong. It's very strong pattern match.

COMMISSIONER BROOKES: Is that the only place in the United States we're looking at this?

DR. LONG: I don't know that.

COMMISSIONER BROOKES: Is this southern, northern California, central California?

DR. LONG: It's central Sierras so it's in the middle of California in the Sierras, slightly south. I don't know that they're doing it in other places. As I said, this was research that was laboratory-directed research. The National Laboratories take a certain proportion of their overhead budget and are allowed to fund research inside the laboratory.

This was a project proposal completed within the laboratory and funded by the laboratory to do this analysis.

COMMISSIONER BROOKES: Yes. Maybe I'm wrong, but it seems this contrasts with the testimony we just had--

DR. LONG: Because she didn't--

COMMISSIONER BROOKES: Maybe it's because they haven't had access.

DR. LONG: It's just brand new.

COMMISSIONER BROOKES: Okay.

DR. LONG: Yes. I mean she wouldn't have had access to this work.

VICE CHAIRMAN BLUMENTHAL: The U.S. government doesn't always coordinate.

COMMISSIONER BROOKES: So this wasn't funded by the government; this was a laboratory--

DR. LONG: It is funded by the government but not--

COMMISSIONER BROOKES: Indirectly. Not directly by the--

DR. LONG: Indirectly by the government, and since this has not appeared in any publication yet, she would not have seen it.

COMMISSIONER BROOKES: Okay. Thank you.

HEARING COCHAIR VIDENIEKS: Next question is to Chairman Bartholomew.

CHAIRMAN BARTHOLOMEW: Thank you very much and thank you, Dr. Long, for appearing here today. I have two questions. One is do you think there are opportunities to collaborate on monitoring the transnational effects of air pollution?

DR. LONG: Absolutely, yes.

CHAIRMAN BARTHOLOMEW: I'm trying to follow this. I'm not a scientist and I'm trying to follow even just the discussion here. We could work with the Chinese to determine what it is that they're emitting and where those things are showing up here?

DR. LONG: Sure. For example, I would imagine that if we start to monitor aerosols everywhere, then you could back up this pattern analysis or mechanical analysis of where the aerosols are coming from with more chemistry and maybe you could discern more about what was going on.

CHAIRMAN BARTHOLOMEW: What incentives would the Chinese government have to provide information on pollutants that are showing up over American land, for example?

DR. LONG: I don't know that I have an answer for that. It's not certainly my area of expertise, but I know they are concerned about their air pollution as well.

CHAIRMAN BARTHOLOMEW: And then a different line of questioning. I'm interested--you talk about the Chinese scientists who have come to Livermore, and do you have any sense--obviously science exists in the realm of scientists, but we all hope that science makes its way into the policy decisions that a government makes--any sense that the work that the Chinese scientists with whom you're working is having an impact on the government decisions?

DR. LONG: Not from me directly. I have had discussions with Mark Levine about that. He's worked extensively in China with many scientists and I think he talks about having gotten access in that the people that he works with on energy do have some influence on their policy.

CHAIRMAN BARTHOLOMEW: I'm asking particularly because many of the places where these people have come from are government run institutions in China.

DR. LONG: Right.

CHAIRMAN BARTHOLOMEW: And I just didn't know if their scientists were being more successful at impacting their policy debates than ours sometimes are here.

DR. LONG: No, and I don't know, but I do think it's important that they're involved in the climate analysis problem because they can buy into the problem. If they're going to buy into the solution, I think it's important that they buy into analyzing the problem.

CHAIRMAN BARTHOLOMEW: Thank you.

CHAIRMAN BARTHOLOMEW: Commissioner D'Amato is next.

HEARING COCHAIR D'AMATO: Thank you, Chairman. On the question of coal sequestration, on our last panel we talked about that technology being available and online in the year 2012, which bothers me because I think that we've been demonstrating certain aspects of this technology already. We've been using it for certain purposes already.

Do you have any sense of, have you looked at the question of how one would move up the time table of coal sequestration technology in terms of the ability to aggressively pursue it? What would be the potential of aggressively pursuing it and shortening those time frames?

DR. LONG: There are some time frames that are extremely difficult to shorten, and I would like to say that I think we can shorten the time scales by trying more different kinds of geologic situations, more large-scale tests. But each of these large-scale tests that we have to perform in order to understand how sequestration is going to work, are going to take a certain amount of time, and you can't speed that up.

So what we really need to do now is have underground sequestration pilot tests that are on the order of about a million tons a year, and that's because that's about how much by order of magnitude that a power plant would produce every year, one to two million tons a year.

When you want to inject that amount of material underground into for example saline aquifers--although there are other some other possible targets--the saline aquifers are the important ones for power production--that amount of material being pushed underground creates mechanical and chemical changes in the underground, and the magnitude of those changes is important. The physical phenomena that occur are going to be different at that magnitude than they are with the experience that we've had before.

So you really have to spend time characterizing the site, and understanding that site, and planning how you're going to do the injection. You need to actually do the injection. You need to monitor. You need to see if it behaves the way you think it's going to behave, and then you need to stop and monitor what happens after you stop injecting. And you multiply by years for each of these.

So I think it's seven to ten years before we know for sure that carbon sequestration underground is a viable technology to buy us time on the climate problem and continue to use coal. Can we speed that

up? Yes, in the sense that we could have these very large-scale tests done in many places. And that requires money, but to actually go through the process of really understanding what happens, you have to take the time to do it right.

The fear that people have is that we'll say we're going to do dozens of these large-scale injections and there won't be enough money to do them right. It's more important to do them right than to do many of them. So fund the first one completely and then fund the second one completely and then fund the third one completely, et cetera. So that you get all the data you need to understand what happened when you put it underground. Did the rock break? What kind of minerals were formed? Where did it go? Did it get lodged in the pores? Did the seal work?

All of those things need to be done and it just takes time. So it's on the order of a decade before you really understand how those large-scale tests worked, and you can't speed that up.

HEARING COCHAIR D'AMATO: Just a quick follow-up. Is it your instinct from what you said that the magnitude of the amount of carbon here, are you pessimistic about our ability to do this in large scale along with the kind of--the extent to which that the Chinese are going to rely on new coal-fired power plants over the next century--our ability to sequester most of that?

DR. LONG: I'm not pessimistic about it, but I think it's going to require a price for carbon and it's going to require people agreeing, people working together to lower the price. Most of the price of the cost of carbon sequestration is not putting it underground. That's only about ten percent of the cost. Most of the cost is from the separation technology. Developing really good separation technology and sharing that technology is probably going to be the key part of making this a useful technology for China.

China's interests are in development and keeping their cost of energy low so that it can continue to develop economically and that piece is really important. From the geologic perspective in China, there are apparently basins where they can sequester CO<sub>2</sub>. Those basins are apparently close to pure CO<sub>2</sub> streams that are now being produced in China from fertilizer and other manufacturing.

So they could go forward with some major underground sequestration experiments at this time. So I'm not pessimistic about it at all. I think we have plenty of geologic capacity. It's going to require new infrastructure. That infrastructure in the United States, for example, if we sequestered all the carbon dioxide from all the coal-fired plants, is going to be on the order of the amount of infrastructure we have for the oil and gas industry today. It's not a small thing, but it can be done.

HEARING COCHAIR D'AMATO: Thank you.

HEARING COCHAIR VIDENIEKS: Commissioner Fiedler.

COMMISSIONER FIEDLER: I'll pass for the moment.

HEARING COCHAIR VIDENIEKS: Commissioner Blumenthal.

VICE CHAIRMAN BLUMENTHAL: Thank you very much. I had a question regarding the most promising technologies and science, particularly with regards to scientific cooperation in the transportation and fuel and oil sector.

It seems that with regard to the carbon issue there are some very impressive scientific programs going on, but the growth that we heard before of the automobile and transportation sector means that the coal programs are going to deal much with that trend.

Again, how you think the Chinese may go about dealing with the fact that the transportation sector is growing so large and what the environmental mitigation policies might be?

DR. LONG: You're going to hear from Lee Schipper after me. I don't see him here yet, but he is an expert in transportation. I have not looked at the transportation sector per se. They are farther along than we are in terms of the efficiency of their cars.

I can comment on the role of underground coal gasification could be used to produce fuel for their transportation, and if we are doing that and sequestering the carbon dioxide along with coal gasification, then the gas that you get has got a lower carbon dioxide emission per unit energy than oil so that would be favorable as well.

The third part of any transportation problem is the vehicle miles traveled, and I think they're going to have to deal with that as well as we do. We have common interests in that largely land use planning, you know, city planning, transportation planning problem in many ways that we will share. You have to hit all three to affect the carbon footprint of the transportation system--the efficiency of the car, the carbon content of the fuel and the driving patterns.

VICE CHAIRMAN BLUMENTHAL: And you are seeing some trends in those directions within China?

DR. LONG: No, I haven't been looking at that.

VICE CHAIRMAN BLUMENTHAL: Oh, you're not looking at it. Okay. A different question. I was struck by some of the work you're doing on East Asian monsoon with both PRC and Taiwan. I wonder if you could elaborate on that work and elaborate specifically on the environmental impacts of the monsoons and the oceanographic work that you're doing.

DR. LONG: I don't think I can give you too many specifics except to say that with the computational power that we have, laboratory is able to increase the resolution of global climate models to the point at which we're beginning to be able to simulate hurricanes

and monsoons, and so we are beginning to show that in the future with extensive computation, we're going to be able to model the occurrence of those monsoons.

Just to give you a feeling for what that means, every time you decrease the resolution, smaller pixels on a climate model, by a factor of two, you increase the computational power required by a factor of eight. As well, if you look at more accurate computational methods, you can increase the amount of time you need on a computer. The laboratory currently has the fastest computer in the world, BlueGene/L, and on that computer when we make calculations on the order of 30 kilometers in a pixel, which is the scale on which we can start to simulate those monsoons, it takes one full day of all the processors on that computer to do ten years of data, ten years of climate modeling.

So we are looking now at decreasing that down to even lower resolution where we will be able to show how these monsoons are going to be developing.

VICE CHAIRMAN BLUMENTHAL: Just very quickly. How have the monsoons, particularly in Taiwan, I know they are very frequent, and earthquakes, and so forth affected the environment across the Strait, in Taiwan and southern China?

DR. LONG: I can't answer that. I'm sorry. I can get you an answer for that if you would like.

VICE CHAIRMAN BLUMENTHAL: That would be helpful.

DR. LONG: Okay. We can, I think there are people that are working on that at the laboratory, but I don't know the answer.

HEARING COCHAIR VIDENIEKS: The next question goes to Mr. Shea.

HEARING COCHAIR SHEA: Thank you, Dr. Long, for being here.

DR. LONG: You're welcome.

HEARING COCHAIR SHEA: One of the great things about being on this Commission is you get these briefing books that are just these mammoth--

DR. LONG: And you read the whole thing.

HEARING COCHAIR SHEA: I read a lot of it. It was very interesting. But I want to get back to this tracking issue that Commissioner Brookes mentioned. I appreciate the work that you've done on the aerosol issue, which you say is recent work.

Just for the record--this is not really a question--it's more of a comment to my fellow commissioners. Elizabeth Economy submitted some testimony to us which says that the EPA, U.S. EPA, estimates that on some days fully 25 percent of the particulates in the atmosphere in Los Angeles are from China. I mentioned that to Administrator Ayres; she disputed that figure. She was aware of that

figure and said we don't agree with that. We can't really confirm that.

And then somewhere else in this briefing book, we have a piece from Daniel Rosen who testified at the last hearing, and Trevor Houser, who says--and he cites the New York Times, so it might be wrong--in California, Oregon and Washington, Chinese sulfur has reached between ten and 15 percent of EPA's allowable levels in the mountains, enough to be concerned about, but not enough to cause acid rain yet.

So there seems to be some discussion here about tracking, some information out there about tracking environmental pollutants from China and how they affect the U.S., and I think we should probably take a look at this further as a Commission.

But the question I have is a follow-up to Commissioner D'Amato's question about carbon sequestration. I'm not a mining-educated person or a scientist at all, but as I understand it, you compress the gas.

DR. LONG: Right.

HEARING COCHAIR SHEA: And you try to inject it very deep into the earth.

DR. LONG: Right.

HEARING COCHAIR SHEA: In porous rock.

DR. LONG: Right.

HEARING COCHAIR SHEA: Or certain geological formations. Have we done in the United States an assessment, a map of where this technology could work and have the Chinese mapped where this technology can work?

DR. LONG: The United States program through the Department of Energy has seven regional partnerships and they have recently completed an atlas, which is an assessment of where storage might be in the United States.

In addition, I think there are some bills currently in Congress right now which would expand that assessment to make it more detailed, more complete.

The Chinese, as far as I understand, are working with the Australians in a program that's, I think, about a \$5 million program to assess sites in China, and some data has been collected and analyzed, and in the back of my briefing book, you'll see some basins that have been identified in China that are potential sites, targets for assessment of where they might sequester carbon dioxide.

HEARING COCHAIR SHEA: Five million doesn't seem like a lot of money.

DR. LONG: No, it doesn't really take a lot of new data to do the initial assessment because people have a lot of data they've used for other purposes. They've done geologic analysis. They've drilled holes

for wells, for water, for oil. They have extensive data; it just needs to be collected and analyzed to some extent.

HEARING COCHAIR SHEA: So in terms of the question about speeding up the introduction of this technology into China, would more aggressive mapping programs speed it up substantially?

DR. LONG: That would certainly. Absolutely. It's just recently that I've seen this analysis showing that there are, in fact, basins suitable for carbon sequestration in China, and if you had asked me last year, I would have said that the best of my knowledge, there aren't very good locations in China. So more knowledge would be extremely helpful in understanding what was happening there.

I don't think that assessment is an expensive part of moving forward with carbon sequestration. It doesn't take a lot of money to assess the sites and how much potential they have for sequestering carbon dioxide.

The expensive part is going to be these large-scale tests that need to be funded and done over some amount of time, and then in the long term, the expense will be the separation.

HEARING COCHAIR SHEA: Thank you.

HEARING COCHAIR VIDENIEKS: Commissioner Fiedler.

COMMISSIONER FIEDLER: I just wanted to ask a general question about wind-borne particulates coming into the United States, and measures of our own reduction, so that you could net out a new large number, or small number, caused by economic development, if you will, new economic development in Asia, not necessarily China specific, because this is a sort of macro number, and has there been a huge increase, a modest increase in wind-borne particulates--

DR. LONG: From China.

COMMISSIONER FIEDLER: --from Asia? I'm avoiding the signature test of the particulate. Just generally speaking, have we gotten a lot more pollution in the United States--

DR. LONG: From China?

COMMISSIONER FIEDLER: --from Asia?

DR. LONG: From Asia. I don't know the answer to that and I don't know that anybody has studied it. I would imagine people could try to answer that question. Through understanding of previous weather data, you could get an analysis of that, but I don't know the answer. I can also find out if somebody else does.

COMMISSIONER FIEDLER: Would that skew our ability or hinder our ability to measure our own reductions? It would certainly--

COMMISSIONER BROOKES: That's what I was wondering.

COMMISSIONER FIEDLER: If you can't figure out the origin of it--

DR. LONG: Yes, absolutely.

COMMISSIONER FIEDLER: --whether it's ours or theirs, then, yes, it's a problem.

DR. LONG: Well, not to mention the fact that it makes it very hard to reduce our aerosol loading because if you can't control 40 percent of it, there's nothing you can do about 40 percent of it, then you're kind of stuck.

COMMISSIONER FIEDLER: I was just trying to understand the overall context--

DR. LONG: Yes, you're right.

COMMISSIONER FIEDLER: --that we're talking about.

DR. LONG: No, you're right. That's an important thing to understand. I just don't know the answer.

COMMISSIONER FIEDLER: Do you think somebody has got that information or it's never been done?

DR. LONG: I don't know if it someone has done it, but I think it's possible to look at it because I think you have data from past times, and you can compare it to the present.

COMMISSIONER FIEDLER: Right.

DR. LONG: I don't know that anybody has done that study.

HEARING COCHAIR VIDENIEKS: We'll start a second round then. I'd like to kick off with a quick question in the beginning. Given that you mentioned there's a ten year possible delay in verifying the feasibility of sequestration, is there also a time lag in determining the feasibility of underground coal gasification?

DR. LONG: I would think that that's a smaller lag. The Chinese are going ahead with a large underground coal gasification project now. So my guess is we'll know a lot about how to go forward in maybe less than a decade, how big an issue it will be.

HEARING COCHAIR VIDENIEKS: But still you're talking years even though commercially the Chinese apparently are doing it now.

DR. LONG: Yes. I think you could move ahead with that much more quickly than carbon dioxide sequestration underground. I don't think you have the same delay. There's still going to be environmental effects that you're going to worry about, and that is the reason that it's going to take a long time to understand carbon sequestration because you want to make sure that you're not creating environmental problems and there are some potential environmental problems with carbon sequestration as well.

Probably one of the worst problems that might occur would be dissolution of metals. This is, however an avoidable problem. When you put carbon dioxide underground, just like putting carbon dioxide in the carbonated water, the water becomes acid. When it becomes acid, it will more readily dissolve metals, for example, and so if you then are dissolving metals and then somehow that water is getting into

ground water that you want to use for drinking, that's not good.

But by putting the carbon dioxide deep enough and far enough away from sources of ground water, you can avoid this hazard.

Similarly, in underground coal gasification, you're having a lot of fluid moving around, heat, and some of that material is toxic. You are going to want to know where it goes. But one thing about underground coal gasification is it can be stopped easily. If you stop pumping the air underground and you stop pumping the water underground, you stop the process.

So I think it's possible to manage all of these engineering problems, and you could move ahead with underground coal gasification fairly quickly.

HEARING COCHAIR VIDENIEKS: Thank you. Commissioner D'Amato.

HEARING COCHAIR D'AMATO: Thank you, Mr. Chairman. Just one quick question. I don't know if you have the answer to this, but let's assume that we would go forward with one of these major sequestration plants on the order of what--a million tons per year--

DR. LONG: Right.

HEARING COCHAIR D'AMATO: --of CO2 injection. Do you have a crude assessment of what the cost of that plant would be on an annual basis to operate?

DR. LONG: That experiment?

HEARING COCHAIR D'AMATO: Yes.

DR. LONG: Yes, I believe that each of those large-scale experiments will be about \$100 million.

HEARING COCHAIR D'AMATO: But not just the experiment. Then you prove the experiment is correct, you want to put the plant into place, what would that cost?

DR. LONG: To do a fully integrated power production and carbon sequestration, remember that the major cost is the capture and the plant.

HEARING COCHAIR D'AMATO: Separation?

DR. LONG: If you're going to do a fully integrated system with a coal-fired power plant (say IGCC), and all the bells and whistles for carbon capture and sequestration, that's on the order of a billion or two billion.

HEARING COCHAIR D'AMATO: A billion dollars?

DR. LONG: Yes. But then you're getting electricity production from this as well.

HEARING COCHAIR D'AMATO: Right. For a plant?

DR. LONG: Right.

HEARING COCHAIR D'AMATO: A billion?

DR. LONG: Yes.

HEARING COCHAIR D'AMATO: Thank you.

COMMISSIONER BROOKES: I would recommend that in the annual report that one of the things we look at is getting greater visibility on this issue of emissions coming from outside the country.

CHAIRMAN BARTHOLOMEW: I think we need to look at the possibility of some research.

COMMISSIONER BROOKES: I just want to make sure we remember it.

CHAIRMAN BARTHOLOMEW: Yes.

COMMISSIONER BROOKES: When it comes around to Commission reporting time, that we look at this and encourage more visibility on this issue because we won't be able to necessarily monitor our own progress--

DR. LONG: Right.

COMMISSIONER BROOKES: --if a good deal of this, if this is accurate, and a good deal of this is coming from outside of the United States.

CHAIRMAN BARTHOLOMEW: Yes, yes. Thank you.

HEARING COCHAIR VIDENIEKS: Thank you very much.

DR. LONG: We'd be happy to help.

VICE CHAIRMAN BLUMENTHAL: Thank you very much, Dr. Long.

CHAIRMAN BARTHOLOMEW: Yes, thank you, Dr. Long. We can take a break for a few minutes. We'll take a ten minute break.

[Whereupon, a short recess was taken.]

### **PANEL III: CHINESE ENERGY CONSUMPTION PATTERNS AND TRENDS: A BASELINE ASSESSMENT**

HEARING COCHAIR SHEA: We'll begin our third panel of the morning. In our third panel, we are pleased and honored to have three experts speak about current trends and patterns in Chinese energy consumption.

Our first speaker, Mr. Saad Rahim, is the Manager of PFC Energy's National Oil Company Strategist practice. His primary focus is managing PFC Energy's National Oil Companies Service, which analyzes the strategies, goals and outlook for national oil companies worldwide.

Also joining us today is Mr. Trevor Houser. Mr. Houser is a Director at China Strategic Advisory, where he leads CSA's energy sector activities. In his work, he travels frequently to China, where he meets regularly with government officials, business leaders, academics and NGOs about energy developments in China.

Finally, Dr. Lee Schipper, is the Director of Research at EMBARQ, the World Resources Institute Center for Sustainable Transport. Dr. Schipper earned his Ph.D. in astrophysics--interesting--but has devoted his career to earthly problems of transport, energy and environment. He came to EMBARQ at its founding in April 2002 where he is Director of Research. Dr. Schipper also has experience with the International Energy Agency and Lawrence Berkeley National Laboratory.

Gentlemen, thank you for joining us today. We'll begin with the testimony of Mr. Rahim.

**STATEMENT OF MR. SAAD RAHIM, MANAGER, COUNTRY STRATEGIES GROUP, PFC ENERGY, WASHINGTON, D.C.**

MR. RAHIM: Thank you. Members and cochairs of the Commission, thank you for inviting me here today. As mentioned, my name is Saad Rahim. I'm a Manager in the Country Strategies Group of PFC Energy. We're a strategic advisory firm focusing on energy and within that I cover mainly Asia, in addition to the National Oil Company's role. So we've done a lot of work looking at China and Chinese energy demands.

I've been asked today to present my views on Chinese energy consumption patterns, and I want to do so by outlining first the political and economic context against which Chinese energy demands are unfolding, and then following that with a discussion of some of the steps that the Chinese government is taking to address rapidly rising demand, and then finally looking at what we see as the projected future demand for energy consumption in China.

I would like at this time to note the invaluable contributions of my colleagues, Dr. Yahya Sadowski and Dr. David Gates in preparing this analysis. I'd like to begin with an overview of China's energy issues and some of the steps that are being taken to address that. China's rapid yet sustained economic growth over the past two decades is one of the great economic accomplishments of the last century.

While growth has, quote-unquote, "solved" many of China's problems, it has also created new ones: massive movements of labor, growth of inequality, political uncertainty, collapse of public services, and other issues.

One of the most important of these problems is a resources bottleneck that threatens to constrict future growth. China needs more skilled scientists and engineers. It needs more water. Most of all it needs more energy.

In the early 1990s, the government of Beijing began to publicly acknowledge that it faced a looming energy crisis. Oil production in

oil fields was declining and demand for fuel was growing faster than new reserves were being discovered.

Self-sufficiency, one of the great objectives of the Maoist era, was no longer possible. In 1995, China became a net oil importer and will remain one for the foreseeable future. By the last 1990s, an even more serious problem had begun to manifest itself. Although China has ample reserves for coal, which serves as the primary driver in the energy mix, production was inefficient and deliveries were irregular, a problem that has continued and has become exacerbated in the 2000s.

Combined with the underdevelopment of its natural gas resources, this has led to brownouts, electricity rationing and losses of industrial production.

This problem, too, had been foreseen, but disagreements over how to finance and organize new plants have prevented its resolution.

In 2004, China's energy crisis took on a new form. International prices for oil rose, but state mandated domestic prices did not. The Chinese NOCs, the National Oil Companies, were caught in a scissor set basically between opposing price movements, cutback on the delivery of refined product, and particularly gasoline. This led to spot shortages, long lines at gas stations and public protests.

As China has begun to rely evermore on imported energy, a new problem has also pushed its way to the top of Beijing's policy agenda: energy security. Now dependent on oil imports from distant regions such as the Middle East Beijing has had to worry about how global developments would affect the price and supply of a key industrial resource.

What would happen, for example, if regional conflicts obstructed access to Persian or Arabian Gulf oil fields? What would happen if superpower tensions, such as a confrontation in the Straits of Taiwan, tempted an outside power to threaten China's energy supply lines across the Indian Ocean? Or even in the absence of political shocks, how could China react to global surges of energy demand that raised the international price of oil?

For observers in OECD countries, the solution to these problems seemed obvious. China should deregulate, privatize, and open the market, the energy sector, allowing markets to undertake the work of coordinating supply and demand.

For the leadership of the Communist Party of China, the CPC, however, this is not an attractive solution, at least in the short term.

An immediate shift to a market-based approach to energy problems would aggravate the unevenness of China's development. New energy investment would concentrate in the industrial coastal provinces sidestepping the less developed hinterland. Worst, the cost of adjusting to a market-based energy regime would fall heaviest on

the working classes erasing much of the income gains they have enjoyed since the liberalization of the economy began in 1978.

The CPC was not only worried that this was unfair; it feared that this could actually be disastrous. Inequality, particularly the gap between the urban and rural population, is already the source of massive political tension, and rising incomes have been the very foundation of the CPC's legitimacy following 1978.

A market-based approach could trigger widespread protests and even a revolution. Energy policy has to be reconciled with Beijing's highest policy priority, which is political stability. So China's energy crisis, which is apparently an economic one, is at root actually a political problem.

Yet if immediate shock therapy liberalization provided no solution to China's energy problems, neither did a program of return to Mao's doctrine of self-sufficiency, simply because the resources aren't there. Although China certainly has more oil left in the ground and Beijing is particularly hopeful that it may be able to make important discoveries offshore, which it's moving into in greater volumes right now, even in the most optimistic scenarios, there isn't enough to match the decline in reserves, much less to meet the rapid growth of industrial demand.

China's most underexploited source of energy is probably natural gas, but its gas reserves are generally concentrated in provinces distant from consumption centers. Gas can be transported by constructing pipelines, but it's a very expensive process that requires careful planning to match production with consumption.

Internal debates, particularly over how much to rely upon foreign investors, have slowed growth in this area. The same problem affects coal, of producers being located in different areas from consumers, and this prevails in the sector.

It's all being compounded by growing worries about the environmental and human costs of reliance upon coal, as we've heard earlier.

I'm going to skip ahead actually to some of the programs that they've chosen to address the energy crisis. CPC has chosen to confront its energy crisis the same way it's pursued industrialization, with a mixed basket of tools, neither purely capitalist nor socialist. And the objective of this approach is simple: to capture most of the efficiency gains that come from reliance upon markets while preserving much of the political stability made possible by an authoritarian state.

China's energy policy is thus a microcosm of the same approach evident in China's wider quest for development: to reap the income benefits available from participation in global markets, while

preserving the power and order epitomized by the Leninist CPC.

In the last two Five-Year Plans, starting with the 10th Five-Year Plan, 2001 to 2005, you begin to see the outlines of this approach, although it finally became concrete in the 11th Five-Year Plan, 2006 to 2010, where Hu Jintao and Wen Jiabao found an opportunity to elaborate a distinct philosophy of development that would not only give this plan, but also the 12th Plan, a political legacy for them.

This has had specific implications for the energy sector. By choosing to develop the hinterland and the western provinces of China, this has really changed the energy picture there in the sense of now massive infrastructure development is taking place in these provinces that previously had been neglected, and this has raised questions of delivery, of supplies and of ongoing economic constraints.

I believe I'm running out of time here.

HEARING COCHAIR SHEA: If you want to wrap up, that's fine.

MR. RAHIM: I will try and wrap up by saying that in the long term, if you look at a couple of critical numbers specifically in terms of oil demand and where we see oil demand going--and I can get into these in more detail in the question and answer period--but oil demand alone, even at a slower growth rate than we've seen in the past few years, we're looking at adding somewhere on the order of about 5.8 million barrels of oil in demand between now and 2220.

And to put that in perspective, if we look at some of the largest producers in the world, we're talking about more than the combined volumes of Kuwait, the UAE, Venezuela and potentially even Mexico. [The statement follows:]

### **Prepared Statement of Mr. Saad Rahim, Manager, Country Strategies Group, PFC Energy, Washington, D.C.**

Members and Co-Chairs of the Commission, thank you for inviting me here today. My name is Saad Rahim, and I am a Manager in the Country Strategies Group of PFC Energy, a strategic advisory firm focusing on energy. I have been asked to present my views on Chinese Energy Consumption Patterns and Trends, and will do so by outlining the political and economic context against which China's energy demands are unfolding, following that with a discussion of some of the steps the Chinese government is taking to address rapidly rising demand, and finally outlining what we see as the projected path for future consumption. I would like to note the invaluable contributions of my colleagues Dr. Yahya Sadowski and Dr. David Gates in preparing this analysis.

#### **An Overview of China's Energy Issues and Programs**

##### ***Issues***

China's rapid yet sustained economic growth over the past two decades is one of the great economic accomplishments of the last century. While growth has "solved" many of China's problems, it has also created new ones: massive movements of labor; a growth of inequality; political uncertainty; collapse of some public services (health care), etc. One of the most important of these problems is a resources

bottleneck that threatens to constrict future growth. China needs more skilled scientists and engineers; it needs more water; and, most of all, it needs more energy.

In the early 1990s, the government in Beijing began to publicly acknowledge that it faced a looming energy crisis. Oil production in old fields was declining, and demand for fuel was growing faster than new reserves were being discovered. Self-sufficiency, one of the great objectives of the Maoist era, was no longer possible. In 1995 China became a net oil importer and will remain one for the foreseeable future. By the late 1990s an even more serious problem began to manifest itself: although China had ample reserves of coal, production was inefficient and deliveries were irregular. Combined with the underdevelopment of its natural gas resources, this led to brownouts, electricity rationing, and losses of industrial production. This problem too had been foreseen, but disagreements over how to finance and organize new plants prevented its resolution.

In 2004 China's energy crisis took a new form. International prices for oil rose; but state-mandated domestic prices did not. The Chinese NOCs, caught in a set of scissors between opposing price movements, cut back on the delivery of refined products, particularly gasoline. This led to spot shortages, long lines at gas stations, and public protests.

As China began to rely ever more on imported energy, a new problem pushed its way to the top of Beijing's policy agenda: energy security. Now dependent upon oil imports from distant regions such as the Middle East, Beijing had to worry about how global developments would affect the price and supply of a key industrial resource. What would happen if regional conflicts obstructed access to Persian Gulf oil fields? What would happen if superpower tensions, such as a confrontation in the Straits of Taiwan, tempted the United States to threaten China's energy supply lines across the Indian Ocean? Or, even in the absence of political shocks, how could China react to global surges of energy demand that raised the international price of oil?

### *Choices*

For observers in the OECD countries, the solution to these problems seemed obvious: China should deregulate, privatize and open the energy sector, allowing markets to undertake the work of coordinating supply and demand. For the leadership of the Communist Party of China (CPC), however, this was not an attractive solution—at least in the short term. An immediate shift to a market-based approach to energy problems would aggravate the unevenness of China's development: new energy investment would concentrate in the industrialized coastal provinces, sidestepping the less developed hinterland. Worse, the costs of adjusting to a market-based energy regime would fall heaviest on the working classes, erasing much of the income gains they had enjoyed since the liberalization of the economy began in 1978.

The CPC was not only worried that this was unfair, it feared that it might be disastrous. Inequality, particularly the gap between the urban and rural population, was already the source of massive political tension. And rising incomes were the very foundation of the CPC's legitimacy. A market-based approach could trigger widespread protests and perhaps even a revolution. Energy policy had to be reconciled with Beijing's highest policy priority: political stability. So China's energy crisis, apparently an economic one, is at root really a political problem.

Yet if immediate, "shock therapy" liberalization provided no solution to China's energy problems, neither did a program of return to Maoist doctrines of self-sufficiency.

China certainly has more oil left in the ground, and Beijing is particularly hopeful that it may be able to make important offshore discoveries. But even in the most optimistic scenarios, there is not enough to match the decline in reserves, much less to meet the rapid growth of industrial demand. China's most under-exploited source of energy is probably natural gas. But its gas reserves are generally concentrated in provinces distant from consumption centers. Gas can be transported by constructing pipelines, of course, but this is a very expensive process that requires careful planning to match production with consumption.

Internal debates, particularly over how much to rely upon foreign investors, have slowed growth in this area. The same problem that afflicts coal, of producers being located in different problems from consumers, prevails in this sector. And it is compounded by growing worries about the environmental and human costs of reliance upon coal.

In 2000, despite a patina of computers, cell phones, and astronauts, China's economy still conformed to a nineteenth-century pattern, fueled by low-wage labor and coal. And the heavy reliance upon coal bred a set of nineteenth-century health problems: industrial accidents, pollution on a massive scale, and a rapid growth of lung diseases. Coal is a cheap source of energy for China only because its full human costs are not reflected in the price per ton. By 2000 Beijing was already scrambling to reduce the human and environmental costs of its energy industry before they too turned into a spur to political unrest.

By 1997, the CPC had debated these facts and reached the inescapable conclusion: China would have to accelerate development of all of its energy sources and yet will still have to rely upon growing imports of oil and natural gas. It embraced a slogan of "going out": of looking overseas for the capital, technology, crude oil and gas that it would need to sustain its industrial revolution.

### ***Programs***

The CPC has chosen to confront its energy crisis the same way that it has pursued industrialization since 1978: with a mixed basket of tools, neither purely capitalist nor socialist, in a strategy that would have been equally offensive to Mao or Milton Friedman.

The objective of this approach is simple: to capture most of the efficiency gains that come from reliance upon markets, while preserving much of the political stability made possible by an authoritarian state. China's energy policy is thus a microcosm of the same approach evident in China's wider quest for development: to reap the income benefits available from participation in global markets while preserving the power and order epitomized by the Leninist CPC.

The dangers of this mixed approach are more subtle. The logics of market and command economies tend to subvert each other. Market signals can tempt producers to ignore political directives, and political controls can stifle the initiative on which market forces rely. To successfully reconcile these opposing forces, the CPC would have to monitor their interaction carefully, constantly redressing the balance between the two.

This means, among other things, that Beijing cannot simply pronounce an energy strategy and then let it play out. The key to success in a mixed approach lies in continuous micro-interventions, endless adjustments of policy and personnel, to harmonize the overall process. China has some expertise in this area. Its entire development strategy, both in agriculture and in industry, has relied upon mixing market and command mechanisms. Chinese policymakers have learned to be patient and pragmatic, to shepherd their policy experiments, building on their successes and learning from their failures.

China's diverse experiments in increasing energy production all reflected three themes that were proclaimed by then Premier of the State Council, Li Peng, in an important series of speeches during 1997:

- First, the inevitability of "going out." Self-sufficiency was impossible, so China would have to learn to not just rely upon foreign sources of oil and gas, but to participate skillfully in international energy markets.
- Second, coal was the backbone of China's energy system and would have to remain central despite the high human costs. However, growth should be concentrated in other energy sources, as much as possible capping the use of coal and limiting its attendant pollution.

- Finally, fostering increased supply is not the only strategy China wields in confronting its energy crisis: regulating demand is also a very real alternative. In part, this can be achieved through efficiency increases, such as improving insulation standards in buildings and thereby reducing heating costs. But it can also be done directly, such as by using taxes to dampen the demand for private automobiles and thereby curbing the growth of gasoline consumption.

In the years that followed, China launched a series of major energy initiatives that reflected these doctrines. It began a series of high-profile mega-projects, such as the West-East natural gas pipeline and the Three Gorges Dam. These are intended not only to directly ameliorate the problem, but also to stimulate the interest of private firms in investing in certain areas.

Second, the CPC ordered a massive reorganization of the energy sector in 1998. This was most far reaching in the oil sector, with the creation of three competing national oil companies (NOCs). These firms promptly went on a “contract offensive” from Saudi Arabia to Venezuela, buying up overseas assets—both oilfields and companies (including a bid for Unocal)—which ironically stimulated demand for hydrocarbons globally. The same year also saw the beginning of a restructuring of the electrical power industry. Because of the difficulties of successfully regulating this sector (think California), the process was more protracted. But coal-powered electrical generators are the front line of China’s energy supply, so when reforms in this area finally take hold they will have a broader impact on energy demand

Third, in 2004-6 the CPC began to reorganize the government in a manner that reflected a move to make energy supply one of its top priorities. The party released a long-term plan for energy development in 2004. A leading group for energy was established in 2005. New energy regulatory agencies were being established. A new five-year plan with energy supply as one of its top targets was promulgated. The next five years should be a period of rapid evolution in China’s energy markets.

Finally, the CPC undertook hundreds of micro-experiments in both new technologies and policy reform. Shanghai was allowed to develop its own restrictions upon automobile growth. Beijing developed a model “green community.” Dozens of windpower complexes and solar laboratories were launched. Each of these experiments was watched to see whether it might reproduced and extended on a national scale.

These experiments, large and small, provided a broad approach through which the CPC thought solutions to China’s energy crisis might be discovered. No one expected them to be “magic bullets,” to provide an immediate short-term cure. But over the medium-term different avenues would be explored, successes expanded and failures rejected, in a learning process that gradually revealed which avenues had the most potential. Indicating which avenues were most promising and deserved the greatest share of resources was one of the functions of the five-year planning process. Understanding the Five Year Plans is a critical component of understanding the underlying forces driving China’s policies towards its energy usage.

## **Goals and Objectives, Policy Tools and Approaches for China’s Eleventh Five-year Plan**

### ***The Political and Economic Context of the 11<sup>th</sup> Plan***

The 10<sup>th</sup> Plan (2001-2005) was transitional, an effort by then-President Jiang Zemin and then-Premier Zhu Rongji to secure their legacy while handing the reins of power over to a new team. The 11<sup>th</sup> Plan (2006-2010), in contrast, was definitional: an opportunity for Hu Jintao and Wen Jiabao to elaborate a distinct philosophy of development that would govern not only this plan but the 12<sup>th</sup> Plan and perhaps its successors.

Hu and Wen represented a very different group within the party from Jiang’s Shanghai faction. Members of this faction tended to have a more egalitarian perspective than those of the Shanghai group. They too embraced the model of the “socialist market economy,” but they did not believe that economic growth alone cured all ills. They worried that unguided growth not only failed to solve the problem of poverty, but actually aggravated other ills such as pollution and corruption.

Hu propounded a new slogan to epitomize this distinct perspective. Since the reforms of Deng Xiaoping, the overarching goal of development in China had been to create a “prosperous society” (*xiaokang shehui*). In 2003 Hu persuaded the party leadership to agree that the proper objective should be a “harmonious society” (*hexie shehui*): one that was not only rich in material terms, but that provided an element of balance with nature, social justice, and promoted the dignity of all citizens. This shift has had, and will continue to have, critical implications for the energy sector in China.

### *The Energy Implications of the 11<sup>th</sup> Plan*

The 11<sup>th</sup> Plan includes proposals for a variety of “conventional” energy projects, such as a second West-East gas pipeline and two new massive oil pipelines. (Many of these objectives were already laid out in a special “Draft Energy Strategy” issued in 2004.) It reiterates the old objectives for increasing the use of non-coal energy sources (particularly natural gas) and for constructing new power plants to meet spot shortages. But the plan raises all of these issues to a new level of urgency, and calls for them to be confronted within the framework of a search for sustainable development.

If it amounts to anything more than rhetoric, China’s search for sustainable development will have important implications for its energy sector. One of its central tenets is that China cannot meet its energy needs by increasing supply alone: it must also cap the growth of demand. Beijing took small steps in this direction immediately after the 11<sup>th</sup> Plan was issued. It announced a minor increase of gasoline taxes and a major jump in automobile taxes to 20 percent for vehicles with engines larger than two liters. (Vehicles already consume about a third of China’s petroleum production.) The campaign to promote sustainability by encouraging conservation was not confined to energy.

The 11<sup>th</sup> Plan also mandates serious increases in the efficiency with which energy is used. By 2008 all vehicles in China will have to meet fuel efficiency standards that are 20 percent more demanding than those applied in the US. A new code of building standards requires extensive use of natural ventilation, natural lighting, water recycling, and renewable energy in new structures. The managers of SOEs will have their promotion prospects scored partly on the basis of improvements in energy efficiency and the government has targeted the 1000 largest enterprises in the country for inspection of their energy practices.

The CPC hopes that its increased investment in science and technology will pay off in the form of greener and more renewable energy. China is already one of the world pioneers in the field of micro-hydroelectric power and low-cost power plant technology. It is putting serious assets behind the development of a fuel-cell powered car, and is experimenting extensively with solar, wind, tidal, and geothermal energy. Most of these experiments are long shots. But the one that the Chinese are most serious about is not: current “clean coal” technologies are too expensive for widespread application in China. So Beijing has launched a crash program to devise low-cost techniques for the gasification and liquefaction of coal, China’s primary energy source.

Beijing is particularly interested in more efficient technologies for processing coal because it is the main source of pollution in China. And pollution is not just a nuisance for the Chinese: it is the source of a major public health crisis. The Worldwatch Institute estimates that by burning 2.1 billion tons of dirty coal each year, China generates acid rain and smog that costs \$13 billion in crop, forest, and human health losses. China is home to 16 of the 20 most polluted cities in the planet, and 80 percent of Chinese towns register sulfur dioxide or nitrogen dioxide levels above those deemed safe by the World Health Organization. Pollution causes 400,000 premature deaths each year. These problems, compounded by coal mining disasters and riverine chemical spills, have already triggered massive public protests.

China’s new pollution control agency, the State Environmental Protection Administration (SEPA), has only 250 staff and is unlikely to turn the country “green” on its own. But environmental issues are a grave concern at the highest levels of the party and certainly lend force to its quest for energy efficiency. It is not

surprising, then, that the 11<sup>th</sup> Plan contains only two official quantitative objectives. One is the increase in GDP. The other is a target for increased energy efficiency. At the moment China generates only 4 percent of world's gross domestic product, but it contributes 15 percent of global water consumption, 20 percent of aluminum, 28 percent of steel, 31 percent of coal, and 50 percent of cement. In creating US\$1 worth of GDP, Chinese producers consume 4.3 times more energy than their counterparts in the US, 7.7 times more than Germany or France, and 11.5 times that of more than Japan. Thus, the 11<sup>th</sup> Plan demands that China consume 20 percent *less* energy for each unit of GDP by 2010.

## **Long-term Energy Demand / Supply Prospects for China**

### ***Economic Growth***

China has consistently been the fastest or one of the fastest growing major countries since the start of the reform program in the late 1970s. Just how fast it has been growing has long been a matter for debate among economists, and the recent government report that revised the historical estimates of GDP, while clearly consistent with established perceptions, will not resolve all of the outstanding issues. The principal issue – even after the latest revisions – is the reasonableness of the estimates themselves – with many economists remaining convinced that reported growth rates are understated when the economy is strong, and overstated when it is weak.

The analysis and forecasts presented below represent PFC Energy's efforts to incorporate the government's latest estimates for GDP including the newly revised data on shares of economic activity by sector. These new estimates show much higher shares – historically and currently – for the service sector (and much lower shares for agriculture) and as such, are both directionally correct and important for understanding what is happening with energy demand. While the adjustments are therefore substantial, sorting out the full implications for the outlook is still in the preliminary stages and subject to revision. Looking ahead, most economists would agree that the Chinese economy will continue to grow very rapidly. But there is less agreement on how rapidly and how the mix of economic activity will change.

### ***Potential Constraints in Energy Demand***

Our base case forecast assumes that real GDP growth in China will gradually slow from the 9.8% per year, that according to the latest estimates, has been the average over the past twenty five years – and just under the average for the past three – to 8.2% per year over the balance of the decade and then 7% and 6.4% per year respectively during the first and second half of the next decade. This assumed slowing of the rate of growth may turn out to be too severe – or not severe enough, representing the high level of uncertainty that remains about the actual state of the Chinese economy given the paucity of data and transparency. But it certainly represents a reasonably likely outcome – one which if approximately correct would be sufficient to raise the level of real GDP per capita from roughly \$1500 US dollars today to more than \$3600 dollars in 2020. Lower international resistance to Chinese exports combined with greater success in increasing the rate of growth in domestic demand would almost certainly result in stronger growth in total and per capita GDP. Greater international resistance and greater difficulty in stimulating domestic demand would produce the opposite result. The energy demands resulting from these alternative profiles (and alternative shifts in the mix of economic activity) have been modeled and the key point is that whatever profile for GDP growth is assumed, the implication is continued strong growth in China's requirements for all forms of energy – including oil and gas.

One primarily economic point regarding these alternative profiles is that if economic growth should turn out to be substantially slower than assumed in our base case, the government is likely to take action – including especially tempering the pace of reform – so as to minimize any adverse effects on the country's ability to absorb new entrants to the labor force and / or workers that are still underutilized in agriculture and the SOEs. (Our working assumption is that the rate of GDP growth at which increasing unemployment would become a concern such that the government would begin to take countermeasures is about 6%). Under a slow growth scenario growth rates as reported may not be much lower than assumed in our base

case but the implications for energy demand – especially improvements in energy efficiency could be such that the reduction in energy demand could be far less than proportional to the reduction in economic growth.

### **Energy Demand / Supply**

Given the strong growth in China's economy since the start of reform, the most surprising thing about China's energy demand is not how fast it has grown – but how slowly. This point is often missed in published commentaries in part because – like exports, discussed above - the volumes involved in China energy are so large. Since 1980 total energy demand in China has grown at an average rate of only 3.9% per year – which compared to an average rate of growth in GDP of 9.8% per year works out to a long-term average elasticity of just over .4. A long-term elasticity of .4 is more in line with what would be expected for a mature western economy and less than half what would be expected for a still emerging market such as China.

There are several reasons for this low growth rate and low elasticity. One of course is the quality of the data. Measuring energy use – like measuring economic activity - in an emerging economy such as China is always a challenge. In China, in particular, energy use can be politically sensitive – especially as relates to reporting between different level governments. In this context there is no question that some of the officially reported data are inherently suspect. The most recent example is reporting on coal use in the late 1990s, when lower level governments were almost certainly under reporting their actual production and consumption so as to appear in compliance with central government directives to limit production from smaller, more hazardous mines. Support for the conclusion that this was under reporting rather than actual lower use is the fact that there was no reported offsetting increase in usage of other fuels (substitution) and no evidence that there was a reduction in economic activity to correspond to the reported reduction in the amount of energy used.

A second reason for the low growth rate, which is partially fundamental, partially a function of how elasticities are measured is the large share of residential energy in total energy especially at the start of reform. Residential energy use in China has grown over the past twenty-five years and PFC expects that it will continue to grow. But the fact that it was large to begin with and has not grown as rapidly as GDP has had the effect of slowing the rate of growth in total energy and thus lowering the elasticity of total energy in relation to GDP as this is traditionally measured. (China's historically small volumes in transportation and commercial energy have grown more rapidly but because of their small size, have had almost no effect on China's total elasticity).

A third reason, which is almost entirely fundamental, concerns the inefficiency of industrial energy use at the start of reform. Basically when reform began, use of energy in China's State Owned Enterprises was extraordinarily inefficient. There are several reasons for this but the most important is probably the fact that these enterprises were not charged for their energy use and thus saw no incentive – other than occasional government exhortations – to use energy more efficiently. With reform there have been two parallel developments – both of which have resulted in dramatic improvements in this sector. One is shifts in the mix – so called “indirect conservation” - as lighter, less energy intensive industries, many of which made up of non-state owned companies have come to account for more and more of China's industrial activity. This is conceptually similar to what happened in Japan in the late 1970s following the first oil shock when production from energy intensive industries such as steel grew more slowly or declined and production from higher value added, less energy intensive industries such as automobiles and consumer electronics began to grow more rapidly. The other is changes in production processes – so called “direct conservation” – as the equipment that was in use at the start of reform was replaced and as more of the production took place in newer facilities that had more efficient technologies simply as a function of being new.

These second and third reasons are extremely important for the outlook for energy demand and supply in China. Residential energy now represents a much smaller share of total energy than it did when reform began. Similarly energy intensive, heavy industries – especially heavy industries relying on pre-reform inefficient processes – are a much smaller percentage of industrial energy use than was the case twenty five

years ago. In this context, while there are many reasons including government policy for assuming that China will be working to limit the future growth in energy consumption, the implication of these historical trends is that many of the easy improvements in energy efficiency – those resulting from the large shares of residential and older, less efficient equipment in industry - have already been achieved. Going forward the likelihood is that future improvements may be more difficult and that as a consequence, future elasticities may not decline as rapidly as the government and many energy economists are currently assuming. The one certainty is that total energy per unit of GDP will not continue to decline at the same rate as it has since reform began.

Our base case forecasts show total primary energy demand in China growing from an estimate of just under 32 mmboe/d (million barrels oil equivalent per day) in 2005 to 55 mmboe/d in 2020. This would be a growth rate of 3.7% per year over the full 15-year period and would imply an average elasticity of just over .50, about .10 higher than the .40 observed since the start of reform. (To put this in perspective the average elasticity over the past five years was about .70, .20 higher than the current forecast but this is probably overstated by virtue of what we believe to be under reporting of coal demand / supply in the late 1990s). Contributing to the forecast growth rate and elasticity, total final consumption – the sum of the five end uses – transportation, residential, commercial, industrial and other (mainly agriculture and non-energy) - is expected to grow at an average rate of 3.6% per year, while energy consumption in transformation – generation of power and district heat – is expected to grow at an average 3.9% per year.

Looking at demand by sector, **transportation** is expected to grow more rapidly than other end uses. Total volumes are expected to nearly double from 2.3 mmboe/d in 2005 to 5.3 mmboe/d in 2020, for an average growth rate of 5.7% per year. Much of this growth is expected to be in road transport – trucks, reflecting ongoing changes in Chinese industry – with greater emphasis on higher value added products and the inherent advantages of trucks for local distribution of freight – and cars, reflecting the assumed continued growth in the numbers of cars from the current extremely low base. (Water and rail will remain important but prospects for growth in these two modes are limited in part by the inherent constraints in these systems. Air will continue to grow strongly but the base is still extremely small.) While forecast volumes for road transport have been tempered to reflect concerns regarding the current and future adequacy of China's road network – and likely improvements in fuel efficiency, especially if hybrid vehicles become an important factor in the market, the facts are that if recent performance is an indication, this part of our overall demand forecast is as likely to be too low rather than too high.

In terms of fuels used in transportation, oil will continue to dominate while electricity will continue to grow, mainly at the expense of direct use coal in rail. Within the oil category, the mix of fuel products – gasoline versus ADO (automotive diesel oil) - is a major uncertainty that will be increasingly important over time. For purposes of this analysis, however, the point is that oil will remain the dominant fuel in transportation.

**Commercial** use energy is expected to grow rapidly at 5.3% per year but total volumes are expected to remain rather small with a forecast increase of 1.0 mmboe/d producing a sectoral total of about 1.8 mmboe/d in 2020. In terms of fuels, electricity and gas are expected to grow relatively rapidly but oil is expected to retain its traditional dominance.

**Industrial** energy is expected to grow at about 4.1% per year, thus solidifying its position as the dominant sector in final consumption. Total volumes are expected to increase from 8.7 mmboe/d in 2005 to 16.0 mmboe/d in 2020.

In terms of fuels, electricity and gas are expected to grow somewhat more rapidly than either coal or oil. Within the oil category, products like LPG are also expected to grow relatively rapidly. These changes in the mix of fuels reflect the judgment that Chinese industry will continue to move in the direction of lighter, higher value added less energy intensive products such as consumer electronics and ceramics. But heavy industry including steel will continue to grow and as a result coal and fuel oils are expected to continue to grow and to retain their dominant positions.

Reflecting its recent performance **residential** energy is expected to continue to grow rather slowly with an average growth rate of only 1.1% per year. But this relatively modest growth rate and correspondingly

modest increase in the total (from 6.5 mmb/d in 2005 to 7.6 mmb/d in 2020) is a function two rather divergent patterns: relatively strong growth in the urban areas where population continues to grow at an average of about 3% per year and little or no growth in the rural areas, where population is flat or in some cases declining. It is impossible to overstate the importance from an energy standpoint of continued strong growth in the urban areas where the fundamentals of urban life – apartment living, jobs in factories and commercial establishments, access to modern appliances - in effect compel a shift to commercial energy and especially oil, gas and electricity rather than coal or more traditional fuels such as biomass. Biomass and coal remain the dominant fuels in the rural areas but even here the cleaner commercial fuels are continuing to penetrate.

Included in the totals for energy consumption for the various end uses discussed above, total electricity demand is expected to grow at an average rate of 4.8% from 2005 to 2020. This implies an elasticity of electricity to total GDP of just over .65 (.67), higher than that for total final consumption (.50) but again, rather low for a country at China's stage of economic and energy development.

Looking in detail at electricity output / generation by fuel, coal is certain to remain the dominant fuel with a market share in the mid 70% range – despite the government and utilities' strong efforts to promote the development of alternatives. Hydro is expected to remain the second most dominant fuel but its share is expected to gradually edge downward – from 15-16% now to about 12% - once current major projects are completed. Nuclear is expected to grow very rapidly especially toward the later half of the outlook as the options for alternatives continue to narrow. In this context nuclear is assumed to account for about 6% of China's power in 2020. Gas is also expected to grow rapidly but given the low start point – and likely slippage especially if currently planned LNG projects are delayed, its share is likely to remain relatively modest (3% or so) even in 2020. Oil is expected to account for most of the balance and will continue to represent about 2% of the total.

Combining the forecasts for fuels by end use sector and the forecasts for fuels for transformation – power generation and district heat – coal is expected to remain the dominant fuel in China's overall energy balance at least through 2020 – and probably many years thereafter. Coal is projected to grow at 3.7% per year – the same as total primary energy - but given the enormous volumes already being consumed, even this modest growth rate is enough to raise the total some 13.8 mmb/d (to 33.1 mmb/d) by 2020. 33.1 mmb/d would represent just over 60% of total primary energy.

Continuing to utilize current volumes of coal let alone supply projected growth poses a number of important challenges ranging from air quality to mine safety to basic logistics – given the current limited availability of rail facilities to move coal from the mines in the north to industry and utilities in the south. Lack of water that might be used to wash coal before shipment is another problem. But given the volumes involved, the clearest implication is the urgent need to pursue all possible options in the areas of energy conservation and the utilization of alternative fuels including oil, gas and nuclear.

Oil is projected to grow at 4.4% per year that translates to an increase of roughly 5.8 mmb/d (from 6.4 mmb/d in 2005 to 12.2 mmb/d in 2020). 12.2 mmb/d would represent about a 22% share of total primary energy. 4.4% and an increase of 5.8 mmb/d are roughly in line with recent past forecasts by PFC Energy and reflect a combination of recent performance, the government's revised estimates for GDP, oil's currently unique advantages in transportation, residential use, specialized industry and petrochemicals and the judgment that with all of the challenges confronting the other energy sources, demand for oil may continue to grow quite rapidly.

Among the questions that bear on the reasonableness of this forecast, one concerns the government's future pricing policy for oil and other fuels. The current forecast assumes that the government will continue to move toward full cost – rather than directly or indirectly subsidized – pricing, as it has indicated is its intent, but that its efforts will continue to fall short of this objective. A key reason for this assumption is last year's creation of an energy leading group within the State Council, a structure that among other things, would appear to give greater voice in energy pricing to consuming industries, rather than leaving this more or less completely in the hands of the State Development and Reform Commission.

Gas is projected to grow at 5.9% per year. This means an increase of 1.1 mmb/d between 2005 and 2020

(from just over 0.8 mmboe/d to just under 2.0 mmboe/d). This forecast is somewhat lower than recent past forecasts by PFC Energy and reflects concerns over government policy and pricing – especially with respect to LNG. A year ago most forecasters were caught up in the excitement of monthly if not bi-weekly announcements of new LNG terminals. This year the challenges are clearer – the most important being the reluctance of consumers to accept prices needed to cover the costs of imported LNG (or pipeline gas) as long as alternatives such as coal are available at much lower cost. In many respects this is a classic public good / private good problem with air quality considerations favoring the use of gas but private economics favoring continued use of coal. But in this case the traditional public / private solution – public intervention to encourage consumption of gas through government guidance or higher taxes on coal - has not yet happened and in fact may not happen any time soon. Reasons range from government reluctance to undercut reform by overriding price based decisions to the involvement of major consumers in policy, pricing and in the financing of the terminals/regasification facilities. In this regard the most encouraging development may be recent trends in which south eastern major consumers are having to pay higher prices for imported coal.

With future production gas somewhat more uncertain than future production of oil, it is reasonable to consider at least two possible profiles for future production and imports: one profile assumes that gas production holds constant at roughly current levels while the other assumes that production will increase by an arbitrary 3% per year. At this point the message is that given what is known today – and given the limited success that the industry has had to date, it is probably best to assume that China will require a huge increase in imports – both pipeline and LNG – in order to meet what must be considered a moderate forecast for end use demand.

Projected growth rates for other fuels – including nuclear and hydro are generally ambitious but given the current low start points and acknowledged challenges are unlikely to make a material difference in China’s overall energy picture within the time frame covered by this forecast.

## **Conclusion**

In conclusion, it is clear that China’s energy demands will continue to increase rapidly in coming years. In fact, in many ways they will rise more rapidly than we have seen in recent years. However, while unconstrained demand growth will certainly tax the world energy system, there are plenty of opportunities to help address this issue before it gets out of hand. China is already undertaking a variety of policies aimed at increasing conservation and efficiency, but there are other opportunities that can be leveraged by U.S., Japanese and European companies. By helping to introduce the widespread use of hybrid automotive technology, for example, rapidly increasing projected gasoline demand could be limited to a much lower amount. Chinese officials realize that it is in their own best interests to limit future energy demand, and thus are amenable to pragmatic solutions as long as they do not perceive a direct economic threat from adopting them. There is a risk, however, that moves made by either China or the United States to secure energy supplies may be misperceived by the other side, a potentially dangerous situation. Unrestricted competition for energy will lead to volatility in energy markets and may threaten uninterrupted supplies, a sub-optimal outcome for all. Therefore, it is strongly recommended that the United States make every effort to engage China on this critical issue, and in doing so help ensure its own energy security for the future.

HEARING COCHAIR SHEA: Thank you, Mr. Rahim. I appreciate that. Mr. Houser.

**STATEMENT OF MR. TREVOR HOUSER, VISITING FELLOW  
COLIN POWELL CENTER FOR POLICY STUDIES; DIRECTOR,  
ENERGY PRACTICE, CHINA STRATEGY ADVISORY, L.L.C.,  
NEW YORK, NEW YORK**

MR. HOUSER: Thanks very much for asking me to join you here today. I should also say I come to you as a Visiting Fellow at the Colin Powell Center for Policy Studies in addition to my private sector advisory work.

Saad did a great job of laying out some of the policy constraints and priorities facing the Chinese leadership. I'm going to use my oral comments to focus on some changes happening in the real economy in China and how that's shaping the nature of energy demand. I go into this in greater depth in the written statement and also in a report my colleague Dan Rosen and I did for the Peterson Institute last month which I think is maybe included in the briefing binders there.

Over the past five years, the energy profile of Chinese economic growth has change dramatically. From 1997 to 2001, efficiency gains reaped from economic reforms allowed China to grow its economy at nine percent a year, while energy demand grew at only half that rate.

Since 2001, however, economic growth has continued apace, but energy demand has risen by 13 percent a year, more than twice as fast as analysts predicted at the turn of the century.

This upside surprise, as Saad mentioned, has resulted in energy shortages at home, tight oil and gas markets abroad, and has placed China front and center in the debate over international energy security and global climate change.

What Dan and I find in our report is that contrary to what most people think, what's driving that surge of demand, the one we've seen over the past five years, isn't automobiles and air conditioners. But it's industry and the reemergence of heavy industry. It's steel mills, cement kilns and aluminum smelters. We call this investment-led energy demand which is China's current energy challenge.

China's future energy challenge is consumption-led demand, automobiles and air conditioners, and Dr. Schipper is going to talk about that, but right now about the challenge comes from industry, industry that's responsible for 70 percent of energy demand in China today.

For example, the iron and steel sector alone is responsible for 16 percent of the country's energy demand. All the households in the country combined account for only ten percent. The chemical sector uses more energy than the private transportation and the aluminum industry uses more energy than the commercial sector.

So as opposed to the U.S., where we have a consumer problem, in China right now they have a producer problem, and this of course expands into the economic realm as well as the energy realm. At only six percent of global GDP, China today accounts for nearly 35 percent of global steel production, 28 percent of global aluminum production,

and nearly half of all the cement and flat glass produced worldwide, and this reflects not only a growth in domestic demand for these goods, but also reflects a shift in China's trade balance.

Four years ago, China's steel imports exceeded exports by 450%. Last year, exports exceeded imports by about 250 percent. That turnaround is responsible for a third of China's global trade surplus, the change in the metals balance from net importer to net exporter, so China is now not only the largest steel producer in the world, it's also the largest steel exporter.

In addition, these energy intensive industries build the infrastructure that facilitates the lighter side of Chinese manufacturing: the ports, the highways, the buildings, the factories that allow China to manufacture Barbie dolls, televisions, electronics that get shipped to the U.S. So whether it's in terms of the steel that's exported directly, the cement poured for highways or the petrochemicals used to make toys, much of China's energy demand is, in fact, used to satisfy consumption outside of China's borders, not least here in the U.S.

So then the question is from a global energy and environmental standpoint, how efficient is the energy use in China compared to elsewhere and from what sources is it generated? Well, of course, in China it's generated mostly from coal. 70 percent of the country's energy needs are satisfied with coal, which in 2006 totaled about 2.4 billion metric tons, more than twice as much in the U.S. and nearly 40 percent of global coal consumption that year.

Every year more and more of this coal is delivered to the end user in the form of electricity, demand for which is growing fast. Last year, China added over 100 gigawatts of new capacity, which is more than the entire installed base of Africa, and again this year will probably add another 100 gigawatts.

The options for moving the power sector away from coal are fairly limited. Beijing has ambitious plans for hydro, wind, nuclear, but faces both economic and political hurdles on all three fronts.

For hydro, they'd like to see capacity double by 2020. Now, to reach that target, it would mean building one Three Gorges Dam every year between now and 2020, which is probably not possible.

For wind and nuclear, the government has similar ambitious hopes, which might be achieved, but even under the best case scenario would account for about six percent of installed capacity in 2020.

Natural gas, which is 20 percent of power gen here in the U.S., it's largely off the table in China due to costs. LNG contracts have been signed. Terminals are being constructed, but prospective gas-fired power generation has to line up behind the petro-chemical industry that needs cheap gas to be competitive with the Middle East

and behind residential consumers who are looking for clean fuel to heat their homes and to cook their food.

In short, alternative power sources in China are important for the global turbine market, the global nuclear market and global LNG market, but they do not mean that China is going to be able to significantly move away from coal in the medium term.

Expect to see China add more coal-fired power plants over the next 15 years than exist in total in the U.S. today.

In addition, rising oil and gas prices have set off a hunt for coal-derived petroleum substitutes. In the beginning, this charge was led by Beijing concerned with the national security implications of China's growing dependence on imported oil, but with crude now above \$60 a barrel, the market doesn't need any help from government and there's a ton of projects on the books under development.

Some analysts estimate that the production of coal-derived transportation fuels could reach 1.6 million barrels a day by 2020. If achieved, it would require an additional 400 million tons of coal and 600 million tons of water each year to produce.

Now, recently, afraid of what this means for coal prices, water supply, and the country's carbon footprint, Beijing's enthusiasm has waned, and the government in recent weeks has actually taken steps to put the brakes on these projects, put a moratorium on the development of new coal-to-liquids in China.

The Commission has asked me how this reliance on coal affects China's overall economic health. To date, it's been supportive of economic growth. If China had been forced to do with imported oil what it's done with domestic coal, the country's energy bill would have easily doubled and economic growth would have no doubt slowed.

Going forward, though, our view is that coal dependence presents more of a downside risk to growth as prices rise and the associated environmental costs come to bear. The recent surge in heavy industry responsible for the country's burgeoning energy demand is made possible by a number of cost advantages that Chinese firms enjoy relative to their foreign competition.

We detail these advantages in our report, but most important are short construction times and approval processes, concessionary land prices and a capital system that's biased toward state-owned heavy industry that in the absence of real interest rate competition for depositors can provide money cheap to lenders.

Energy prices in and of themselves don't actually provide much of an advantage in China. Domestic coal and electricity costs have largely converged with international levels, and in many cases, Chinese companies actually pay higher prices than their counterparts in Russia, Australia and even the U.S.

Where Chinese firms do have an advantage is in the environmental cost associated with producing and consuming energy. Few Chinese power plants and even fewer steel mills and cement kilns control pollutants emitted from the coal they burn. The cumulative effect of this is decreased agricultural yields, premature mortality and chronic respiratory problems.

China's coastal residents, however, are now reaching an income level where their food and shelter needs are met, and things like clean air and water are more valuable.

This rising middle class is putting pressure on the government to force industry to reduce the amount of pollution it emits, even if it comes at the expense of growth. Incorporating these environmental costs into already rising energy bills will surely hurt the competitiveness of some of China's heavy industry. Now, this can be either a net positive or a net negative for Chinese economic growth, depending on how the government manages the process.

There's been a lot of discussion in the U.S. recently about how to rebalance Chinese growth away from investment towards consumption, away from industry towards services. Worried about the negative impacts of the current investment-led industry boom from energy demand to environmental degradation to the exploding trade surplus, Beijing is eager to see such rebalancing take place, but the steps the government has taken to date are insufficient to bring it about in an orderly manner.

In their timidity, they risk causing a more abrupt adjustment down the road. Many in government realize this and are trying to move beyond traditional administrative approaches to reining in industry.

My time is more than expired, so I'll wrap up. I'm happy to go into the international implications, both for climate change and energy security in the Q&A.

[The statement follows:]<sup>4</sup>

HEARING COCHAIR SHEA: Thank you very much, Mr. Houser. Dr. Schipper.

**STATEMENT OF LEE SCHIPPER AND WEI-SHIUEN NG  
DIRECTOR OF RESEARCH, EMBARQ, WORLD RESOURCES  
INSTITUTE, WASHINGTON, D.C.**

DR. SCHIPPER: Thank you and I'll speak as fast as my cold lets me. Thanks. I'm summarizing work we've done in EMBARQ with WRI

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<sup>4</sup> [Click here to read the prepared testimony of Mr. Trevor Houser](#)

Center for Sustainable Transport. Our work is in many, many cities, supported by the Shell Foundation, the Caterpillar Foundation. Actually it works with empowered leaders to catalyze social, financial and environmentally sound solutions to the problems of mobility.

We've worked a great deal in Shanghai and Xi'an. And I will give you hard copies, real hard copies of some of the things we've done, and you'll get little brochures about EMBARQ.

Everybody talks about the rising need for fuel in China and I think after hearing the previous two speakers, I'm almost afraid to make things sound worse, but I will.

Our thesis is that in spite of China's tiny oil demand-- tiny by our standards, we share the concerns expressed here about the implications of imports of oil in China and the expensive alternatives-- we think that transportation is a more fundamental roadblock to improving China's energy use. You can build factories; you can export dolls; you can't really create space where there is none, and there isn't space in Chinese cities.

I think the point made earlier that particularly on coastal China, people have money, they have cars. In my eight years of going back and forth to Shanghai, I've seen it go from passible to impassible. We call this hypermotorization, not because cars are bad, but because it happened so fast, in half a generation, and the number of people getting knocked off the road is really, really shocking, and in my written testimony the first picture is the "No bike" sign on Nanjing Road. Even pedestrians like myself take real risks in trying to walk across the street in China.

Fuel will either come from oil imports or it will come from synthetics. As we describe in the testimony, we've commissioned a book for Chinese readers in Chinese written by Chinese and non-Chinese experts paired up, and the outlook for anything other than coal-based synthetics is grim.

But the Chinese admit when you talk long enough that the coal-based synthetics are also going to be expensive. I point that out because in the other chamber of this organization, they're talking about subsidizing coal-based synthetics. China, well, we'll see.

The authorities understand that the alternative is expensive, but they still pay less for gasoline and diesel than we do, and they haven't sorted that whole issue out of how to internalize even basic market prices, not to mention externalities.

The cost in human terms, in lung terms, having gotten sick many times in ordinary Chinese cities from being stuck in traffic, cost is very high, but the real cost is the irreversible attempt in places like Beijing to sprawl, thinking that will solve the problem, and as we know from our congested cities, that doesn't solve the problem. Ask

anybody on either side of the aisle who has to deal with Northern Virginia, and outer Beijing and now Pudong, which was empty 30 years ago, in the east of Shanghai is beginning to look like Tysons Corner.

China thinks it has a market economy and all of us who go there know that it's really fun to go to either a fancy department store or haggle for a piece of art, but the real blood of the market economy that it takes to steer consumers' investment isn't necessarily quite there.

We modeled three futures. I won't go into the details because of lack of time. The first was business as usual, and bingo, we get whatever else gets, two million barrels a day for cars in the year 2020.

Then when we said what about Japanese gasoline prices and modest fuel economy standards, and I'm proud to say that my student Feng An is the guy that turned the trick on the fuel economy standards. And that gets you to about one-and-a-quarter million barrels a day, and they can stick in some alternatives like compressed natural gas, maybe some electrics, but the cities are still awash in too many cars. Okay.

So we said what happens if they really take transport seriously like very few places in the world have done? One place that's trying now is a small town north of us called New York, and that's what you have to do to manage millions and millions of people in a small space.

First of all, the results of the scenarios are we have about a doubling of oil use. We have about a quadrupling in total energy, not a ten-tupling. We have a modest increase in greenhouse gas emissions. The cars are small, safe and slow, and one of the precedents for that is the popularity of two-wheelers through most of the rest of Southeast Asia. So it's not impossible given when you have the constraints they have.

You need right pricing; you need congestion pricing; you need to charge for parking; you have to stop the Paris-style parking that is now filling up the sidewalks in China. And while people talk about China needing technology, Americans have the most efficient cars in the world. That is we use the least fuel per ton mile because we have the biggest cars. What China doesn't need is big cars that are efficient. It needs fuel-economic cars, and so I worry when people think about technology when the issue is small cars, safe cars and slow cars.

Above all, China also needs a real concept of how to do urban transport, and that is what has emerged in our discussions with the leaders of Xi'an and Shanghai, particularly in Xi'an where we got the members of the People's Committee to fight amongst themselves, and my assistant was from Singapore. So I got kind of as best as I could.

We've never seen that, and what they were basically saying is we don't know really what the problem is. We don't know what to do. At one point someone said let's tear down the historic Wall; that will solve our problem. And then everybody looked at him in kind of

horror because that's what makes Xi'an Xi'an. You could also plow over the Terracotta Warriors.

My view is that it's not too late for China to change, to choose rather. If you look at one of my graphs, China has the car ownership now, roughly where we were in 1920, 1925, at half of our income. That's because cars are cheaper. What that means is they have 90 years of our experience to say here's where that path goes. They're ahead of us, okay.

And it's not my role to say to the Chinese authorities here's what you must do. What I think I have to do is say you must choose. Here are some tools; here are some outcomes. We can work these things. That's what we've done. And I can that the leaders of Shanghai and Xi'an really look up and take notice when they realize where they're headed.

Finally, the issue of assistance. What can the U.S. do? Because we were, for example, privileged to brief the head of EPA last year before his first trip. We don't need to support exports of energy-intensive vehicles. We don't need to support exports of an energy-intensive lifestyle which says something for Wal-Mart and things like that.

I admire the fact that Ikea in Shanghai is right by a transit node right downtown. Okay. What we can do is export some of our best thinking that our municipal areas or planning organizations do. We do have stakeholder involvement, something you don't have in China. We do have a way of looking at alternatives to scenarios such as the ones that I've shown today. And we believe that that kind of work followed by some real money to really test things, whether it's vehicles or low energy/low impact transport patterns demonstrations, that's the kind of a thing that will show China, and in a funny way show us, what kinds of alternatives you really have because it's not too late, and I think with those tools, the Chinese will not only choose, but they will choose wisely.

Thank you.  
[The statement follows:]<sup>5</sup>

### **PANEL III: Discussion, Questions and Answers**

HEARING COCHAIR SHEA: Thank you very much, Dr. Schipper. I'm going to defer my question and start off with Vice Chairman Blumenthal.

VICE CHAIRMAN BLUMENTHAL: Yes. I have, I suppose I have two, two questions. One, I think they're both directed at Mr.

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<sup>5</sup> [Click here to read the prepared statement of Dr. Lee Schipper and Wei-Shiuen Ng](#)

Houser. The first is in terms of now being a net coal importer, as you mentioned, what surrounding countries that actually share land border with China have coal deposits and coal mines that the Chinese may be interested in buying from, using? That's the first. Go ahead and answer that, and I'll then ask the other.

MR. HOUSER: First, I want to qualify this question as it got a lot of press this year in China as well as outside of China when the country officially became a net coal importer for the first time. It's important to qualify the scale, and we're talking about 2.4 billion tons of coal consumed each year. Total imports this year will maybe top a couple hundred million tons. So while it's impact is large for Vietnam, for Australia, for the surrounding countries who are going to sell coal to China; it's not a fundamental shift in China's import dependency on coal of any significant degree, and it won't be for a number of years.

It's significant if you're Guangdong province on the coast in the south and the cost of delivered domestic coal is like \$70 a ton. Then maybe you're going to import better than 50 percent of your coal from neighboring countries, but for the country as a whole it's not going to terribly significant.

As for the countries most affected: it will be Australia, which is loaded up and ready to go and ship their coal. It will be Vietnam. It will be Indonesia and it will be Mongolia. The Chinese are up in Mongolia every weekend with suitcases full of cash trying to buy coal mines, and the Mongolians sandwiched between Russia and China with no port (though they do have a Navy--it sits on a lake--it's one frigate that sits on a lake with an admiral)--they're a little wary based on their history of becoming a resource supplying appendage to their southern neighbor, and are eager to bring in European and U.S. companies as a hedge against that influence. They call it a "third-neighbor policy."

VICE CHAIRMAN BLUMENTHAL: That question on--

MR. HOUSER: Yes, sure.

VICE CHAIRMAN BLUMENTHAL: On the Mongolian question, are they simply afraid of being a resource exporter through the market or are they afraid of larger strategic questions regarding Chinese, past experience with China?

MR. HOUSER: Both. They're afraid economically of having a captured market. They know that they don't have a port. It's either got to go through China or Russia. The problem is they're selling coal into the cheapest part of the country in Inner Mongolia. That's the transit route. When I talk to the Mongolians, they look at the port price at \$60 a ton, and they're getting from Shenhua maybe eight, nine dollars a ton, and then Shenhua trucks it 200 kilometers south of the border and sells into their distribution system, and the Mongolians worry that

they're getting gouged because they're only getting eight, nine dollars a ton, but the mine mouth price in Inner Mongolia is only \$12 to \$15 a ton. Two-thirds of the cost of coal in China is transport to the coast. So they're not selling into a particularly sweet part of the Chinese market.

So they want to be able to do more downstream value added, maybe do coal conversion, do power. They want the same thing for the copper mines and for the gold mines, to keep as much of the value inside of the country as possible. Then strategically, yes, they don't want to have all of the big--the copper mine, the Oyu Tolgoi deposit, it's huge for Mongolia. This would double the GDP of the country. Some of the coal projects are of similar scale, and so to have that only be done with Chinese investment is a geopolitical concern for Mongolia as well.

VICE CHAIRMAN BLUMENTHAL: I don't know how much time I've got left.

HEARING COCHAIR SHEA: You've got a minute left.

VICE CHAIRMAN BLUMENTHAL: Okay. You seem skeptical about moving the power sector away from coal to some of the other things we've heard in earlier testimony. You mentioned hydro and the problems and expense with that. What about the nuclear plans that we've heard about?

MR. HOUSER: Sure, there's plans to build 30 gigs of new nuclear capacity between now and 2020. And it's possible that it could happen. Those are ambitious plans. They will account for maybe 30, 40 percent of the global nuclear build-out during that period, so if you're a Westinghouse or you're a GE or you're Siemens, it's very important to you as a market.

But even at 30 gigawatts of new construction, if we get to 40 gigawatts of nuclear capacity in 2020, that's going to be three percent of total installed capacity. So the build-up will be massive, but its ability to make a dent in the total power picture is pretty small.

VICE CHAIRMAN BLUMENTHAL: So why do it? Do you think these plans are going to be carried out?

MR. HOUSER: Yes, absolutely, because they're going to be done in coastal provinces where delivered coal is particularly expensive, more in Guangdong, more in Fujian, along the coast where the price of coal is \$60, \$70 a ton. They're important for those areas. As part of the national picture, it's less significant.

VICE CHAIRMAN BLUMENTHAL: Thank you.

HEARING COCHAIR SHEA: Thank you. I'll ask a question. In your prepared document with Dan Rosen, and you mentioned it in your testimony, that heavy industry is the main source for energy demand in China as opposed to residential, commercial transportation. That's

because China's has an export-led economy, I imagine.

MR. HOUSER: Not exactly. If you look at steel, so China produces 35 percent of the world's steel, 460 million tons last year. That's up from 12 percent of global steel only ten years ago. 90 percent of it is consumed domestically. Exports are only ten percent of China's total steel consumption; right. It's laying the infrastructure that's building China's cities, China's factories. Now, it's facilitating exports of other goods, of lighter industry goods, but that steel is not all loaded on to a ship and sent out around the world. It's mostly for domestic consumption. The same would be true of cement and glass.

HEARING COCHAIR SHEA: Will the energy resource mix change if what we want, which is more consumption in China, arrives? What will be the effect of the resource mix if we get more consumption in China?

MR. HOUSER: Ideally. What we think makes optimal sense for China from an economic standpoint is that, if you need to create 25 million new jobs a year, and you're a densely populated country and don't have a lot of resources comparatively, it doesn't make a lot of sense for you to be 50 percent of global cement production and 35 percent of global steel production.

Steel doesn't employ a lot of people. Doing steel in densely populated areas has a high environmental cost. And so if that capital was redirected into services, into more labor intensive industry, the stuff where China has more of a comparative advantage, we think that that would be net positive for economic growth.

But like I said in the testimony, if those environmental costs come to bear in a way that makes Chinese firms uncompetitive, and if it happens at a crisis point, then it's going to be a negative for growth for as a whole.

In terms of energy consumption, a rebalancing of growth towards consumption led/services-led growth would be positive for energy demand. We'd see a reduction in energy demand coming from that type of rebalancing in the short term. Now in the long term, the consumption-led future, when we have Chinese at ten to 15,000 per capita GDP, that brings with it its own problems.

But that type of demand isn't as volatile as the investment-led demand, and there's ways now some of the work that EMBARQ does to get ahead of that curve to try to reduce the impact of that consumption led future.

DR. SCHIPPER: I think the word "volatility" is partly correct. One of the things you do see is consumers' ability to change how they move around in this country quickly. In spite of what people say, our oil consumption for gasoline is off from where we were headed before the prices started to go up in 2002, and even in the last few years, I

think people with two cars have switched.

Now most Chinese have no cars and so what we're facing now is the beginning of a car market. People are going to drive kind of almost at any price. But we see the emergence of a small car market and what I was saying is perhaps even a mini-car market. On the appliance side, some of the work from my former colleagues at Lawrence Berkeley Lab helped the Chinese develop appliance efficiency standards somewhat like ours, somewhat modeled like ours, which means that now you have very efficient air-conditioners.

When I first went to China, a private citizen could not own an air-conditioner, and I was in a guest house that had one, and I was rather surprised.

In the case of transport, what I think I tried to emphasize is that the clock is ticking quickly. As China's joint ventures, China-only companies are quickly girding up to build really world-class cars, and the more that a city like Beijing keeps adding ring-roads, the harder it is then to say, okay, let's all move back into a slightly different way of organizing our homes. This is particularly evident in the part of Shanghai that I mentioned, Pudong, which again is brand new.

It can be spread out and sprawling, but once you do that, people are far from the metro stop. Those of us who know how to go from the Maglev there to the metro and then get to town are sort of privileged, but most of Pudong won't be near one of those lines. We've talked to the Shanghaians about bus rapid transit, and I think it's fair to say we convinced them they can't solve their problem with the metro alone--buses, but real bus priority.

One of the pictures that I have shows nine buses lined up in downtown Shanghai, and what is really scary is not only are they stuck in traffic, but most of the people bicycling or riding two-wheelers next to them have heavy loads including propane cylinders. That's not safe.

And saying to China the more you keep this pattern going, the less flexible your consumers will be, so in a sense, they will become less volatile, and then you have the same problems in China that you might have here where you have truck drivers angry over the cost of fuel and stuff like that. So it's hard for Chinese to envision today this problem, but it's going to come.

HEARING COCHAIR SHEA: Thank you, Doctor. Commissioner Reinsch.

COMMISSIONER REINSCH: Let me start with Mr. Houser and then if I have time go to a question for Dr. Schipper or we'll do another round hopefully.

I want to pick up on your last sequence, the last exchange with Commissioner Shea. It seems to me from your testimony--and that of others also--that you're suggesting that they are where they are in

terms of industrial production in part because of deficiencies in the market system, and through other testimony we've had, government subsidies and efforts to direct production in certain directions. You've talked about the need to rebalance, and I don't think there is a lot of disagreement about that, probably not even on their part.

My question in general is how do you get there and do you get there in a way that's consistent with market principles or do you get there essentially by asking or expecting the government to explicitly reverse course and mandate production or provide incentives in other directions?

It's not clear from what you said that rebalancing can be achieved simply by trying to integrate real market principles and market-based incentives and costs into the system or whether it can only be achieved by the government saying, all right, we're going to stop investing in steel and we're going to start investing in services.

MR. HOUSER: I think that for us the question, the research question, was first you have to know how did we get here, and that helps you figure out how do you unwind it. Was it national aspiration for China to be producing 35 percent of the world's steel and 28 percent of world's aluminum or was it companies responding to economic incentives?

What we found was mostly that it's the latter, that when given the price of environmental compliance, given the price of land, given the price of lending, it's profitable to do steel in China and companies rush in, and actually for four years now, we've seen Beijing try to consolidate the steel industry and rein in production and have been somewhat ineffective in doing that.

The number of steel enterprises today is 7,000, up from four years ago--there were about 3,500 steel companies--despite Beijing's insistence on consolidation, on slowing growth, on administrative guidance to banks to stop lending to heavy industry by trying to raise the energy price for energy-intensive industries, by instituting export licenses.

There's a number of steps Beijing--

COMMISSIONER REINSCH: Well, if all those things have failed, what should they do instead?

MR. HOUSER: Finance reform. Because at the end of the day, this is the challenge. When Beijing gets scared--about the direction the economy is heading they reach for the toolkit that they're most comfortable with, which is the administrative toolkit. That toolkit is less and less suited for the economy China finds itself with today.

So just throwing on some export tariffs, or putting a moratorium on lending, it's a blunt instrument to use. Real reform in the finance sector, allowing interest rate competition, allowing/encouraging banks

to lend to the private sector as well as the public sector, there's some encouraging steps on this front.

Sulfur control is probably the most encouraging example of where market-oriented environmental compliance tools have been used with some success. I'm sorry--you have a question on that.

COMMISSIONER REINSCH: Let me interrupt if you don't mind.

MR. HOUSER: Sure.

COMMISSIONER REINSCH: Because I see the yellow light. Let me just ask Dr. Schipper, on that same point, is that also the answer to their transportation problems, market principles?

DR. SCHIPPER: You saw me write down toolkit. It doesn't necessarily exist for transport. I think strong fuel taxes, basing the taxes on a vehicle and how much you use it and what it costs to park it, congestion pricing which Shanghai is extremely interested in. Market forces don't solve all the problems, but they define things in terms of what you need or don't need to do, what costs and what doesn't cost.

If you think about Xi'an, there are 16 gates to Xi'an, holes burrowed in this wall where we can drive through. It's kind of the easiest place in the entire world. There are no natural places in London other than the river. But in Xi'an, you've got the perfect place to try congestion pricing.

On the other hand, and we had two chapters in the book that talk about this, with no experience in doing this at all, Chinese economists are learning about the theory of the environment in economics and stuff like that. But then what happens when you go to the People's Committee and you say we should charge for congestion pricing, another important member says, ah, but the automobile is a pillar of economic growth, so we can't offend it.

That was what somebody who could be a vendor for congestion pricing equipment said was his company's fear working in China. So, in other words, the market stimuli are so important, and yet somebody has to say I want this to be reflected in this price, and someone else will say, as we do again here, but that's against me.

I think one of the things we can do with our Chinese colleagues is learn how to do this on both sides because we're not perfect and they're far from perfect, but I think without that, you'll have simply more cows.

HEARING COCHAIR SHEA: Thank you, Dr. Schipper. We've got to move on to the next question. Commissioner Houston.

COMMISSIONER HOUSTON: I would like to thank all three of you. You've provided such great succinct and complete information in such a short period of time. To say that the sustainable development problems in China are a daunting challenge is probably an understatement, and I think we've had a really good handle on how

these issues affect our environment here today which we've discussed national security and economic security in the past. I'm sure you heard some of the testimony about the particulate matter coming over here.

I have a quick question with a follow-up. The quick question is now that China is a net importer of coal, how much of that coal comes from the U.S. percentage-wise?

MR. HOUSER: I guess that's probably to me. I would guess almost none of it comes from the U.S.

COMMISSIONER HOUSTON: Almost none of it?

MR. HOUSER: Yes. The bigger challenge for coal markets was China exiting the market as an exporter. China was the second-largest coal provider in Asia up until recently and has basically exited the Asian coal market over the past four years and become an importer. So it has a big impact in Indonesia, Australia. I would doubt any U.S. coal makes it to China. It's possible a couple boats do, but very little.

COMMISSIONER HOUSTON: Okay. So going to the next step, it seems to me from what we've heard today in particular that it is in our national best interests from an environmental perspective to encourage China to follow the course to other sorts of energy that are cleaner, that don't come blowing over to our country.

But again, China appears to be stuck in this paradigm of coal dependency, at least in the short term. Do any of the three of you see any possibility of China saying to itself, maybe we need to put the brakes on for awhile? Maybe we need to slow the growth. Maybe we need to cut back a little bit on the development--based purely on--not purely, but for the sake of this panel--on environmental concerns or on any energy demand, that some of the numbers you gave out this morning were startling, and one wonders if they are thinking to themselves we can't sustain this, so now what do we do?

Mr. Rahim, do you want to start?

MR. RAHIM: Yes. I think there's already a sense of that to some degree in China, but I think you're dealing with competing forces here. On the one hand, you have to grow above a certain percentage to absorb the new entrants in the labor force. I think the number was 25 million, but it's a massive number. In order to do that, you have to keep at least I'd say a seven percent growth rate just to absorb those new entrants.

On the other hand, as you mentioned, there are these huge and rising environmental and energy costs. And the view then really is, we do need to moderate at least the high end of that growth, and so we're seeing some of the measures that they've tried to take, raising the lending rates and other steps. They haven't proved effective, market forces are driving the expansion.

I think at some point you are going to start to see that you can't

grow exports at 30 percent a year indefinitely. There isn't enough capacity in the world to absorb that level of exports. So I think there will be some slowing down eventually.

The question really on energy, I think they have started to take steps in terms of efficiency, and they have set very clear goals as part of the Five-Year Plan. How successful they're going to be in implementing that I think is an open question. But there is that recognition there. It's just how do you go about doing it.

COMMISSIONER HOUSTON: Dr. Schipper.

DR. SCHIPPER: Yes, on two accounts. One, the urban air pollution problem is increasingly one of transportation. Even if the cars are relatively clean unleaded fuel, the sheer rise in the numbers and the amount of traffic means air is not really getting cleaner.

The second is what I said about transport. If cities can't move, we're told that the mayor of Kunming was fired because the head of the People's Committee there was stuck in traffic and missed an important meeting.

You can't create some things if you keep running into a wall harder and harder. My reading of our Chinese contacts is they see these problems and they hear street protests about the bad air and about the bad fuel and above all about the bad traffic. But we hear that in this country, too, and it takes a long time, even in a democracy, to really change things when you're going at such high speed.

The gentlemen on both sides of me probably can tell you better how long it takes to react. I think that's the uncertainty, is not do they know it; it's how quickly can they change course without risking their political careers and some kind of economic disruption?

MR. HOUSER: Yes, I'd agree. It's a growing issue. It's just a matter of timing. Beijing can deal with it now and it doesn't have to be a choice between growth and environment. It can be positive for both. If the ball is kicked down the road ten years before serious action is taken, then the options are going to be much less economically benign.

HEARING COCHAIR SHEA: Thank you.

COMMISSIONER HOUSTON: Thank you very much. Appreciate that.

HEARING COCHAIR SHEA: Commissioner Fiedler.

COMMISSIONER FIEDLER: My question was partially dealt with. My question really was how much time do they have to make their choices before dramatic things happen. You made reference to middle class resistance along the coastal areas or what not.

The resistance that we read about seems not to be coming from the middle class but rather protests by people who live in places that have been environmentally degraded extremely, actually people

probably working in the industrial enterprises that are doing the polluting.

So the politics and the economics and the environmental nexus seems to me to shorten the time that they have to make real serious choices. Anybody disagree; agree? You're shaking your head both ways, Dr. Schipper. You agree to disagree?

MR. RAHIM: Yes. I think you are seeing real effects today in terms of the environment, in terms of the amount of arable land affected by acid rain, these types of things, the number of work days lost to pollution, all that. Again, these aren't costs that are going to bring the economy to a grinding halt today, but it is a question of cost down the line.

Right now you have an opportunity to put that framework in place, as Dr. Schipper talked about. If you wait and you delay that, then the costs rise exponentially, the farther you delay those decisions.

COMMISSIONER FIEDLER: The economic or the political costs?

MR. RAHIM: Actually both, I would argue, because I think they're interlinked.

DR. SCHIPPER: Think of it this way. In 1984, LA kind of shut its traffic down a little when we had the Olympics. Now they say that if Beijing shuts its traffic down, that will cause a global recession. I don't think they're going to get through the Olympics smoothly.

Shanghai, on the other hand, with Expo 2010, with more total people spread out, is taking I think a much more phased attitude towards how do we get through this and how do we get through this so that the transport system we have ready in 2010 is also good for us in 2015 and 2020?

So I think we have two tests coming up, but you still see mayors at meetings bragging about how many overpasses they built rather than bragging how many people an hour they can move across a river or under a river, and so the time is still ticking away.

MR. HOUSER: I actually have become over the past year a little bit less pessimistic about ability to deal with the immediate environmental problems, that being air and water pollution before they reach a crisis point. There's been some encouraging steps on sulfur control by power plants using market mechanisms that make it economic to put in flue gas de-sulfurization and most new power plants built today are doing that.

The marginal costs of controlling things like particulate and sulfur through end-of-pipe solutions isn't so great, and I think that you can take those steps without a significantly impacting growth. Now that doesn't reduce overall energy demand significantly. In fact, in some cases it increases and it does nothing for carbon dioxide. But in

terms of the immediate challenges to China of the air that you can't see through and the polluted water, I think that they can actually take fairly reasonable steps to deal with that and are beginning to do so.

DR. SCHIPPER: If I can just add, China started to take its lead out of gasoline at roughly a third of the per capita income that we had when we put lead into gasoline. So, again, you see this telescoping in time where they're actually doing things sooner. Even if it comes after us in time, it comes earlier in development. The key issue for all of this is enforcement, is monitoring. The Chinese don't have good road statistics.

They don't have a lot of the numbers that we get constantly. I'm not advocating just counting; they also need help in learning how to monitor, how to enforce, how to do things in an equitable way. So that you don't get in principle very clean fuel, very clean new vehicles, and people obeying the speed limit, but in the real world, a totally different world. That's what I unfortunately still tend to see.

HEARING COCHAIR SHEA: Thank you. Commissioner Videnieks.

HEARING COCHAIR VIDENIEKS: A question primarily for Mr. Houser. We heard prior testimony that pollution costs are eight to 13 percent of GDP, how would this figure into the net GDP growth of ten percent over the past decade, whatever? Does that net out to a much smaller number then? And also, is it a cumulative time bomb? As GDP grows, the 12 or 13, let's say ten percent, whatever was the greater number, it's got a geometric progression, and how serious a problem, from a time bomb point of view, would this be? Can we quantify how serious a problem this really is?

MR. HOUSER: It's a challenge to quantify. The World Bank and the U.N. have been trying to develop a green GDP metric for a long time and have had trouble doing it, and the Chinese have been trying to do it for the past five, six years, and have had trouble doing it. It depends on the approach. If you just do a resource accounting, looking at how much coal you've taken out of the ground, how many forests you've cut down and score that against GDP, that's fairly easy, but to quantify the costs of air pollution and water pollution on the economy is tougher.

Some estimates we've tried to do these numbers; other people have too--put the number at anywhere between five and ten percent of GDP.

Now, is that a ticking time bomb? Not necessarily. We don't account for green GDP in this country. If there's an oil spill, all of the people who go and clean up that oil are net positive for GDP. The wages going to oil spill workers are positive for GDP. So is that unsustainable in the U.S.? Not necessarily in terms of a calculation. I

don't think that it accumulates in that way.

Things like, on the other hand, the problems that get built in that are tougher to deal with are the consumption-oriented problems that Dr. Schipper talks about of how if you don't account for the cost of the pollution in building that office building or conducting urban planning now, then the ability to change course later on is much more difficult.

HEARING COCHAIR VIDENIEKS: Is eight to 13 a high number, as a cost of pollution both of their GDP and is this going to be a constant percentage as their GDP increases I guess is the question? Is this postponed cost or--

DR. SCHIPPER: This is the yin and the yang of this kind of accounting, and I subscribe to this approach. On the one hand, the average new steel mill, the average new home, the average new car, the average new water purification plant means things are cleaner. But at the same time, you're cramming more and more activity per capita and more and more capita into smaller and smaller space, preferentially the eastern coastal zone.

So it's kind of a race, and I don't know whether anybody has really done a careful calculation about the scaling of things. I do know that my World Bank friends, the BBC, you just see these nightmare scenes today in many cities, and you think those are 50 years ago if you look at the numbers, and it's not getting better; it's getting worse.

A few places like Shanghai really want to be clean and have said that and have really worked at it. And the question is how much that can be a model? Shanghai is not far from the water. It has geographical advantages, but I think that's the case of how transparency on the political side can become a pressure in itself to make the world cleaner in Chinese cities.

MR. RAHIM: Yes, I would say that eight to 13 is a high number, and I don't think it is cumulative for precisely this reason, that there are new cleaner technologies and there are steps being taken to address that. So I don't think the relative percentage is going to increase, but I worry that it is going to stay stable to some degree for awhile as you do get larger growth and you do get some of these other issues being exacerbated. So I would take it as sort of net out.

HEARING COCHAIR SHEA: Thank you.

HEARING COCHAIR VIDENIEKS: Thank you.

HEARING COCHAIR SHEA: Madam Chair.

CHAIRMAN BARTHOLOMEW: Thank you very much. Thank you to all of our witnesses. One of the benefits of serving on this Commission is we get the opportunity to pick the brains of some very talented, intelligent and creative people. So it's a great opportunity for us.

I'm not sure that my question is going to be very clear. I'm struggling a little bit with the contradictions that are inherent in a lot of what you say. Mr. Houser, for example the point you made about how heavy industry doesn't provide jobs, it uses a lot of energy, and yet if you look at the 11th Five-Year Plan, some of the pillars of development, things like the aviation industry, are things that are very dependent on heavy industry.

How does the Chinese government reconcile sort of competing, conflicting demands in there? It's sort of a tipping point that we're talking about with all of your testimony. Where is it that the decision is being made that the environmental quality is more important than what for us might not seem a rational decision to fund all of these steel mills and doesn't seem rational if it's not employing a lot of people and is using a lot of energy? How is it the decisions are being made? That's one question.

Dr. Schipper, I was really struck listening to you about essentially trying to say to people learn from our mistakes and yet, writ large, it seems to me often when we say learn from our mistakes, the response back is you're just trying to impede our development. How do you deal with that in a conversation and why is Shanghai being more successful or more interested in this than Beijing? So sort of the question for all of you. It's a basket of issues here.

MR. HOUSER: On the industry side, which is what we track more closely, I just would stress again that the driving force is not Beijing, and the problem is not Beijing. It's what's going on in the provinces and localities, and firms are responding to market incentives.

Some of those market incentives are incentives that should be corrected. They are incentives based on land that was taken from farmers without compensation. They are incentives based on a capital system that doesn't lend to dynamic private sector firms, but lends mostly to state-owned enterprises. They are incentives based on a failure to incorporate environmental externalities.

But if you take that landscape and I'm an entrepreneur, steel looks quite profitable to me in China, and so I'm going to do it without any government encouragement, and then at a provincial level, each one of these 7,000 steel companies wants to become the national champion. They want to be the U.S. Steel or the Nucor or the Nippon or the Baos Steel. So consolidating that industry, which is something that Beijing actually would like to in order to rationalize energy use, runs up against provincial level protection and barriers because every province wants their steel mill to be the champion.

It's something we're very familiar with here in the U.S.: interstate competition for development and interstate competition for

economic resources. So while there is this rhetoric put into five-year plans about pillar industries, when you actually go stress test it on the ground, what that means in the day-to-day economics of these firms, it means almost nothing to them--almost nothing.

CHAIRMAN BARTHOLOMEW: But it is a planned economy that we're talking about.

MR. HOUSER: If you go talk to a steel mill, Beijing having a notion that steel is strategic, has no bearing on what these companies do. It doesn't have any bearing on where they get their money. It doesn't have any bearing on their regulatory framework they face. It doesn't affect them much at all. They mostly laugh at those national plans.

The five-year plans are becoming a joke to folks in China today, the farther you get outside of Beijing. Many of the folks in Beijing are still under the illusion that they have total control of the economy when people down in Guangdong are doing whatever they please.

CHAIRMAN BARTHOLOMEW: But if the five-year plans are a joke, then why should we point to the things that they're going to do on energy in the five-year plans?

MR. HOUSER: I don't.

CHAIRMAN BARTHOLOMEW: It gets back to that thing we're always told about enforcement. Chinese government signs agreements and then says, well, we can't enforce them because everything is happening at the provincial level or people use that as an excuse.

How do you balance what is happening at the national level or national goals if the national government has no control over what's happening?

MR. RAHIM: This is the dilemma China is facing is that it is transitioning to some degree and market forces are becoming much more important and a much larger player. So the entrepreneur who is looking to the steel mills says fine, this isn't going to add 100,000 jobs, but it is going to make me--

CHAIRMAN BARTHOLOMEW: Rich.

MR. RAHIM: --rich. Exactly. And so it's hard to control that individual impulse from central Beijing. Again, they're dealing with blunt tools to try and do this. They're trying to control lending rates and all that and export tariffs, but that hasn't worked, and so it is a process of gradual reform that has to take place at the national level over time.

CHAIRMAN BARTHOLOMEW: So are the people in Shanghai more interested in the quality of transportation life because they're rich already?

DR. SCHIPPER: Yes, and because they want to be seen as the premier city in the Pacific Rim. That's really, really clear. If I may

just add, we haven't admitted our mistakes. We're still arguing over what happened in 1973 with energy. My views, I admit, are in the minority about what I think about traffic.

So, again, these bodies that surround us here are subsidizing. All the things I'm saying to China, don't do this, and they say, well, it works, it sort of works for the Americans. They get reelected. The first primaries are in Iowa and that's an ethanol state, so we've got those farmers there that might make ethanol.

It happened in Mexico, a non-OPEC oil producer. Some mayor said you got to try out these ethanol buses because we got farmers that make ethanol from sugar cane, and I think that kind of thing does take root naturally in both so-called planned economies and in private economies.

Finally, Shanghai was the first city to have a kind of Transport 25 Year Plan, a white paper seven years ago. We came in on part of that process. There's a new one. Xi'an is doing it. That's the first time. Up until then it was kind of what would the mayor like next year? Ah, that subway system, we'll get you that one, because they're wealthy, and there are a lot of things that have slowed this development down, but the thing about the motorization is car plants are prestigious to have and, as my colleagues have pointed out, people can now afford cars.

Metro is a little more expensive. So it's a kind of lack of five-year plan mentality in transport. It all kind of happened spontaneously and that's going to have to be something that is learned quickly. That's where one of the urgencies is.

MR. RAHIM: Just to go off of that point a little bit more. If we look at cars in the U.S. over the last 15 years where acceleration has increased by 22 percent, weight has increased by something like 28 percent, and mileage has only increased by about two percent. So then China looks at that and says, why should we listen basically to what's being told to us?

Now, again, I think that there are drivers within China and within the government they're saying we do need to address this. But they are saying, okay, we'll do it our way, and the same thing on climate change, and all that as well. And again, with the car issue, again, I think as people are able to afford cars and they don't want to be told, okay, drive one that's more efficient, they want to drive one that will get them places quickly. So that's why they're going to move-

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CHAIRMAN BARTHOLOMEW: They can't get there because the traffic is so bad.

MR. RAHIM: Yes.

CHAIRMAN BARTHOLOMEW: Thank you.

HEARING COCHAIR SHEA: Commissioner Reinsch.

COMMISSIONER REINSCH: Thank you. I can't resist commenting that I'm not surprised the Chinese haven't learned from our mistakes since I think we haven't learned from our mistakes. We probably should begin with ourselves, but I was going to ask Dr. Schipper a question. I think on reflection I'm going to ask all three of you or any of you that wants to comment a comparison question. Have you done a similar analysis with respect to India? And what are the differences?

DR. SCHIPPER: With respect to?

COMMISSIONER REINSCH: India.

DR. SCHIPPER: Actually we're just about to finish a similar India study. The key difference is two-wheelers, which the Chinese have kind of thrown out of their cities, and some cities are even banning electric two-wheelers, which were suddenly they're 15 million electric two-wheelers in China. There were none five years ago because someone realized, okay, if you don't like the pollution from, shall we say, cheap two-stroke dirty motorbikes, we'll make clean ones, and some Chinese cities said, oh, we don't know how to treat this so we're not going to let you have it.

India in our view might represent a sustainable transport future, as I said, slow, yes, not clean yet, not necessarily safe yet, but certainly small. I can't tell China to take something with much smaller footprint, but my experience from 11 trips to Hanoi working on similar issues is that while Hanoi is now very congested with motorbikes, that there is a kind of a third way. If China looks for examples, she will probably look first to India, because it's a comparable population and it has the same hugely prosperous middle and upper middle class that's growing very rapidly and that that's really a model.

On the other hand, the Chinese have moved faster on fuel economy standards, on cleaning up fuels, partly because they're less of the kind of democracy--that's fair to say--than India, where everything gets argued to death for 20 years. So China is now way ahead of India in the urban transport systems it has, and I think the great reckoning for both countries comes when they look at what these hidden time bombs in transportation will cost them in five or ten years out.

COMMISSIONER REINSCH: Do either of the other two of you want to comment on India, not specifically with respect to transportation, but with respect to their energy consumption, energy policy?

MR. RAHIM: I generally think that the volumes, again, are a lot smaller right now in China. They're undertaking a lot of the same steps looking abroad for energy. They're looking at China and saying, well, that's a path maybe again we don't want to follow on some things.

But I think they have started to take some steps earlier like the CNG buses that they've introduced. In India, you almost have a problem of too much democracy. It breaks down, where again every state acts like its own independent country. So even with things like electricity deregulation, things like that, where you've gotten steps undertaken to change it, but nobody is really following it, again, for a very different reason than in China.

I think they're going to run up against some of the same issues, but I think they're in a much better starting position than China is.

COMMISSIONER REINSCH: Thank you.

MR. HOUSER: I don't have much value to add on India.

COMMISSIONER REINSCH: Thank you.

HEARING COCHAIR SHEA: Commissioner Videnieks.

HEARING COCHAIR VIDENIEKS: Earlier today we heard testimony--this is for all three of the panelists--that Caterpillar just signed a contract with an entity in PRC, 56 million bucks, to deliver mining equipment, coal mine equipment. We also heard testimony that coal may be a closed sector for foreign investment in PRC.

The basic question I have is how does one define a Western or foreign-owned company over there? We've heard figures as low as ten percent equity. General question, question to all.

MR. HOUSER: On the coal side it's not a closed sector. It's not closed in the way that upstream oil and gas is. I've worked on some investments in the coal sector, and there is a certain project scale of projects that gets into politically sensitive territory, and where the ability of a foreign company to do an acquisition and a majority owned stake are limited by political considerations, but it's not a sector that is blanket restricted for foreign companies.

In terms of what's defined as a foreign-owned enterprise, I actually don't have those numbers in my head. My colleague is better on that front and I could certainly get that to you.

HEARING COCHAIR VIDENIEKS: That's an issue that always crops up because PRC argues that a lot of our imports from them are from our own companies, foreign-owned companies. Now if ten percent is a criterion, in my mind that does not equate to an owned plant or company.

Does anyone have any other comments on that?

MR. HOUSER: If it's a wholly foreign-owned enterprise, if it's a WFOE--

HEARING COCHAIR VIDENIEKS: I think they use the phrase "foreign owned," wholly foreign owned.

MR. HOUSER: Yes. In the stats, there are different categorizations for firms that are private, are foreign and are state-owned enterprise. And within those three, there's actually about

several other categories, and if you're a wholly-owned foreign enterprise, then its listed as foreign enterprise in the Chinese statistics.

HEARING COCHAIR VIDENIEKS: Okay.

MR. HOUSER: Now a lot of times it's Taiwanese owned or Hong Kong owned, and sometimes it's Chinese investors are working through a Taiwanese or Hong Kong entity.

If it's a joint venture that has some degree of foreign involvement, then that can be categorized as a foreign company as well, but that threshold, I'm not exactly sure what the law is.

MR. RAHIM: I think he's covered it. Yes.

HEARING COCHAIR VIDENIEKS: Thank you.

HEARING COCHAIR SHEA: I have a question and then I'm going to turn it over to Vice Chairman Blumenthal.

The title of this panel is "Energy Consumption Patterns and Trends," and as I understand it, if you look at a pie chart, you want to look at the energy mix in China today, it's coal, 67 to 70 percent; oil, about 20-21 percent; natural gas, three percent; nuclear, two-three percent, maybe lower; renewables, two or three percent.

If I project out 20 years, the pie is going to be bigger, as I understand it, the pie is going to be a lot bigger, but it's going to be coal, 67 to 70 percent; oil, 21 percent; natural gas, three percent; renewables, three; nuclear, three to four.

Is that fair? Is that a fair projection?

MR. HOUSER: Yes, oil will be slightly higher. Coal will be slightly lower. Gas and nuclear will be about the same size.

MR. RAHIM: Exactly. I think there will be some changes in coal and oil, but I think because part of it is that the demands on each of those fields is going to be so high, that just simply to meet that, let alone transition, is going to be such a challenge that I don't think you're going to see much movement.

HEARING COCHAIR SHEA: Okay. Vice Chairman Blumenthal.

VICE CHAIRMAN BLUMENTHAL: I just had a quick clarification for Mr. Houser. We heard testimony early this morning that in terms of equity oil, the Chinese do, if I understood the answer, it was that the Chinese do send most of it back to their own home. That conflicts with your paper, which is that it's mostly put on the market.

MR. HOUSER: Last year, the three oil majors produced 690,000 barrels a day of equity production overseas. If you look at Customs stats, the most that could possibly have come back home is 250,000 barrels a day of the 690,000 barrels a day. So that's 250,000 barrels a day out of an overall import bill of 3.6 million barrels a day. So it doesn't go very far toward meeting energy security.

What's even more fascinating is if you look at a specific project like Sudan, last year Japan imported more Sudanese crude than China did. They bought it from CNPC. And this is creating a little bit of heartburn in Beijing because while Beijing goes to the Security Council and goes to bat for CNPC and its interests in Sudan, CNPC isn't even selling the oil back home. They're selling it wherever the yields are better.

In the paper, we've got a chart tracking Japanese imports of Sudanese crude and Chinese imports of Sudanese crude, and they're mirror images. Once that oil is loaded on a tanker, the oil trading branch of CNPC is going to sell it wherever the yields are higher.

That's starting to change thinking in Beijing, especially in the Ministry of Foreign Affairs about whether it is really worthwhile to lend diplomatic support to these projects, when they have to go clean up the mess, if all we're doing is in putting money in the pockets of the oil companies and not actually getting any degree of oil security. I think we're going to see a change in that thinking in Beijing in the next two to three years on that questions.

MR. RAHIM: Yes. One of the things we've been tracking is exactly this. I know Trevor and I have spoken of this quite a bit, but it's really that energy policy is increasingly driven by the NOCs, not by the central government as much, and then since the government is listening to what the NOCs are telling them, and the NOCs are basically viewing this go-out strategy, securing energy abroad as an opportunity to make money, to get technological experience, to be exposed to international partnerships rather than being energy security as the primary driver.

VICE CHAIRMAN BLUMENTHAL: Now if they're looking at a policy change, does that mean that they will stop buying equity stakes in places like Sudan?

MR. RAHIM: No.

MR. HOUSER: What it means when CNPC says--first, we have to qualify two things. The Chinese oil companies don't need any capital to make the investments that they're making. They've got plenty of money themselves. We're talking about 200, \$300 million equity investment. CNPC made \$24 billion in profit last year. They don't need any extra cash. They don't need any financial support from the government. They don't even need any loans.

CNOOC was an exception in that sense, that they needed a loan because they are a small company. So what it means to change policy is that when CNPC with its own money and for commercial reasons, wants to go buy a stake and thinks it would be helpful if Hu Jintao came out and did a state-to-state meeting during that signing, that maybe Hu Jintao decides to go somewhere else or not to tie in the

energy companies into meetings he does take in the country.

VICE CHAIRMAN BLUMENTHAL: But they're not going to stop them from production and development in places where we sanction? That's not going to be the policy change?

MR. HOUSER: My view would be that they're not going to stop production in Sudan. Going forward, whether they take a different approach toward sanctions, I think that's actually influx. I think what they'll also start to do, and in the case that we make to the Chinese is that, look, the reason that the U.S. disciplined the behavior of its companies overseas wasn't out of altruism. It wasn't that we thought it was bad for democracy in Africa. It was that if you put money into dictators' pockets and support those regimes, you plant seeds of instability. And so when the regime changes and all of a sudden your assets are nationalized, it isn't a terribly good investment strategy.

Now, China is new to this space and they're new to foreign investment in this way and haven't had to endure a regime change where their assets were nationalized. I think once that happens, and it will happen sooner or later, the thinking is going to change pretty fundamentally about whether it makes sense as a policy or whether you should start applying some conditions on your companies and where they invest.

VICE CHAIRMAN BLUMENTHAL: Thank you.

HEARING COCHAIR SHEA: Madam Chair.

CHAIRMAN BARTHOLOMEW: Thank you, and I'm glad that the subject of Sudan came up because Mr. Rahim has quite an expertise on this too from what I understand, and I was going to ask about it.

CNPC is not a private company and profits from CNPC accrue back to the Chinese government; don't they?

MR. RAHIM: They don't.

MR. HOUSER: There is no dividend policy so it all stays with the company, all the profits.

HEARING COCHAIR SHEA: I thought SASAC changed that or is changing that?

MR. HOUSER: There are indications that there will be a dividend policy put into place this year. The degree to which that's enforced remains to be seen--how much of the money is actually called back to the government. But right now, all that capital just sloshes around in a company kitty and means that when CNPC goes to bid on a project--if I'm BP, and I want to invest somewhere, my margin hurdle is maybe 15 percent because if I can't get 15 percent, my shareholders would love to have their money in dividends and put it somewhere else in the S&P 500. If I'm CNPC, the only opportunity costs for that investment is depositing it in a Chinese bank where I'm going to get two to three percent return; right.

MR. RAHIM: Because the rates are like five percent in some projects.

MR. HOUSER: Yes.

CHAIRMAN BARTHOLOMEW: So they can take a whole lot more risk is what you're saying?

MR. HOUSER: Can take more risk; right.

MR. RAHIM: Yes.

CHAIRMAN BARTHOLOMEW: But what I'm trying to understand now is this, again, where is the tipping point? Where is the cost too high for the Chinese government on CNPC's investment in Sudan? You're saying that there isn't ever a point at which that cost is too high?

MR. RAHIM: Well, not under current conditions, I don't believe. I don't know if Trevor has a different view.

MR. HOUSER: I don't.

MR. RAHIM: But I mean again the investment has already taken place. They're already there. I don't think they're going to back out of that at any point in the foreseeable future.

MR. HOUSER: Right.

MR. RAHIM: Again, if there's obviously a nationalization or a move towards that, then I think they wouldn't view that favorably. But in other areas, like Iran, for example, they are changing that view where they have all these deals that have been signed. Everyone talks about Chinese investment in Iran. If you look actually at dollars in the ground and in projects, it's very, very limited. In fact, it's almost nonexistent to this point.

So a lot of these deals that have been signed haven't really gone forward, and precisely because of the political conditions that are surrounding that investment. But again that's a joint decision as well from the company saying we don't want to put money into a place where we're not sure if we're going to be able to execute on that project.

CHAIRMAN BARTHOLOMEW: But the government in Beijing could, could insist, it has the power to insist, doesn't it, that CNPC has to--

MR. RAHIM: Desist the investment.

MR. HOUSER: Has to shut up shop, you mean?

CHAIRMAN BARTHOLOMEW: Shut up shop, for example.

MR. RAHIM: It is the majority shareholder.

MR. HOUSER: In theory, sure, they could say, yes, you need to close down all that investment. We'll buy it, all that investment that you sunk, we'll buy it off from you, and you have to close up shop and come home. And the world would have 600,000 barrels a day less oil on the market, which is about half of global marginal demand.

MR. RAHIM: That would be pretty big shock.

MR. HOUSER: --there would be a pretty big impact on oil markets.

CHAIRMAN BARTHOLOMEW: I think it's, again, the balance or if the Chinese government is playing the Sudan issue in a way that it gets it both ways. So let's say Hu Jintao doesn't go for another signing of another big oil deal. So what? The oil deal happens. How is it that we connect the fact that this is a government enterprise that is investing in the place and there are other activities going on that are perpetuating a genocide? I'm asking you a question outside of the realm of your interest.

VICE CHAIRMAN BLUMENTHAL: I don't want to take up your time--

CHAIRMAN BARTHOLOMEW: No, no. Go ahead.

VICE CHAIRMAN BLUMENTHAL: A clarification question would be, are there thoughts within MOFA and in other places of having a policy akin to a sanctions policy or a no-vote policy for companies that are actually punished? A policy akin to what other governments have, ours and others, or is that not on the table?

CHAIRMAN BARTHOLOMEW: Maybe even another way to ask, is, if Beijing is concerned about the public relations problem that it has building that it's now connecting even to the Beijing Olympics? What kind of leverage does it have over this company and what do you think it could or would do?

MR. RAHIM: Actually from what we've seen, they wouldn't try and use their leverage over the company. They would actually try and use it against, with Sudan. So they've been reaching out more to Sudan than they have to CNPC to say curtail your activities; it's been more to the Sudanese government.

The other thing I think we're seeing in places like Sudan and elsewhere that the Chinese have invested in fairly heavily overseas, so there's actually a local backlash against a lot of the Chinese investment.

CHAIRMAN BARTHOLOMEW: Right.

MR. RAHIM: So that may be what changes corporate behavior more than again the Chinese government directing them to do that. We've seen it in Latin America. We're seeing it in West and East Africa, these attacks in Ethiopia against Sinopec employees. So they may realize that it's not in our best interests to go after the riskiest countries and the riskiest investments, that we may want to reconsider what our return really is on some of these, but--

CHAIRMAN BARTHOLOMEW: Do you think they'd do something if they think the Olympics are at stake?

MR. HOUSER: I think they are for them.

MR. RAHIM: Yes.

MR. HOUSER: From our perspective in the U.S., the changes that the Chinese government has made Sudan don't seem terribly significant. From a Chinese standpoint, with a long-standing view on interventionist policy at the Security Council, I think the changes have been pretty significant.

MR. RAHIM: Absolutely.

MR. HOUSER: In a Chinese context.

MR. RAHIM: Again, it's this whole principle of not interfering in other country's affairs.

CHAIRMAN BARTHOLOMEW: They've done it in places like Zambia.

MR. RAHIM: Absolutely. This is what they at least appreciate. So that's their line.

CHAIRMAN BARTHOLOMEW: Thank you.

HEARING COCHAIR SHEA: Any more questions?

COMMISSIONER HOUSTON: I have a really quick one.

HEARING COCHAIR SHEA: Sure.

COMMISSIONER HOUSTON: I'm just curious as to your thoughts on Venezuela--18 months ago, two years ago, whatever it was, Hugo Chavez said we're going to divert some oil resources away, specifically away from the U.S. and send them to China, even though it's going to cost us more money to ship it there because we don't like you or whatever his reason was.

Has that happened? Has Venezuela diverted any of our oil, Venezuelan oil supply to China, and is it enough that we care? Has it made any kind of an impact?

MR. RAHIM: At most, it was one or two cargoes, and essentially it was more commercial enterprise than anything else. It was a bidding. Oil tankers change hands up to 300 times between the source and when they actually end up at the refinery.

The problem with Venezuela and China in terms of crude is that Chinese refineries in their current state really can't process larger volumes of Venezuelan crude. And there's this issue right now of Venezuela saying, Venezuelan production is actually declining fairly rapidly, and they have to look at what's called unconventional, the heavy oil, to really make up that production. But the only companies who could really do that are the international oil companies, which have all essentially now either be kicked out or told that in no uncertain terms that life will become much more difficult for them.

So they have said, well, we'll bring in CNPC and these other guys to come and actually make those investments, and these investments are now running anywhere between five and \$8 billion for 200 to 500,000 barrels a day, which isn't a return of any sort really.

So what the Chinese are saying is, look, maybe we'll upgrade our own refineries to be able to better handle Venezuelan crude. The point is that this is a much longer term process so this shift has not taken place now, and it's unlikely to really happen in any major way any time soon. So I don't think that--

COMMISSIONER HOUSTON: With the comments, particularly Mr. Houser made about--or maybe it was you, Mr. Rahim, about the fear that those assets would be nationalized with Hugo Chavez nationalizing everything that's not nailed down in Venezuela, I would think that would be a concern. So I just wondered if it was a big enough issue that we needed to be really worried about it here.

MR. HOUSER: And CNPC is very concerned. They're furious at the Venezuelans for a bunch of reasons. Venezuela stopped producing oil emulsion which they used to sell to China. Just when China had built a variety of power plants to run on it, the Venezuelans cut it off.

These new laws PDVSA has where you have to have a certain percentage of Venezuelan employees in the project. CNPC likes to bring a village with them when they invest somewhere. And PDVSA has a hard time working like that. So there is no love lost between PDVSA and the Chinese oil companies.

MR. RAHIM: Which is precisely why they're saying, look, we're not going to build the upgrade in Venezuela; we're going to upgrade our own refineries to be able to handle it. So that way we're not stuck there essentially.

COMMISSIONER HOUSTON: Okay. Great. Thank you.

MR. RAHIM: The worry is that if there isn't that investment in Venezuela by whomever, whether it's the Chinese or the international oil companies, is that Venezuela's overall oil production really does start to decline very rapidly, and that does impact exports to the U.S., which currently it's one of the larger suppliers to the U.S.

COMMISSIONER HOUSTON: Sort of a domino theory.

HEARING COCHAIR SHEA: Before I wrap up and excuse our guests, I just want to on behalf of the cochairs thank Marta McLellan, who is the staffer for the Commission who has done a great job putting this hearing together and tomorrow's hearing together, and Mr. Houser, Dr. Schipper, Mr. Rahim, thank you very much.

We'll break now for lunch.

[Whereupon, at 12:54 p.m., the hearing recessed, to reconvene at 2:00 p.m., this same day.]

**PANEL IV: THE STRATEGIC CONSEQUENCES FOR THE  
UNITED STATES AND THE WORLD OF CHINA'S ENERGY  
CONSUMPTION**

VICE CHAIRMAN BLUMENTHAL: We're going to come to order again. We're very pleased to introduce this fourth panel where we'll explore the global security and political impact of China's energy consumption and acquisition strategies.

We're very pleased to welcome three distinguished experts to provide their analysis of the issue:

We have Dr. James Holmes, who is an Assistant Professor at the Strategy and Policy Department of the Naval War College in Newport, Rhode Island. He is a graduate of Vanderbilt University and has a Ph.D. from the Fletcher School of Law and Diplomacy at Tufts University.

Dr. Toshi Yoshihara is also an Assistant Professor in the Strategy and Policy Department at the Naval War College. He served previously at the same department or a similar department in the Air War College in Montgomery, Alabama, and currently his research agenda focuses on geopolitics in Asia, China's naval strategy and Japan's maritime strategy.

And we have Mr. Michael Herberg, Research Director of the Energy Security Program at the National Bureau of Asian Research. He has 20 years experience in the oil industry in strategic planning roles for ARCO, and has contributed to worldwide energy, economic and political analysis. So thank you for testifying, and we'll begin with Dr. Holmes, and we will tell you when you have two minutes and one minute left so thank you.

**STATEMENT OF J.R. HOLMES, PH.D., ASSOCIATE PROFESSOR,  
STRATEGY AND POLICY DEPARTMENT, U.S. NAVAL WAR  
COLLEGE, NEWPORT, RHODE ISLAND**

DR. HOLMES: Thank you for allowing me to address this gathering. Needless to say, the views that I will voice here are not necessarily those of the United States Navy, the Naval War College or the Department of Defense.

My purpose today is to venture a few thoughts about the kind of sea power China may become as it pursues its overall goal of economic development and its subordinate goals of energy security and sea lane security.

Studies of Chinese sea power over the years have tended to conclude either that China will content itself with focusing on events ashore as it has over the past few decades, keeping its attention on events ashore and its attentions also on coastal waters or that it will

build a powerful Navy, perhaps symmetrical to our own and venture out into the Pacific to vie for naval supremacy in some coming decade.

By contrast, I will argue that China is turning its nautical energies to the South and to the Southwest along vital maritime communications that provide the stuff of a modern economy. Once Beijing can manage to settle events in East Asia to its own satisfaction, asserting control over the China Seas and Taiwan where these vital maritime communications run, it will feel confident enough and it will have enough resources to deploy naval means in South and Southeast Asia astride these vital communications should it see fit to do so.

If so, what factors will shape Chinese thinking about these vital waters? First, and the subject of our hearing today, energy security, which leads to a focus on sea lane security.

Secondly, geopolitics. Geographical thinking is pronounced in Chinese policy and academic circles. Some analysts extend the two island chains that ring the Chinese coast all the way into the Indian Ocean encompassing Guam and Diego Garcia, where American forces are stationed.

China is acutely sensitive of Indian pretensions in the Indian Ocean region in particular, India's favorable geographic position and its ambitions to be the preeminent power in South Asia.

And thirdly, that Beijing is clearly conscious that the United States retains its naval dominance in waters that convey the stuff of Chinese economic development. No less a figure than President Hu Jintao routinely speaks of the Malacca dilemma or the Malacca predicament that arises from this naval dominance and its economic repercussions.

At this point, I should interject, this all sounds rather grim, but as a panel of senior experts up at the Naval War College shaping U.S. maritime strategy has concluded, no nation has any obvious incentive at present to disrupt the flow of shipping or vital resources through these waters. I would caveat my analysis with that rather than sound too grim about the whole situation.

Nonetheless, it is fair to say that China is increasingly reluctant to entrust the security of shipping and thus its economic development to what it sees as the uncertain goodwill of the United States.

So what can it do as it looks to the South and Southwest? First, as my colleague Toshi Yoshihara will show in a few minutes, Chinese officials are attempting to build up soft power in regions adjoining vital sea communications. Until and unless Beijing decides to amass hard naval power, manifested in ships and the usual implements of military power, in South and Southeast Asia, the soft power or what's been called "a smiling diplomacy" affords China the ability to court

influence now, to ease concerns that a future military build-up in the region might provoke, and to help Beijing begin to stake its claim to the status of the leading guarantor of sea lane security in these waters.

How China's fellow Asian nations will receive China's charm offensive remains an open question as Toshi will discuss in a few minutes.

Secondly, China has begun to negotiate basing agreements in Southeast Asia and in particular South Asia, the much discussed "String of Pearls." I would argue that it's laying the groundwork of military infrastructure for a future build-up of naval power in these regions, again, should Beijing see the need for such a build-up.

Two caveats are in order. First, whether the "String of Pearls" represents a coherent Chinese strategy to me remains an open question. While Chinese analysts and policymakers have adopted the lingo, it's very difficult to find in the literature references that would suggest this is a concerted campaign to add this component to Chinese sea power to its south.

And for the second caveat, the value of these prospective bases is less I would argue than it might seem. Gwadar in western Pakistan, which has garnered a lot of discussion, if you analyze the base according to the Mahanian indices of position, strength and resources, it becomes apparent that the position is quite perhaps not what, does not add as much value as you might think because the United States can outflank Gwadar simply by being in the Persian Gulf.

Strength. It sits on a narrow peninsula. And resources seem scant. So the port would be highly vulnerable to bombardment from the sea. It's also not apparent to me that Pakistan would permit the use of this resource on which its own economic development hinges in war time.

Thirdly, as an element of Chinese maritime strategy, many Chinese thinkers and policymakers urge their leadership to build up the final pillar, which Alfred Thayer Mahan discussed, of sea power, namely a powerful ocean-going Navy. This need not, I would argue, be a Navy that closely resembles our own. I think this is one place I would take issue a little bit with most analyses.

What will be some determinants of Chinese success in the Indian Ocean? On the grand strategic level, first, asserting at least a measure of control over the China Seas and regaining control of Taiwan to Beijing's satisfaction will be essential to any southern and southwestern strategy.

How Beijing fairs in this effort will clearly influence China's ability to refocus energy in South Asia and Southeast Asia.

Secondly, China confronts another power as it moves into these regions that has its own ideas about who should be number one in the

Indian Ocean. Namely, India. India holds considerable reserves, a soft power of its own. Also, it has a powerful navy including aircraft carriers and it has made naval diplomacy one of the core missions of its maritime forces signifying its appreciation of the value that maritime forces bring to diplomacy and solidifying the nation's reputation as a good neighbor.

And thirdly, turning to hard power, if China can mount what the MIT scholar Barry Posen would call a contested zone in its home waters, even despite its overall inferiority to the United States, then you could certainly see India doing this, pulling the same feat off in its own home waters should China attempt to build up hard naval power in India's backyard.

Now, moving down to the operational and force structure level, just two final observations are in order. First, to what extent will platforms built or acquired for a Taiwan contingency be transferable to a strategy in the Indian Ocean? How far these platforms--it remains an open question how easily these things can be transferred to a southern strategy.

And secondly, a naval build-up need not lead to a PLA Navy that looks like our own aircraft carriers--perhaps not, and so forth. I would be willing to address this further in the remarks.

And finally, I would simply close that Chinese capabilities will not match Chinese intentions in the region any time soon. I would argue that China's relative weakness in this area affords Washington and perhaps New Delhi as well the ability to begin fashioning a maritime partnership with Beijing that helps defend mutual interests along these sea lanes.

Thank you.

[The statement follows:]<sup>6</sup>

VICE CHAIRMAN BLUMENTHAL: Thank you very much. Dr. Yoshihara.

**STATEMENT OF PROFESSOR TOSHI YOSHIHARA  
ASSOCIATE PROFESSOR, STRATEGIC RESEARCH  
DEPARTMENT, U.S. NAVAL WAR COLLEGE, NEWPORT,  
RHODE ISLAND**

DR. YOSHIHARA: Members of the Commission, thank you very much for inviting me to this hearing. It is truly an honor to be here. What I'm about to present is my personal view and does not necessarily represent the view of the Naval War College, the U.S. Navy or the

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<sup>6</sup> [Click here to read the prepared testimony of Dr. James R. Holmes](#)

Department of Defense.

The premise of my argument is that forceful advocates in China are already looking beyond Taiwan as a nautical problem due to its energy dependence and perceptions of increasing vulnerability to sea lane disruption by hostile powers, particularly the United States.

At the moment, China does not have the wherewithal to influence maritime events with its military power. Consequently, it has relied primarily on economic inducements and its growing soft power to shape the regional littoral environment, particularly in Southeast Asia.

My focus today is on how the Chinese have leveraged this soft power to create favorable strategic conditions that mitigate vulnerabilities to sea lane disruption and create opportunities for its longer-term maritime ambitions.

China already boasts a sizable lead in three key dimensions of soft power in Southeast Asia. The appeal of its culture and history, its apparently successful development model, and its insistence on non-interference have all gained traction in the region.

It is in this context of widespread goodwill that China has spun a historical narrative to bolster its image and credibility on the high seas. Given the paucity of China's seaborne activism in history, the Chinese have latched on to a maritime figure that has long fascinated observers in the West. Admiral Zheng He, who commanded seven voyages of trade and discovery in Southeast and South Asian and even East African waters six centuries ago, has become a kind of a poster child for Chinese diplomacy.

His exploits have empowered Chinese diplomats to shape regional expectations of China's reentry into the nautical arena. Indeed, top leaders including President Hu Jintao and Premier Wen Jiabao have repeatedly referenced Zheng He at public events to use the past as a prologue to China's rise.

What's their message? First, China boasts a proud seafaring history and thus China's entry into the maritime domain is nothing new and not to be feared.

Second, China's technological prowess far surpassed European counterparts in its time, implying that its naval build-up is not an anomaly.

Third, Zheng He's voyages are invariably portrayed as peaceful and benevolent, fitting into Chinese declarations of a peaceful rise today.

Fourth, on a related point, China's benign encounters with local populations are compared against the rapaciousness of Western imperialism.

The bottom line, China is a more trustworthy steward of maritime security in Asia than any power, especially the United States,

could ever be.

What are the objectives of this message? They bestow legitimacy on China's naval aspirations in Southeast and South Asia, mollifying littoral nations skeptical of Chinese pretensions and undercuts America's claim to rule the waves in the region. By assuaging regional anxieties about China's rise, Beijing is seeking to foster perceptions that the nation's return to the nautical arena is not to be feared but rather embraced. This in effect could forestall U.S. or Asian opposition to its bid for sea power while averting the rise of a balancing coalition that might oppose Beijing's interest in secure shipping lanes and its desire perhaps for regional primacy.

Beijing believes that such a permissive maritime environment would enable China to extend its naval reach with greater ease should it see the need to do so over the longer term for energy security purposes.

What are the implications? Well, China is clearly determined to enter the waterways to its immediate south and eventually to the Indian Ocean. China will rely on soft power and other forms of inducements until its military capabilities match its longer-term security objectives.

This is having a clear effect on Southeast Asian nations who apparently welcome this message and have already acquiesced to various Chinese foreign policy initiatives.

But, we need not inflate or overreact to this soft power act. China is hobbled by a critical deficit in its soft power. Its political values are anathema to many in the region and undermine its legitimacy and credibility.

Finally, the United States is in a position to convey a far stronger message as it is, in practice, producing real tangible maritime security benefits to the region.

In conclusion, I'd like to end with a few follow-on questions. First, is soft power a zero sum game? In other words, are gains in this area for China necessarily a loss for the United States? My current reading is that the Chinese leadership does, in fact, see soft power in great power and competitive terms.

Second, how unconditional is Chinese soft power? China has drawn clear lines in the South China Sea, for example, particularly with regard to energy security issues where soft power apparently does not extend to. Recent spats with Vietnam seem to confirm this. This suggests at least some level of brittleness to Chinese soft power.

Third, to what extent is the soft power an integral part of a broader maritime strategy? Are there linkages to Chinese attempts to develop strategic ties and presence along the so-called "String of Pearls"?

Are the Chinese consciously using these forays to open the way

for naval power projection into the Indian Ocean region down the road?

Fourth, I have primarily focused on the supply side of soft power from China. So it is worthwhile to study the recipients of soft power. Given the diversity of the region, such analysis will necessarily have to disaggregate the nations in the region. How are Southeast Asian states evaluating Chinese soft power?

Are they really taking this message at face value? If so, do they have a Plan B if they are wrong about Chinese intentions? And if not, what kind of a hedging strategy are they pursuing?

Finally, why is there such a stark difference between the abundance of soft power dynamics in the South China Sea region and a complete absence of soft power in the East China Sea where China and Japan have territorial disputes? Behind the disputes over international law, energy resources, the history question, and also operational considerations related to Taiwan, are there broader linkages that tie Chinese diplomacy in Southeast Asia to Northeast Asia, particularly with regard to Japan?

Hopefully, this set of preliminary questions will engage scholars and practitioners alike and form a baseline for further analysis.

Thank you very much.

[The statement follows:]<sup>7</sup>

VICE CHAIRMAN BLUMENTHAL: Thank you. Mr. Herberg.

**STATEMENT OF MR. MIKKAL E. HERBERG  
RESEARCH DIRECTOR, ASIAN ENERGY SECURITY PROGRAM,  
THE NATIONAL BUREAU OF ASIAN RESEARCH,  
SEATTLE, WASHINGTON**

MR. HERBERG: Let me say thank you also to the Commission for inviting me to speak to such an important group. It's a pleasure and an honor. I've been asked to discuss a couple of issues. One, what is China's approach to energy security and is that impeding or supporting energy cooperation globally?

And second, make some comments about China's energy relations with its central Asian overland neighbors in pipeline issues and the geopolitical implications of those two.

I'll stay in my lane on these two issues rather than venture into maritime issues, which can best be covered by the other two panels.

Energy security, it goes without saying is a extremely important economic and political issue for the Chinese leadership. They're desperately worried that energy shortages will undermine economic

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<sup>7</sup> [Click here to read the prepared statement of Prof. Toshi Yoshihara](#)

growth and the job creation machine, and that's what keeps the leadership awake at night worrying about that job creation machine.

The energy supply and the demand gap is significant in China across almost all fuels and the gap in oil is particularly but in the long run natural gas and even coal supply shortages are going to become much more significant.

This has led to a perception, if you try to catch the atmosphere in Beijing that energy in a sense is too important to be left entirely to the markets. Energy is too much of a strategic commodity determining the direction of the Chinese economy.

China's overseas strategy is based upon the perception that there's a great distrust of markets and the ability of the markets to deliver reliable supplies at reasonable prices. There's a perception in Beijing that the U.S. controls global oil markets or has a great influence over those markets and might use energy to weaken China, contain China.

Moreover, Beijing's leadership feel like they're playing catch-up, that their national oil companies are not strong competitors for the big international oil companies. And their response has been this go-out strategy or go-out campaign is a better term for it, which is really a loosely coordinated program of investments by the national oil companies, overland pipeline development proposals, and diversification of supplies globally. I won't elaborate since it has been discussed many other places.

All these things combined provide a strong rationale for intervention by the government in the global energy investment process, and give the strategy a very mercantilist cast.

The implication is, that Beijing's energy strategy has been up to now a relatively go-it-alone approach, much more bilateral than multilateral, a much more politicized approach to energy supply security in the future. It tended to politicize the global market environment for supply security, to help contribute to the zero sum atmosphere, we see particularly in Asia over competing for supplies. I'm afraid the U.S. to some extent has been pulled into this more politicized approach, as well.

This has meant a limited commitment by Beijing to multilateral international approaches to energy cooperation. Beijing's domestic approach to energy policy also has limited prospects for energy cooperation with other countries on efficiency and other reforms, because Beijing hasn't focused much on efficiency.

I think that's where we are today or where Beijing has been on energy security strategy until recently. —However, I think there are very important signs of change in their approach toward a more cooperative approach to energy security internationally.

There are several reasons for this. First, there is growing evidence that Beijing is concluding that this equity strategy, ownership, the fixation on control of barrels is not going to give them the kind of energy security that they're looking for in terms of secure supplies of oil. Oil demand is simply rising too fast for them to keep up with a strategy focused on ownership and control. For example, demand for imports of oil are rising at five times the rate that they're adding equity barrels. So that's focus on ownership rather than access is simply not going to work, and they're beginning to realize this in Beijing.

Second, there's a realization among energy policy advisors in Beijing that these national oil company investments abroad don't necessarily need extensive state support and, moreover, may not be synonymous with state interests all the time. There is a growing perception that these companies are getting in places that complicate other important strategic relationships and issues, and moreover, that the companies don't need the subsidies and extensive direct state support to be competitive. What China really needs is competitive oil national companies and this doesn't require the equity strategy they have been pursuing.

Third, the zero sum atmosphere of competition for energy supplies is creating collateral problems in key foreign policy areas for China, particularly in strategic relations with U.S and with Japan. Those are the two most obvious cases, and from the point of view of the Foreign Ministry and the foreign policy and strategic policymakers, the companies are getting China into a lot of places and a lot of issues which are damaging these collateral relationships, which are very important for them in the long run.

A final factor is that there is a new focus in Beijing on energy efficiency, conservation, technology and the environment, and that opens the door for cooperation in many ways with the U.S., Japan, the IEA, and others. It's a door that simply wasn't very open in the past because China's leadership wasn't focused on those issues.

So I think there is a lot of evidence in China's recent discussions with the IEA, the bilateral energy and strategic economic dialogues with the U.S., with Japan and other countries that they're beginning to take a more cooperative posture over time to multilateralize their approach to energy security.

I think it's a little premature to say Beijing has decisively changed its previous "go it alone" mentality on energy security, but I think they're moving in that direction very clearly. The real question is the pace at which they are moving in this direction, and this is where I think if the U.S. can engage more effectively with China on our common energy security concerns, we can encourage that move

towards market solutions and cooperation as a solution to their concerns over energy security. So we need to redouble our efforts to engage China.

A few words are in order on the issues related to China and Central Asian overland pipeline developments and geopolitics. China sees these countries, Kazakhstan, Central Asia, Russia, as key sources of diversification for supply routes to reduce their dependence on seaborne imports from the Mideast, Africa and other places. This is closely related to the "Malacca dilemma" that was mentioned in earlier testimony.

For China, overland pipeline routes are a major potential diversification of supplies and Beijing has been working assiduously for the last decade to try to develop energy ties with Central Asia and with Russia. I think it's fair to say they've been far more successful with Kazakhstan than Russia on that. They currently receive roughly 200,000 barrels a day of oil from Kazakhstan through a new pipeline to China completed in 2006. That will grow to 400,000 in the next few years as the pipeline is expanded.

They have also signed a strategic energy alliance with Kazakhstan. China's national oil companies now account for a quarter of Kazakhstan's oil production controlled through equity investments by their oil companies. So there's a series of strong energy ties and this supports strong strategic ties between China and Kazakhstan.

There are clearly tensions in this energy relationship, but still a fairly strong partnership has emerged.

Alternatively, Sino-Russian relationships on energy have been tortured, undermined by suspicion, and stalled by capricious Russian energy policies. China currently does receive roughly 250,000 barrels a day of oil by rail from East Siberia. Beijing would like a lot more, but the Russians have not been very cooperative. The oil pipeline that was to be built may be built to the Chinese; it may not be built.

Natural gas supplies, which President Putin and the Russians have promised China over and over again, are simply not moving forward as the Russians fail to move on building the necessary pipelines. There are other energy tensions between Russia and China over their competition to access and control future Central Asian gas supplies. Consequently, energy has become as much a source of tension between Russia and China as it's been a source of new ties. So I think that's a very troubled relationship in terms of energy.

As to how much overland pipeline routes could help China meet its future oil import needs, in the long run, one to two million barrels a day could flow from Central Asia and Russia combined to China. Two million barrels per day would be the high end of the reasonable estimates. It's worth considering that this would be 15 to 20 years

from now when China will be importing ten to 12 million barrels a day. So the scale of China's oil demand growth and import demand is such that although Central Asia/Eurasia can be a hedge, it can be a part of diversification effort, will remain deeply dependent on seaborne supplies from particularly the Mideast for the foreseeable future.

So with that, I think I'll stop and leave it open it for questions.  
[The statement follows:]

**Prepared Statement of Mr. Mikkal E. Herberg  
Research Director, Asian Energy Security Program,  
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I first would like to thank the members of the Commission for the opportunity to testify to this important group. It is an honor and a privilege.

I have been asked to speak about China's approach to securing its energy supplies and implications. I will focus mainly on the first two issues for our panel since there are two other panelists much more qualified to discuss China's maritime security policy:

- What is China's approach to securing future energy supplies and does this encourage or impede cooperation among countries to promote secure and stable supplies globally?
- How have China's relationships with its land-based neighbors been influenced by its increasing energy consumption and how will the development of oil and gas pipelines influence China's access to petroleum? What new security challenges for China and the U.S. will arise from this development?

**What is China's Approach to Energy Security?**

The global energy emergence of China reflects the enormous scale of its rising oil demand and Beijing's increasingly active strategic diplomacy designed to secure future energy supplies. China is now the second largest oil consumer in the world and the third largest oil importer, accounting for roughly one-quarter of the growth in world oil demand during the past decade. China's three national oil companies (NOCs) have become important new players on the global oil industry scene and China is now a major factor in world oil demand and prices, production prospects in key energy-exporting countries, and the global oil industry competitive rules of the game. Energy ties abroad are expanding Beijing's diplomatic reach in key energy-producing regions and China's efforts to secure energy supplies and transport routes around the world and are increasingly affecting the shape and tenor of China's diplomatic ties and rivalries globally.

Energy security has become a critical political and economic concern for Beijing's leadership for several inter-related reasons. First, at a visceral level, China's leaders fear that domestic energy shortages and rising energy costs could undermine the country's economic growth and thus seriously jeopardize job creation. For a regime that increasingly stakes its political right to rule on economic performance and rising standards of living, the threat of economic stagnation raises real risks of social instability, which could in turn threaten the continued political monopoly of the Chinese Communist Party (CCP). Hence, energy security is a strategic domestic political concern for the leadership. Beijing also has been alarmed, like other oil importing governments around the world, by the huge rise in global energy prices over the past four years and the increasing specter of long-term global oil "scarcity."

China's strong economic growth is spurring a concomitant rise in energy demand that is outstripping domestic energy supply and infrastructure capabilities. This supply-demand gap will become more acute

over time and, in this regard, oil is a particularly sensitive problem. Over the next fifteen years, oil demand is expected to roughly double. By 2020 China will likely import 70% of its total oil needs and will become heavily dependent upon the Arabian/Persian Gulf to supply a large share of its future oil needs, and an increasing share of China's oil imports will have to transit vulnerable maritime choke points. Other significant shares will be coming by tanker from Africa, by pipeline and rail from Russia, and by pipeline from Central Asia. More than 50% of China's oil will have to transit the Malacca Straits. Added to insecurity over future tanker seaborne supplies, China has growing concerns about the reliability of Russia as a future energy supplier as well as seeing itself in competition with Japan, South Korea, and India for access to those potential Far East Russian energy supplies.

The same long-term trends are likely to hold for China's natural gas needs, although import dependence will probably accelerate only after 2010. The U.S. Department of Energy forecasts that natural gas imports from Southeast Asia, the Persian Gulf, Africa, and Russia will account for 40% of China's gas needs by 2025.

In short, China's domestic energy supply-demand gap poses serious challenges to ongoing rapid economic growth. As this problem becomes more acute over time, energy imports will play an increasing role in China's economy. Consequently, energy security has increasingly become an issue of the "high politics" of national security, not just the "low politics" of domestic economic policy.

For Beijing today, energy security has become too important to be left entirely to the markets. In response, Beijing has adopted an approach called the "Go-Out" strategy, a loosely coordinated range of efforts aimed at reducing China's vulnerability to future oil supply and price shocks. Briefly, the main elements of the go-out strategy include a more active, energy-centric form of commercial diplomacy by Beijing's leaders in the key energy exporting regions, combined with a more commercially-driven expansion of China's three major NOCs—CNPC, Sinopec, and CNOOC—to secure equity investments in oil and gas fields abroad, with an emphasis on physical control over oil supplies. Additionally, the NOCs are pursuing a diversified slate of long-term crude oil supply market contracts and liquefied natural gas [LNG] supply contracts from a broad range of exporters to meet future needs. A further aspect of this loosely coordinated effort is Beijing diplomacy and NOC investments to promote development of new overland oil and natural gas pipelines that will diversify future transport routes for energy imports.

China's NOCs have acquired growing equity oil stakes and signed long-term crude oil supply contracts in the Arabian/Persian Gulf, anchored by growing involvement in Iran's oil and gas sector and more recently by growing energy and diplomatic ties with energy giant Saudi Arabia. China's focus on Central Asia has centered on the acquisition of sizeable equity oil stakes in Kazakhstan that will be shipped via a long-distance pipeline currently being built to western China. Russia has become an important crude oil supplier through its rail shipments to northeastern China, and has plans to build both crude oil and natural gas pipelines from East Siberia to China. China recently had its first success in establishing an equity oil position in Russia through the recent acquisition of Urdmurtneftgas.

China's NOCs have also built a large portfolio of oil stakes and supply contracts in Africa, centered on the NOCs' largest equity production position in Sudan's oil industry, along with growing investments and supply contracts with major West African oil exporters Nigeria and Angola. In the western hemisphere, China owns growing equity oil stakes in Canada's western heavy-oil belt and is building ties with Venezuela. China has recently acquired equity investments through a major acquisition in Ecuador, and a strategic energy alliance with Brazil's Petrobras. In Southeast Asia, China's energy acquisitions and supply contracts are growing rapidly in Indonesian oil and LNG, Australian LNG and natural gas supplies, and potential oil pipeline deals with Myanmar.

All told, China's NOCs now have equity oil production overseas of roughly 500 thousand barrels per day (MBD), equal to approximately 15% of China's oil imports. Beijing has signed "strategic" energy alliances of one sort or another with at least nine countries, including Iran, Sudan, Russia, Kazakhstan, Saudi Arabia,

Brazil, and Venezuela. However, while seeking to expand its equity oil and state-to-state (or NOC-to-NOC) position, China still must rely on the open market for the vast majority of oil imports.

The decidedly mercantilist cast of the go-out strategy reflects China's sense of weakness and vulnerability regarding reliable access to energy supplies which has provided the rationale for significant state intervention and support. This mentality has been strongly influenced by a general mistrust of global energy markets. China's leaders believe they are facing an unstable and unforgiving global energy market that is dominated by sophisticated global oil companies, Western industrial countries, and unreliable and unstable-oil exporting countries. The market alone cannot be counted on to provide reliable oil supplies at reasonable prices. This helps explain Beijing's fixation on physical control of oil supplies through direct investment in the major producing countries, state-to-state cooperative agreements, and transport systems in which China has a stake.

Second, distrust of energy markets has been aggravated by the perception that these markets are dominated by the United States, a perception that overlaps with concerns that the United States is out to exploit China's energy weakness. U.S. strategic power in the Persian Gulf, the U.S. Navy's control over critical energy transport sea lanes, and what is perceived to be the power of the U.S. in the global oil industry and institutions, drive a perception in Beijing that the United States exerts a powerful influence on global oil prices and flows. Strident rhetoric in the United States during the 2005 CNOOC-Unocal episode has reinforced the perception that the U.S. seeks to undermine China's access to secure supplies and reinforced suspicions in Beijing that the U.S. saw energy as an arena of strategic competition and that the U.S. intended to use its strategic power and leverage over access to global energy supplies to weaken China.

Third, in terms of energy sector capabilities, Beijing feels it is working from a position of weakness and must play "catch-up." Excluded from the major institutions governing global oil cooperation (such as the IEA) and forced to rely upon NOCs that are relatively new and weak competitors in the dynamic global oil industry, China feels dominated by the large, powerful, and technologically sophisticated oil companies that Beijing feels help to defend the interests of Western industrial countries.

All these factors combine to give a mercantilist character to China's energy security drive and to Beijing's rhetoric about its energy security concerns.

#### ***Does Beijing's Approach Encourage or Impede Cooperation?***

As described above, Beijing's focus has been on a relatively "go-it-alone" approach to meeting its oil supply needs, with an emphasis on bilateral energy relations often including significant political, trade, and aid components, and reliance on investments abroad by its own state-owned NOCs to meet future oil security needs. This has certainly contributed to a more politicized and competitive environment, both regionally in Asia as well as globally, regarding access to and control over long-term oil and gas supplies. It has added to the zero-sum atmosphere that exists among today's oil importing and consuming countries. At the same time, Beijing has relegated regional or multilateral approaches to energy security to the back burner and often simply "lip-service". Moreover, in terms of domestic energy policy, Beijing until very recently has focused very little attention on energy conservation, improving energy efficiency, or reducing the rate of growth of oil and energy demand. This has limited prospects for energy cooperation with the U.S. or other Asian countries on energy efficiency and demand management efforts.

However, China's approach to energy security shows some signs of evolving gradually toward a more cooperative posture for a number of reasons. Most importantly, there is a growing perception among key policy advisors in Beijing that the current strategy is not fundamentally improving China's energy security. Oil demand and need for oil imports is simply growing too quickly to be met effectively through equity investments by China's NOCs and bilateral deals with producing countries. Demand is growing roughly 500 thousand barrels per day (MBD) annually, almost all of which will have to be met with imported oil. In five years China will be importing 6 million barrels per day (MMBD), compared to today's 3.5 MMBD. At best, China's NOCs expect to add perhaps a total of 500 MBD to their equity production in that five

year period. The realization is growing that China's future oil supplies and security are ultimately tied to market access to crude oil rather than ownership of crude oil. This inevitably is leading policy advisors in Beijing to suggest that policymakers begin focusing on the stability of the global oil market, stability of supplies, and unimpeded access to long-term contract crude supplies as the key to China's energy security, rather than outright ownership and control. Global market stability is impossible without international cooperation.

Related to this point, there is a growing sense in Beijing that the investment interests of China's NOCs in expanding abroad are not necessarily synonymous with China's national energy security interests. For example, the reality is that most of the oil produced by China's NOCs abroad is not shipped back to China, it is sold into the global market in the same way other global commercial oil companies do. The crude shipped to China reflects its particular value in China's refining system which needs mainly light, sweet crude. There is growing discussion that, while China should have strong, globally-competitive national oil companies commensurate with other global powers, China's energy security interests do not require heavy state support or unnecessarily controversial financial and diplomatic support for their NOCs.

In broader foreign policy terms, there also seems to be some recognition that the atmosphere of zero-sum energy competition is creating serious and potentially unnecessary collateral foreign policy disputes with key powers, most importantly the U.S. and Japan. While there remain suspicions about the long-term energy intentions of both the U.S. and Japan, there are concerns among those responsible for China's broader foreign policy interests that energy disputes are unnecessarily complicating these important diplomatic relationships. Moreover, there appears to be some growing realization that as China seeks to reassure other world powers that China's rise will be peaceful and non-threatening to the world, that one area where China can begin demonstrating a more responsible posture, a "responsible stakeholder", is in the management of the global energy system.

A final key change that is occurring in Beijing is a growing recognition that domestic energy policy in China, particularly regarding oil and coal use, needs to focus much more intently on energy conservation, improving efficiency, and demand-side reforms. Energy policy has traditionally been heavily supply-side driven, which partly explains the emphasis on accessing oil supplies abroad rather than addressing rapidly rising demand domestically. This is changing rapidly toward an understanding that demand cannot continue to grow on its current trajectory without disastrous environmental, infrastructural, and health consequences. This opens the door widely to a new interest in international cooperation on energy.

The result of all these underlying trends is that there appears to be the beginnings of a sense in Beijing that international energy cooperation is in China's interest. For example, China has become gradually more engaged and forthcoming with the IEA on its development of Strategic Petroleum Reserves. In recent meetings it has suggested that it was favorably inclined on issues such as coordinating strategic stock releases with the IEA during global market disruptions. This is new. Last December, China convened a Ministerial-level meeting of the major Asian energy importing countries, including the U.S., Japan, South Korea, and India to discuss common approaches to the importing countries' energy security concerns. In recent bilateral meetings with the U.S., both the SED and the Energy Bilateral, China has expressed growing interest in energy cooperation with the U.S. on coal, natural gas, and oil issues. Beijing has also recently begun make new efforts to resolve energy disputes with Japan, in particular a long-running dispute over natural gas fields in the East China Sea. Recent China-Japan bilateral energy discussions also made substantial new progress on cooperation on energy technology, efficiency, and energy/environmental issues. In Southeast Asia, China has begun to show a more cooperative regional approach to maintaining the security of regional sea lanes and the Straits of Malacca from the threats from piracy and terrorism.

It would be premature to say that China's approach to energy security and energy cooperation has changed decisively from its "go-it-along" pattern of the past decade. However, there are significant indications that policy is evolving toward a policy that recognizes that the stability of the global market and reliable transport flows are more important than trying to carve out its own secure energy supplies and supply-lines

unilaterally. As this develops, it is likely to lead to policies that increasingly support market stability through global and regional energy cooperation. Consequently, it is vital that the U.S. re-double its efforts to engage China across the board on energy cooperation internationally and bilaterally in order to encourage the positive evolution of these policies.

### **Energy, Pipelines, and China's Land-based Neighbors**

China sees its land-based neighbors in Eurasia as key sources of oil and natural gas supplies that can help diversify China's growing dependence on these seaborne supplies of both oil and LNG. Russia, Kazakhstan, and Turkmenistan are all potentially large suppliers of oil or natural gas to China and the rest of Asia and the logistics of pipeline transport favor much of that oil and gas moving to China.

For this and many other strategic reasons, China has worked assiduously over the past decade to establish closer energy and diplomatic ties with Russia and the key Central Asian energy rich states. Many analysts have expected energy to become one of the main sinews to cement a strong set of strategic ties between China and Russia and between China and Kazakhstan. For the U.S., the idea that China and Russian strategic ties would strengthen as a result of a strong energy alliance raised questions of the implications of Eurasia's two major powers increasingly closely aligned in policies potentially seeking to reign in U.S. power in influence in Asia and globally.

In reality, energy investment and trade have indeed helped cement improving strategic relations between China and Kazakhstan. China's NOCs have acquired several major oil production assets since the mid-1990s and now control nearly 25% of Kazakhstan's crude oil production. The first leg of a major oil pipeline from western Kazakhstan to China's western border was completed last year and is currently delivering 200 MBD, with expansion plans to take the pipeline to 400 MBD over the next few years. China also has signed a Strategic Energy Alliance with Kazakhstan. In the next 20 years, it is possible that up to 1MMBD of crude oil could flow to China by pipeline from Kazakhstan,. However, market drivers suggest most of Kazakhstan's crude is more likely to flow west through the CPC pipeline to the Black Sea with new supplies from the Kashagan offshore field due to come in the next several years going into an enlarged Baku-Ceyhan pipeline to the Mediterranean coast. Both sides have also recently discussed a potential natural gas pipeline to China as Kazakhstan's gas production ramps up over the next 5 years of field development. All of this has led to a strong strategic relationship with Kazakhstan, encompassing energy cooperation, military cooperation, and growing trade and investment.

However, the Sino-Russian energy relationship has been tortured and fraught with cross-currents of competition, suspicion, and Russian energy policy paralysis and, hence, has done little to bring the two Eurasian powers closer together, yet. China has been receiving 250 MBD of crude oil delivered by rail over the past several years and these volumes are contracted to increase gradually, assuming Russia invests in expanding its Far Eastern rail capacity. Russia has finally, apparently, begun to build a long-promised oil pipeline from Angarsk to a point near the Chinese border, but details on that remain very sketchy. But Russia's repeated promises to build gas pipelines to China have been stalled by the re-centralization and re-nationalization of much of the oil and gas industry during the Putin era which has paralyzed major new projects in East Siberia and Sakhalin Island. This includes both Sakhalin Island projects and the Irkutsk gas project in Eastern Siberia. Second, even where the Kremlin has had unchallenged control of gas resources in Western Siberia, it has failed to follow-through on repeated promises, made as recently as March 2006 by President Putin in Beijing, to build a major West Siberian gas pipeline to China. China has also been rebuffed several times when it tried to make equity investments in producing oil assets in Russia, only recently finally successful in gaining control of Urdmurtneftgas in a recent auction. Finally, Russia has become a major obstacle to China's hopes to access potential pipeline gas from Turkmenistan and Kazakhstan. In a recent deal Russia has locked up large future supplies of gas from both countries to move north to Russia, which is likely to leave insufficient gas supplies to justify a gas pipeline east to China.

So Sino-Russian energy relations have been rocky, at best, despite the natural strategic resource fit. Over

the long-run, however, the logic of more oil and gas moving from Russia to China are compelling and volumes are likely to grow. The question is how much and at what pace of growth.

Therefore, in China's straightforward energy security calculus, it is likely that Russia and Eurasia will be important future suppliers of both oil and gas and should help diversify China's sources of oil and gas imports. However, these supplies are likely to only marginally reduce China's dependence on seaborne oil and gas imports. Most forecasts suggest a range of oil exports from Kazakhstan over the next 20 years of possibly up to 1 MMBD, but more likely in the range of 500 MBD since most Kazakh oil exports are likely to move west to markets in Europe. Russia could potentially export 1-2 MMBD to China in 20 years, but most likely in the 1 MMBD range given the somewhat less robust oil reserve picture in East Siberia and the Russian Far East. Most likely combined would be in the 1.5-2.0 MMBD range in 20 years. Alternatively, on current trends, in 20 years China is likely to be importing roughly 10-12 MMBD worldwide. So an important source of supply and an important source of transport diversification, certainly, particularly as it will mainly be by overland pipeline rather than seaborne supplies. Another small increment of oil imports could avoid the Malacca Straits through a proposed oil pipeline through Myanmar that may or may not get built. Nevertheless, China's dependence on seaborne supplies from the west, mainly the Middle East, transiting the Malacca Straits will remain profound, accounting for a minimum of 70-75% of China's oil imports.

#### **PANEL IV: Discussion, Questions and Answers**

VICE CHAIRMAN BLUMENTHAL: Thank you all very much. I'll take the first question. This is for Dr. Holmes and if anyone else has an answer, I'd encourage that as well.

We heard when we were in Beijing a commitment to some form of an ocean-going blue water navy. We heard it from the PLA. They were quite open about it in the ways that you described, such as supporting economic development and so forth. There were stories afterwards that Admiral Keating heard a similar message. I wonder from your perspective, and of course it's a speculative question, but if it's not the kind of ocean-going navy that we have or that we're even used to, what type of ocean--what are the characteristics of that ocean-going navy? What sorts of things will we see more of in terms of developing that capability?

DR. HOLMES: As Yogi Berra said, prediction is always a difficult thing and especially when it involves the future. If you see China achieve what I would describe as its premier objective geopolitically, which would be settling matters within the first island chain of which Taiwan of course is the centerpoint to its own satisfaction, using its current mix of capabilities, if indeed you do see China turn its attention to the south and to the southwest towards the Indian Ocean, you would certainly see more emphasis on nuclear submarines, capabilities that are capable of longer endurance at sea along these sea lines of communication.

Land-based tactical aircraft are of limited utility arguably in the Indian Ocean. I would expect to see a big push on combat logistics fleet, oilers, ammunition ships and the other units that allow ships to

stay at sea longer, patrol these sea lanes. My colleague Gabriel Collins up at the China Maritime Studies Institute has written a paper detailing China's plans to actually convoy shipping back and forth from the Persian Gulf to Chinese seaports, very intensive, very intensive mission, as you might be able to imagine if you assign a frigate or destroyer or some sort of small combat to each shipment of oil.

So basically that would be my prediction. With regard to the aircraft carrier question which is probably implicit in what you were asking, I can tell you what I would build if I were in Beijing. As a former Navy officer, I would certainly be looking at smaller carriers, suitable more for patrolling the sea lanes rather than something more equivalent to our large Nimitz class carriers which have been the mainstay of the U.S. Navy for the last 20, 30 years, which was the basis of my point that I don't necessarily expect to see a PLA Navy emerge that's going to be symmetrical with our own. It could look quite different.

Does that answer your question?

VICE CHAIRMAN BLUMENTHAL: It does. The follow-on would be given some of your skepticism about the porting and basing relationships along the Indian Ocean, that would seem to me to be a critical component of such a strategy unless it really had the capability to replenish at sea and that sort of thing.

So can you expand a little bit out about your skepticism of some of the relationships, diplomatic and otherwise, in what is called the "String of Pearls" strategy?

DR. HOLMES: Yes. Perhaps I didn't explain myself very well. I think I was attributing my skepticism more to a lack of evidence that this is something that, certainly if the Chinese are followers of Alfred Thayer Mahan, which I would argue that a large and sizable school in Beijing is, one of the components of sea power that Mahan always urged rising naval powers to amass was bases, forward bases, to support forward operations of the kind that you're referring to.

I simply haven't seen in the literature any notion that this is a concerted effort. I think it's more of an opportunistic thing. The Chinese are taking advantage of these opportunities as they arise, and as I tried to do with my analysis of Gwadar, I was poo-pooing the value of these assets as naval bases even if they do have such a strategy in mind.

Perhaps Toshi might want to comment on that as well.

VICE CHAIRMAN BLUMENTHAL: Quickly because we're running out of time.

DR. YOSHIHARA: Just very quickly, I think that throughout the 1990s the debate about the Chinese Navy was kind of a stale one which

was a false dichotomy that if the Chinese were not in fact building a blue water navy then it must forever be bound to a coastal navy, and I think that that's kind of a false dichotomy. I think it's possible that China would build some kind of a hybrid capability that Dr. Holmes has mentioned that would enable it to do the things it needs to do, which is primarily SLOC defense. I think to understand this you have to start with what the Chinese have today.

The Chinese are well equipped to create the so-called contested zone within the first island chain stretching from Japan down to the Philippines. In other words, to conduct sea denial, sea control operations along China's coast.

If you look at the capabilities, most of those capabilities are land-based. In other words, that actually might be a way for us to use a proper benchmark to measure Chinese progress in building a fleet for SLOC defense, and I would argue that because most of the assets for a contested zone are land-based. They still have quite a way to go before they can have those kinds of long-range maritime reconnaissance or replenishment that would enable it to conduct those kinds of missions that Dr. Holmes mentioned.

Thank you.

VICE CHAIRMAN BLUMENTHAL: Thank you. Commissioner Fiedler was next.

COMMISSIONER FIEDLER: I have two questions. I want to see if I understood you correctly. I think it was Dr. Holmes. If the Chinese were to develop a more robust Southern Seas strategy, naval growth strategy, did you say that they had to have Taiwan in order to accomplish that?

DR. HOLMES: Yes, sir. That is my analysis, and I think I'm speaking for Dr. Yoshihara who has coauthored with me on this matter as well. My vision of it is that rather than surge out into the Pacific for some sort of mythical battle with the U.S. Navy for supremacy in the Pacific, what China really needs to do, and I believe it is intent on doing, is regaining control, if not physical control, then at least the ability to operate freely around this first island chain of which Taiwan forms the midpoint. If you go back into history, General MacArthur back in 1950 referred to Taiwan as an unsinkable aircraft carrier. Dean Acheson, Secretary of State Acheson referred to it as the centerpoint of the American defense perimeter, a very key strategic point.

My analysis is that China is attempting to basically form a hold strategy in East Asia so that it can turn its attention to more pressing matters, namely the flow of vital energy resources, to which necessarily, as Mr. Herberg said, will come from the South.

COMMISSIONER FIEDLER: I have a second question for you,

sir. Anybody can jump in. I want to make a general statement, and see when we reach a critical point that could result in military action alternatives to solve the problem.

So China's growing rapidly. We've heard a lot about its energy use. I don't remember all the numbers. It's striking me as exponential growth. We are growing. Europe has needs. Brazil has needs. Pretty soon there's a scarcity, and then people want to get theirs. Done any projections on that?

MR. HERBERG: I don't do those kind of estimates myself. The best consistent forecasts on long-term oil supply and demand would be from the IEA's bi-annual *World Energy Outlooks* and the DOE's annual international energy forecast.

I don't believe that there is any tipping point out there that you reach where this sense of competition spills over into direct conflict. The supply and demand picture globally in oil is going to remain very tight, very precarious at least for the next two or three years or more. I could imagine some easing in that tightness beyond that.

But if we remain in a \$70 kind of world where we are for oil, where every country and government continues to be deeply concerned about where their future supply is going to come from, it will continue this atmosphere of scarcity, which is already is already deeply entrenched in people's thinking.

My sense is it's going to lead to a great deal of diplomatic jousting and tension, but an outright conflict over barrels strikes me as far more damaging than working out multilateral way to manage the tightness. That's why I think it's so important to get China, India and these other consumers into the IEA global institutions or aligned with them in some way so that everybody is focusing on the same thing which is the stability of the global marketplace, not trying to carve their particular chunk of barrels from the market for their own security.

VICE CHAIRMAN BLUMENTHAL: You still have time.

COMMISSIONER FIEDLER: The reason I raised the question is that you and others have said that the Chinese government has to worry and worries deeply about the job creation machine and energy is a key component in its ability to generate, continually generate massive numbers of jobs, and the generation of jobs is seen as a key factor in what is known as social stability, which is to mean the continued survival of the Party as the predominant force in the country.

So that's actually the root of my question. So when they have interruptions, it's a little different than gas lines in Washington and New York that we had in the United States because the survival of the government is not at stake. Right.

I just wonder if anybody has studied that, projects it, thinks

about it, calculates the tipping point? I'll address it more to the military guys in that sense.

MR. HERBERG: The linchpin in this is price. As the market gets tighter, prices go up. This is the market. Barrels are always available on the international market at the market price, and this is what the Chinese don't really understand well and the Indians do somewhat better. But frankly many people and governments don't seem to understand this.

The barrels are always available at the market price. If it's \$90 a barrel, then that's the price. Barrels will be available. What China fears is, and what you're talking about is a pre-1970s vision of the global oil market where supply lines were very rigid. If supplies got tight, somebody didn't get barrels. In today's market with futures markets, international exchanges around the world, prices respond in a nanosecond.

Barrels are always available at the market price. So it's not like somebody won't get their barrels. The only case here where this is an issue is if someone were to try to deprive China of its barrels in a Taiwan confrontation, that then would be a very serious issue for China. But in a normal non-war circumstance, barrels are available out there at the price, and that's what the Chinese are evolving towards understanding better.

VICE CHAIRMAN BLUMENTHAL: Commissioner Houston.

COMMISSIONER HOUSTON: Thanks to all of you for being here this afternoon. We really appreciate your testimony. I have a question about the Chinese Navy and energy security not necessarily in their backyard. We've heard sort of anecdotal evidence of military build-up, Iran building up around the Strait of Hormuz through which a whole bunch of oil goes to everybody everyday, and that China has supplied either cash or the equivalent boats in the Strait of Hormuz for Iran, and that really does present a problem for us, in particular, in our own energy security if Iran decided to misbehave and close down the Strait of Hormuz using Chinese materials.

Have you assessed this or studied this issue at all and if you have, what do you think China's intent is there? Is it sort of a diplomatic move with Iran or is it to protect their own oil supply and how worried should we be about it?

DR. YOSHIHARA: I'll take a stab at this just from a broader geopolitical perspective. If you recall, in the 1980s, Saudi Arabia had wanted certain advanced weaponry from the United States which the United States quickly turned down. The Saudis then turned to the Chinese and the Chinese were very willing to provide medium-range ballistic missiles to Saudi Arabia that involves Chinese crews on the ground.

So I think that the Chinese do see opportunities of that kind, whether it's through arms sales or from economic inducements. Essentially, in a kind of geopolitical maneuver, vis-à-vis the United States, and I think that the connection in terms of the competition with the United States is that there is a perception that that region is essentially dominated by the United States, and so that the Chinese need to do whatever they can essentially to counterbalance American influence, to the extent that it can, and as we've seen, their ventures into Africa and so on and so forth with fairly repugnant regimes is really essentially trying to circumvent America's dominance in the Persian Gulf.

So from a geopolitical perspective, I think it makes sense for the Chinese to do what it can to basically its ability to open up a secondary theater in a way in that region.

Thank you.

DR. HOLMES: I would only add that if you look down on the operational level, I think the Iranians could, if you look at what they have, they could perhaps close the Strait of Hormuz for a limited amount of time. I have very few doubts that we could force the Straits in fairly short order.

Having said all that, clearly there would be a serious shock to the world economic order even from a brief shutdown. So that's--

COMMISSIONER HOUSTON: Those are very good answers, but is the short answer that the Chinese are active in providing materials, ships, whatever, to the Iranians for the Strait or you're not aware of any of that activity in particular?

DR. HOLMES: As Toshi pointed out, the Chinese over the years have been very, very cognizant of the ability or of the capacity of weapon sales in the region provide them to amass a diplomatic, not only diplomatic influence, but of course now, under the circumstances Mr. Herberg talked about, guaranteed supplies of oil, the ability to develop the Iranian oil sector and so forth.

So, sure, I was in the first Gulf War and we found we were always on the business end of Chinese-built missiles. So it's not a new thing.

COMMISSIONER HOUSTON: Thank you very much.

VICE CHAIRMAN BLUMENTHAL: Commissioner Videnieks.

HEARING COCHAIR VIDENIEKS: This is a question for Dr. Yoshihara. A lot has been written recently about a joint 1,000-ship Navy to patrol the seas, and there was a lot of disagreement on it, whether it's overly formal or not.

Also, the Chinese obviously have this strategy of the "String of Pearls." Is there an inherent conflict in that the "String of Pearls" strategy to me sounds more or less like it's a unilateral type of thing,

and obviously the joint navy, 1,000 ship navy, if it's a feasible concept even, is a cooperative effort.

Will you please, any of you, talk about that a little bit because I think there's a conflict, but it may not be.

DR. YOSHIHARA: I think Chinese reactions to the Proliferation Security Initiative, for example, its deep reluctance both from an international legal perspective, but also from a geopolitical perspective, provides us a window into Chinese thinking about naval cooperation.

I think you're right. I think the way the Chinese have developed their physical forward presence through the "String of Pearls," I think is seen in competitive terms rather than in cooperative terms.

I would suspect that the Chinese would probably not look upon the 1,000 ship navy with much happiness, I would say, and if you think about Chinese reactions--and I've mentioned this in the paper--when Admiral Dennis Blair proposed the Security Communities concept, for example, the Chinese very quickly quelled that by pressuring Southeast Asian nations behind the scenes to essentially reject that proposal. There are suspicions that in terms of Southeast Asian reactions to the Regional Security Maritime Initiative, which is a fairly innocuous--it was misquoted in the press--but it was a fairly innocuous initiative to share information on transnational threats, and Kuala Lumpur and Jakarta reacted very negatively to that, and I would suspect that part of that rejection was in part incorporating some of China's own maritime concerns in that region, which is not to give additional excuses for the United States to maintain a more permanent presence in the Malacca Strait.

HEARING COCHAIR VIDENIEKS: All right. So this is a proposal by our admirals--

DR. YOSHIHARA: That's correct.

HEARING COCHAIR VIDENIEKS: --that may not be favorably received by our people and also the PRC?

DR. YOSHIHARA: That's correct.

DR. HOLMES: Sir, I think the Chinese are very reluctant to do anything that would seem to ratify American, continued American naval dominance in their backyard, or even assuming some sort of maritime partnership did emerge, they would be reluctant to seem to assent or to acquiesce in the United States holding the senior position in such a partnership.

VICE CHAIRMAN BLUMENTHAL: Thank you. Chairman Bartholomew.

CHAIRMAN BARTHOLOMEW: Thank you and thank you, gentlemen, for a very interesting testimony. As always, there are so many issues that come up, it's difficult to know where to start asking,

but I guess I'm going to ask a military question, first, which is on this whole "String of Pearls" concept, I've heard from a friend in Sri Lanka recently that the Chinese are building a base in the southern part of Sri Lanka, and I wondered if you guys had heard anything about this?

I had not heard about it anywhere else. It's very difficult when you look at the map not to see some sort of strategy taking place when you see places that they are putting bases. Have you heard anything about a base in Sri Lanka?

DR. HOLMES: Not specifically. If I could clarify, I think news reporting on the "String of Pearls" has been a tad misleading. So if you look at the base in Gwadar, which has I think occasioned most of the debates, a lot of things have been done. If you do something as simple as go to the Web site the Pakistani government maintains, it's quite clear that the primary purpose of the dredging in the channel and building of all these facilities is economic. The Pakistanis are clearly expecting that to become one of their megaports and are looking to it primarily for economics, basically as an outlet for trade, also potentially to allow China to transship oil over land.

So, yes, it could serve a military purpose at some time in the future, but I wouldn't expect that to be an immediate prospect. I don't know about Sri Lanka in particular.

DR. YOSHIHARA: No.

MR. HERBERG: No.

CHAIRMAN BARTHOLOMEW: Okay. I'm going to switch from the military aspect to politicization. Mr. Herberg, you mentioned about a more politicized and competitive environment, and I was wondering if you could elaborate a little bit on what you mean by a more politicized environment?

MR. HERBERG: What you see across Asia, amongst the big consumers, Japan, India, China, to some extent South Korea, is that this sense of scarcity, that each country feels like it has to sponsor its own companies to go out and get physical equity supplies and buy fields for oil supplies to, in theory, bring back home to feed the home economy.

The Chinese have been the biggest player in this process, but the other Asian governments are contributing to that atmosphere as well, where energy supplies become a political commodity, become a key strategic goal, and access to those supplies becomes a strategic competitive arena. You're seeing the impact of that in many ways, particularly in China-Japan, relations today, but also in China-India relations as well, where the geopolitics of these suspicions and rivalries spills over into this competition for supplies.

Competition for supplies is not a reality; it's an illusion because the global oil market is one big pool of oil. So if you take less out of

this end of the pool, you can take more out of that end. So it's based upon a deep misperception of the world oil market, but at the same time it's motivating real actions, and in the process is creating new and unnecessary tensions among the Asian states. The bilateralization of energy ties, throwing government aid into the package to try to get advantage, is also a key characteristic of the politicization I'm talking about.

CHAIRMAN BARTHOLOMEW: Is some of this misperception based on the differing idea of ownership versus access?

MR. HERBERG: Exactly. And the Chinese I think are moving from ownership and control to an access view. What we all work through the IEA and through international cooperation on energy, is focused on the stability of one global market and access to those supplies that's critical to all of us.

One key issue is the avoidance of a disruption of Persian Gulf oil supplies to the global market, for example. We all have a common interest in that, including the U.S. and China. So I think access is the issue; it's not ownership and control.

But still China, in particular, and Japan still to some extent, and even South Korea, still fall back into this kind of a pre-1970 mentality and it's creating this competitive atmosphere.

CHAIRMAN BARTHOLOMEW: But if you think that you can lock up the supply, then there isn't a model or a paradigm of common interest. Do you think that there's enough of a similar understanding or conception of the whole thing, that we can base an interpretation of what's happening on that?

MR. HERBERG: I think that is dawning on Chinese policymakers, in particular. The problem is when you view it in these kind of mercantilist terms, balkanized, my supply, beggar thy neighbor approach, it leads you to one vision of supply security, which is competitive. What I think Beijing policymakers are beginning to understand is if they turn Sudan into their own little filling station, it means they're buying less West African oil, so that's more oil available to all the other consumers.

CHAIRMAN BARTHOLOMEW: Presuming that the demand does not go up at the same time.

MR. HERBERG: Right.

CHAIRMAN BARTHOLOMEW: You're presuming a leveled off of demand.

MR. HERBERG: You've got gradually increasing demand, and the key question here is global supply. We're balancing off that global supply picture.

CHAIRMAN BARTHOLOMEW: Right.

MR. HERBERG: So that's really our key problem is that OPEC

and these other producers are not increasing supply fast enough to meet rising world demand. But on average, world oil demand has not been growing that fast relative to historical conditions, and so this is not about getting my barrels here and you get your barrels there. It all comes out of the same big pool.

But the perception in Asia is very much still influenced by this we need to get our barrels, and this is part of the competition over supplies that comes from \$70 oil prices. Moreover, widespread discussion about "peak oil" and other threats to supply instill this fear about where will each country get its supplies. When you're in the oil industry, you see this is just one big pool, take a little more here, it means a little less there. The pool doesn't get affected, but the political perception of this, and frankly some of the Unocal-CNOOC debate here in Washington, D.C. fell into this category, that the U.S. is going to have certain of our supplies deprived from us because of this acquisition and their ownership and control. It just means they're buying less West African oil and less Venezuelan oil and less North Sea oil.

That's the way it ultimately sorts out. It's price neutral. The global supply and demand balance drives prices, but not who takes which barrel out of which end of the pool.

CHAIRMAN BARTHOLOMEW: Right. Thank you.

VICE CHAIRMAN BLUMENTHAL: Thank you. Commissioner Shea.

HEARING COCHAIR SHEA: Thank you very much for your testimony. I just have a pure military question. I was wondering if the two doctors could educate me a little bit and give me a primer on the capability of the Indian Navy and assess the Indian Navy's capabilities vis-à-vis the PLAN?

CHAIRMAN BARTHOLOMEW: In two minutes.

DR. HOLMES: I think the Indians, my analysis was predicated in part on Barry Posen's notion of the contested zone, namely, just to boil it down to a sound bite, namely, that countries have a home court advantage in their own backyards. They're obviously close to the theater of action. They have more manpower. They know the area including things like the underwater geography better and so on and so forth.

If you look at the Indian Navy now, if you see a force that's, I guess, it's roughly comparable to what China has out there. If you put them together in the middle of the Indian Ocean, two forces going at it in some sort of Mahanian Trafalgar-type clash. The Indians have aircraft carriers. They've operated them for a long time, of which they take great pride in.

You certainly would not liken them to our own nuclear powered

aircraft carriers. There are a few problems. They have had a lot of difficulty putting to sea an undersea nuclear deterrent manifested in nuclear ballistic missile subs. This has been a spot of some contention in New Delhi for some time.

Now what else? The Indians have had a habit of buying a hodgepodge of foreign-supplied military equipment. Anything who's served in uniform knows it's very difficult to make equipment supplied not only by two different companies but by two nations work together well. So this has been a bit of a problem for them.

So I guess the overall synopsis would be that the Indian Navy is very capable. I think it's getting more capable. The Indians have clearly set out to put to sea a national maritime force. They're trying to break down bureaucratic stovepipes between the Navy and the Coast Guard in the service of these naval diplomacy missions, and I actually find it rather impressive the way they've put naval power at the service of national foreign policy.

Can I add anything to that?

HEARING COCHAIR SHEA: Very good. Dr. Yoshihara?

DR. YOSHIHARA: I would only add sort of from a more sea power theory perspective, the debate has always been what kind of a navy do you want to build? Do you want to build a well-balanced navy or would you like to build a niche navy? And I think at the present moment, as I've said, because of China's concern over Taiwan, China has very consciously built essentially a niche navy to create the so-called contested zone that we've discussed within the first island chain.

From that perspective, I would argue that India's Navy is probably more well balanced than China's more limited niche navy that's designed particularly for just one mission, and so from that perspective I think that the Indian Navy probably has a qualitative, although not a quantitative, edge over the Chinese.

But on the other hand, I would say that China's focus on certain niche capabilities, like its submarine force, might one day, as some of our colleagues at the Naval War College have argued, become sort of the sharp end of the spear for it to penetrate into the Indian Ocean, especially if it has nuclear powered attack submarines, for example, that would be able to conduct longer-range patrols in the South China Sea and the Indian Ocean.

DR. HOLMES: Can I add just five more seconds?

HEARING COCHAIR SHEA: Sure. Ten more seconds.

DR. HOLMES: The Chinese have been rather coy about whether they want to build a blue water navy, built more similar to our own. The Indians make no bones about it. Blue water navy is it for New Delhi.

HEARING COCHAIR SHEA: Thank you very much.

VICE CHAIRMAN BLUMENTHAL: Have any more first-round questions? Second round. I have a question. I'm trying to make sense of even some of the not inconsistent but different types of testimony we received this morning as well as on this panel.

On the one hand, you get a picture of the U.S. pushing forward with a number of cooperative programs to teach the Chinese the importance of the market, and that's how it comes off. I'm being a little bit glib, but teach the Chinese the importance of the market and environmental cooperation and some of the things Mr. Herberg is talking about and Mr. Herberg testified that the Chinese may be moving to a model of access versus control.

On the other hand, you gentlemen follow the naval debates very closely; you say there's a big Mahanian school building in China, which is a much different proposition than accepting the international energy market, having a liberal--lower case "l"--view of international energy markets.

So I'm wondering how to reconcile these two. There are debates going on in China, I'm sure. We're having a debate here about what China is debating. But I'm wondering how to make sense of Chinese military statements about the need to--statements and capabilities, actions, about the need to protect your own, have an ocean-going navy because you can't trust the Americans to provide you with security of supply versus the Chinese debate about relying on, becoming a member of the multilateral community in terms of accessing its energy. How do we make sense of these two strands?

Are they hedging? That's the answer to everything these days or what's going on there? I probably took an answer away from you.

DR. HOLMES: Very good. Let me come at it from a little bit of a theoretical point of view. Toshi and I have predicated our analysis with regard to Mahan and China on the assumption that China reads Mahan perhaps not as in as a sophisticated a fashion as they might.

The quotation that always comes up in the Chinese literature is the definition of command of the sea. Mahan defined command of the sea as overbearing power that drives an enemy's flag from the seas, from vital waters, or at best allows it to appear as a fugitive.

This quotation appears over and over again in the Chinese literature. So, if that interpretation indeed wins out in Beijing, then we may have problems on our hands.

Now, if you read--Mahan's works are like many secret texts--there are elements in all of his various works that you can use to support almost anything. Mahan also wrote that force was an alien element in peaceful international commerce. So there's a tension even within Mahan's works that perhaps the United States could use to help fashion some sort of more benign environment in East Asia in the

coming years.

DR. YOSHIHARA: Let me just very quickly sort of paint the cacophony of voices that you've identified. Even within the geostrategic community of China, there are debates that are ongoing right now.

There are those who say we need to build the sea power for all of the reasons that you've raised, but then, on the other hand, there are those who are basically abiding by Mackinder's theory, which is that you need to have a continental heartland in order to maintain a great power status, and there are people who are equally enamored with Mackinder's teaching. They argue essentially that because of the United States' dominant naval power along the first island chain, the Western Pacific has essentially been closed off to the Chinese. So they therefore ought to go west to go to the land route toward Central Asia.

So even there, it's a fairly contentious dispute and they are quite clear that they disagree with this other school of thought, and even within the Mahanian school of thought, there are splits as well.

On the one hand, I think that there are sophisticated analysts who actually do read Mahan from cover to cover. I think that even many U.S. scholars do not read Mahan from cover to cover. But there are those in China who think very seriously, and I think there is an intellectual buy-in that sea power does determine the fate of nations.

On the other hand, there are those I think that have a fairly shallow interpretation of Mahan that would make me suspect that they're really looking for resources, that this is simply a justification for the build-up of the PLA Navy. So again, it's an ongoing contentious debate that's going on even within the strategic community.

VICE CHAIRMAN BLUMENTHAL: Did you have--

MR. HERBERG: Yes. He pointed to the divisions within the strategic community, and I would add to that those divisions also exist between those who deal with energy policy in China and the strategic community in china; huge gaps and silos, and compartmentalization.

So when I talk about energy policy, I think it's gradually moving towards a more cooperative posture. It doesn't necessary mean it's filtering through to the strategic portion of the policy community.

And second, its important to also recognize that the energy policymaking side in China is deeply fragmented. There is no there there when you look at the strategy. It's more a campaign where everybody kind of marches off in the same direction but without any real coordination. So it's much more of a mentality. Ironically, there's nobody in charge a lot of times on this. So how and when it will affect strategic views from an industry that's been deeply controlled and is

one of the least reformed industries within China, that is subject to much more state control, I think all those things make that disconnect make a little more sense.

VICE CHAIRMAN BLUMENTHAL: Let me just follow up real quickly. Is it safe to say that as long as there is a Taiwan dispute, the Chinese will not trust the United States to provide safety of energy supply, the Mahanian instincts, inclinations will be reinforced?

MR. HERBERG: If you probe deeply when you talk to the Chinese energy people about this, ultimately that's where you end up, is, well, in the case of a confrontation with the U.S., we know you'd cut off our oil supplies. Well, the only real scenario for confrontation is Taiwan, so I think if you were to remove that from the equation, I think a lot of things change.

VICE CHAIRMAN BLUMENTHAL: What about the two of you? Just quickly on that question?

DR. HOLMES: I would pretty much go along with what Mr. Herberg said. Yes, actually I think if you want to cast it in international relations theoretical terms, which I'm reluctant to do--you would tend to see that as China rises to great power, it's going to almost inevitably tend to look askance at another great power that controls this important medium in its environment.

VICE CHAIRMAN BLUMENTHAL: That's a different. That's a different answer. Mr. Herberg's answer was that if the Taiwan issue was resolved, we'd probably see a little bit more trust of U.S. control of sea lanes, whereas you're saying something different.

DR. HOLMES: I think perhaps my time horizon was a little shorter. I thought I was agreeing with him. Perhaps not.

MR. HERBERG: It doesn't mean cooperation would break out overnight, but it is a barrier to energy cooperation and a real concern of the energy folks that Taiwan would be the cause of an energy cutoff.

VICE CHAIRMAN BLUMENTHAL: You're just saying a great power will want control at sea.

DR. HOLMES: One of my standard recommendations, whenever I write something about this, is that the United States ought to invest effort into trying to fashion some sort of maritime partnership, whether through the Proliferation Security Initiative or these other anti-trafficking efforts to see if we can't, if not draw China into such a partnership, at least set a more convivial tone. Perhaps this would advance the interests that Mr. Herberg was talking about.

MR. HERBERG: I'm not arguing it would change the fundamental geopolitical equation. It would simply take energy out of that equation, as a source of firepower behind the difficulties.

DR. YOSHIHARA: I think the debate, and we use this debate also at the Naval War College for our senior military officers, and the

question is, is, I think what you're asking essentially is, is Taiwan an appetizer or is it a dessert? In other words, if, if, if Taiwan is, in fact, the dessert, then Chinese great power ambitions would be satiated and therefore would go along the path of cooperation.

But if it's an appetizer, then you can see Taiwan as essentially a platform for continuing to extend its geopolitical influence, and I think that I would tend towards the appetizer mode I think rather than the dessert mode.

VICE CHAIRMAN BLUMENTHAL: Commissioner Fiedler and then Chairman Bartholomew.

COMMISSIONER FIEDLER: At what price per barrel of oil does the Chinese economy hit a little more than a bump?

MR. HERBERG: In fact, the IEA is working on some of those issues right now. It's not a step function issue, it's a gradual escalation issue. What I mean by that is, the Chinese economy absorbed a tripling of oil prices, a tripling of coal prices over the last six years, and we know the economy hasn't skipped a beat. If anything, it's growing too fast.

So I'm not sure what the price is that really begins to create problems for the Chinese economy. Clearly, they're sensitive to the potential economic impact of higher energy prices and that's part of the real fear and why they control oil, retail oil prices, for example.

But what price begins to really affect their economy, I think it's an awfully high price because they have a lot of scope for savings if prices get high enough.

COMMISSIONER FIEDLER: It's a more complicated thing than just them because it's a global economy and prices here affect retail sales, price of gasoline affects retail sales fairly dramatically with some major retailers in the United States. That then in turn has to affect Chinese export production to the United States.

MR. HERBERG: Sure.

COMMISSIONER FIEDLER: We've seen fluctuations in it, but we haven't seen any real hits against the wall. So nobody is really looking at these numbers that you know of?

MR. HERBERG: It's a gradual escalation rather than some step function where suddenly it creates huge problems. Much, much higher prices would definitely be a drag on the Chinese economy, on the world economy, which feeds back in the export machine as well, but I don't know what the point at which it creates unmanageable problems.

COMMISSIONER FIEDLER: Thank you.

VICE CHAIRMAN BLUMENTHAL: Chairman Bartholomew.

CHAIRMAN BARTHOLOMEW: Thank you. Dr. Yoshihara, I think that you have just done the best job of putting out the challenge of intent, whether Taiwan is appetizer or dessert, in a concise--I don't

know--more picturesque way than I've heard before.

VICE CHAIRMAN BLUMENTHAL: I would say that you could have a dessert and then a meal the next day.

CHAIRMAN BARTHOLOMEW: Thank you for that. It's a useful image, useful way to think about it. Actually not what I'm going to ask about.

Mr. Herberg, you mentioned in your testimony there is a growing sense in Beijing that the investment interests of China's NOCs in expanding abroad are not necessarily synonymous with China's national energy security interests, and one of the last discussions we had with the last panel was how this would play out in the Sudan context, and I wondered what does the Chinese government do as these interests seem to diverge with whatever its other interests would be if that's selling on the market or its own standing in the world?

MR. HERBERG: I think you've already begun to see some marginal shift in their attitude/policies on Sudan. It's a small change at the margin, but the Chinese are gradualists on everything.

This is where I go back to the broad view of market versus our little corner of the market that we can corner. Let's start with the basic fact that relatively little Sudan oil actually goes to China. The national oil companies that produce it there sell it on the local market for the most part..

Roughly 150,000-200,000 barrels per day goes to China, but that's because it fits Chinese refineries. So it's really a market issue; it's not feeding needs for oil in China directly anyway.

Second, there's a real disconnect which I'm just beginning to understand better, that the tail is wagging the dog a bit here. The Chinese oil companies are out doing deals, going to places, that the Foreign Ministry doesn't hear about it until later. They often convince President Hu to travel to countries to sign bilateral energy agreements without much coordination of the broader foreign policy community in Beijing. I have heard it argued that it's the oil companies that are the most powerful in Beijing when it comes to where they go, what they do, and where they invest.

It's the tail wagging the dog here, and some feel the government is having trouble controlling the NOCs. This is a very sensitive issue in Beijing. They don't like to talk about it. But the picture that we have of this strategy is in some way overdrawn. I think there are beginning to be perceptions among those responsible for China's broader relationships, where Sudan issues come in, Iran issues come in, that are really creating toxic issues for the U.S.-China relationship, whether it is really in China's interest to have these companies out there investing in oil fields that don't bring oil back to China anyway, when we can buy that oil in the West African market at the same price

we're bringing it back from Sudan?

Why should we be taking all the foreign policy pressures that this is causing us in very important relationships? So, if you look at it that way, which to me seems to be a more accurate view, you're beginning to see that disconnect about why should Beijing be out supporting these companies when they're creating real headaches in key places in strategic relationship with the U.S. and Japan?

Beijing does want capable competitive global oil companies. The government wants to have its own Exxon type of oil companies. The U.S. has them; the Europeans have them. That doesn't mean Beijing will always want to have these state companies out there pulling China into a series of foreign policy problems that they really don't need.

CHAIRMAN BARTHOLOMEW: But, so then what does the government in Beijing do? Recognition is the first step, but what actions?

MR. HERBERG: I think what's going to happen is they're going to become more helpful over time in places like Sudan. I don't want to overdraw this. It's premature to declare they're going to become highly cooperative here. But I think as these problems accumulate at the State Council level and they begin to make the connections, that these companies increasingly will be cut loose to do their own business, to go out and compete all you want, but maybe Beijing has broader international interests in Sudan and globally which trump control over oil.

CHAIRMAN BARTHOLOMEW: So then Beijing gets it both ways. These are state companies that are doing this behavior. There is only so far the government is going to be able to disassociate itself from what the state companies are doing.

MR. HERBERG: This is a real problem in Beijing because you will talk to people who say we need to cut them loose. We want capable companies, but we're getting tied down by these companies. But these are very powerful companies, very powerful institutions, that bypass the NDRC and go straight to the State Council Vice Premier level many times for certain things. So it's an internal Chinese policy issue, and you will see it in economic policy process, energy policy. It's replicated other policy areas in Beijing where there's a lot less coordination going on than we tend to think, and particularly in their international energy activities. So I think what will happen is they will gradually cut the companies loose from state sponsorship and all the things that go with that and that will allow them the opportunity to be somewhat more statesmanlike or responsible stakeholder in areas like Sudan, but don't get me wrong; it's not next week or next month.

CHAIRMAN BARTHOLOMEW: They might not have the time if

the Olympics are at stake.

MR. HERBERG: That's why the leadership is feeling so much pressure on this because of that disconnect. What do we do?

CHAIRMAN BARTHOLOMEW: Thank you.

VICE CHAIRMAN BLUMENTHAL: Commissioner Brookes.

COMMISSIONER BROOKES: Thank you very much and thank you all for your testimony. I'd like to direct this question to Dr. Holmes and Dr. Yoshihara. I see you're both in the Strategy and Policy Department at Naval War College. I'm a graduate of the Naval War College a number of years ago and it's a terrific course. I'm sure you're still putting your students through the rigors of tens of books on strategy and policy.

I'd like both of your comments on this separately if they're not quite the same--how does Japan and the U.S.-Japan alliance figure into China's maritime energy security or insecurity, as it were?

DR. YOSHIHARA: Initially, I think the Chinese did see some benefits of the U.S.-Japan alliance. It's traditionally been seen as kind of a way to keep the Japanese down. In other words, the U.S. security assurances and capabilities and commitment to defend Japan would basically provide disincentives for the Japanese to build up their military capabilities.

But I think that a few articles have already emerged written by Chinese scholars who have said that it's the kind of the end of the silver lining, that the alliance is, in fact, becoming a platform for empowering Japan, particularly with regard to the development of ballistic missile defense.

Specifically, related to the energy security issue, I think the East China Sea dispute is a very interesting one. Aside from some of the legal disputes, and of course, disputes over the natural gas fields, I think that there are also some operational considerations with regard to the East China Sea dispute that might in fact involve the U.S.-Japan alliance. And what do I mean by that?

I think that in many of the scenarios in which a Taiwan crisis sort of flares up. If it gets closer to the point of conflict, the East China Sea could potentially be a platform from which the Chinese could essentially declare an exclusion zone, based on their interpretations of their sovereignty and sovereign rights over the East China Sea. If that's the case, we can see if we buy China's argument that the Continental Shelf is really what empowers the Chinese to have sovereign rights over the East China Sea, that would extend China's sort of maritime authority out to the Okinawa Trough which is just, maybe 30, 40 miles from the coast of their Ryukyu Island chain where a tremendous amount of American and Japanese military power resides.

So I think in that context, the Chinese clearly have energy

security stakes in the East China Sea. We cannot forget the operational considerations because it would clearly benefit the Chinese to have that kind of an exclusion zone with regard to a Taiwan Strait crisis, and I think that would pose tremendous challenges to the Japanese policymakers in terms of how do you deal with that? What kind of sea denial, sea control capabilities can the Japanese deploy in order to counter that type of a scenario in which the Chinese declare an exclusion zone?

Thank you.

DR. HOLMES: Thank you. A good question. I should preface my remarks by saying they only made you read tens of books back then? Y'all had it easy.

COMMISSIONER BROOKES: 500 great books.

DR. HOLMES: One 5,000 page book. I'm going to commit a little bit of intellectual thievery and then cast my answer in terms of Toshi's topic which was Chinese efforts to build up soft power to the South. I guess I'm staking out the southern front in the testimony today.

China as it looks at the South China Sea has been in the habit of what our colleague up at the War College, Peter Dutton, has called maintaining a managed confrontation with Japan, and provides them basically a country to tee off with, remind regional governments of Japan's imperial past in the region and so forth, casting itself as a benign power that has the best interest of the region at heart.

So as it reaches out, tries to build up to amass the soft power, leading all the way down to the Strait of Malacca, the key waterway there, I think Japan actually provides a useful foil for its efforts to make inroads there. Other than that, I like what you said.

VICE CHAIRMAN BLUMENTHAL: Commissioner Videnieks.

HEARING COCHAIR VIDENIEKS: A follow-up on the East China Sea argument. Do I understand you to say that the reason for U.S. not ratifying the Law of the Sea Treaty would be operational considerations?

DR. HOLMES: I'm not sure I entirely heard the--

HEARING COCHAIR VIDENIEKS: Okay. I'm asking a rhetorical question whether, to what extent do military operational considerations factor into the U.S. not accepting the 200 mile Continental Shelf limits?

DR. HOLMES: I'm not sure I would necessarily cast it in operational terms. Certainly it undercuts our ability to go out and maintain our diplomatic case since we haven't become a party to the treaty ever since it was inked back in the early 1980s. In operational terms, I think it gives the Chinese an advantage should they in this worst case scenario that Toshi framed try to declare some sort of

exclusion zone in the region.

DR. YOSHIHARA: I would only add, just to flesh out some of the sort of legal disputes between China and Japan, is that the Chinese take the Continental Shelf argument. The Japanese take the exclusive economic zone argument with the midline.

My understanding of the international legal interpretation of those two, because those two kind of coexist uneasily, is that usually when there's a dispute over that kind of a situation, the EEZ midline dispute actually takes international precedent over the Continental Shelf argument.

HEARING COCHAIR VIDENIEKS: Or there could be cooperative action.

DR. YOSHIHARA: Right, and the Chinese have actually staked out a fairly novel interpretation frankly of international law with regard to this, and what's interesting is some of these debates that are coming out of China that one scholar basically said, well, because of the silt that has been coming out of the Yellow Sea into the East China Sea over history, this reinforces China's sovereign claims that the Continental Shelf is, in fact, China's sovereign territory.

So they will push the argument as far as they can to enforce this novel legal interpretation.

HEARING COCHAIR VIDENIEKS: My second question is to Mr. Herberg. If indeed there is only one pool of oil and the market rules the seas or the pool, why is there a concern about maybe 70 percent of the oil reserves being owned either by states or state-owned companies? Is there a trend away from that now and it's a misguided concern?

MR. HERBERG: Countries where we can't get access to the oil, where we can't invest--

HEARING COCHAIR VIDENIEKS: Well, access could be by military power or otherwise. Access is access. But I'm saying in this case, 70 percent of--my understanding is that 70 percent of oil reserves are owned either by foreign governments or state-owned companies. So the majors are shooting for the remaining 30. Is there a false concern about this foreign ownership, this state/foreign company ownership, the state owning 70 percent?

MR. HERBERG: I think the problem there is that so much of that oil is not getting developed up because it's under the control of the national oil companies who either don't have the capital or won't put the capital into developing up that oil to meet growing oil supply needs/demand globally. And that's the real set of problems that we as consumers all face.

HEARING COCHAIR VIDENIEKS: Not enough R&D or?

MR. HERBERG: Well, just simply the unwillingness to invest

sufficient capital. These are very expensive projects and in Russia, Iran, Nigeria, Venezuela, I could go down the list--

HEARING COCHAIR VIDENIEKS: Mexico.

MR. HERBERG: --of murderer's row of countries that are not investing in raising oil production when they're sitting on large sizable reserves. At the same time, demand just keeps bumping up against supply. That's what we have in common with China and that's a global one-pool-of- oil problem that you're not growing the pool to meet that rising demand, but it is one of the things that contributes to this sense of scarcity, fear over your security of supplies and feeds this atmosphere of competition, let's try to unilaterally secure our oil, which ultimately is futile--futile in the sense, not futile.

VICE CHAIRMAN BLUMENTHAL: Unless someone else has a question, I think we'll wrap up and take a five minute break before the next session. But thank you all very, very much for a fascinating and very useful testimony and we very much appreciate your insights and your contributions to our mandate.

Thank you.

[Whereupon, a short recess was taken.]

## **PANEL V: THE ENVIRONMENTAL CONSEQUENCES FOR CHINA, THE UNITED STATES AND THE WORLD OF CHINA'S ENERGY CONSUMPTION**

HEARING COCHAIR D'AMATO: The Commission will come to order for the fifth and final panel of our day, which focuses on the impact of China's energy consumption on its environment.

Dr. Jennifer Turner is the coordinator of the China Environment Forum and a Senior Project Associate at the Woodrow Wilson International Center for Scholars. She coordinates several research exchange activities in China, the United States and Japan on issues of environmental non-governmental organizations, environmental journalism, river basin governance, water conflict resolution and municipal financing of environmental infrastructure. Dr. Turner has published frequently on China's environment and energy issues.

Also joining us today is Dr. Mun S. Ho, who is a Visiting Scholar at Resources for the Future. Dr. Ho's research focuses on economic growth, productivity, taxation and environmental economics.

Dr. Ho also works with the Harvard University Center for the Environment focusing on Chinese energy use and environmental policy. He recently co-edited "Clearing the Air: Assessing the Health and Economic Damages of Air Pollution in China."

Thank you both for coming and testifying before the Commission

today. We look forward to your remarks and we'll begin with Dr. Turner. You'll have seven to ten minutes and then Dr. Ho, and then we'll open it up to some Q&A. So Dr. Turner, go ahead.

**STATEMENT OF JENNIFER L. TURNER  
COORDINATOR, CHINA ENVIRONMENTAL FORUM  
WOODROW WILSON INTERNATIONAL CENTER FOR  
SCHOLARS, WASHINGTON, D.C.**

DR. TURNER: Thank you very much. I'm really honored to come here and talk to all of you. Seeing this as more a conversation in the end, I like the small group. Since 1999, I've been directing the China Environment Forum at the Woodrow Wilson Center, and we put on meetings, bringing together government, NGO, business and researchers in U.S. and Asia, trying to promote dialogue to understand China's energy and environmental problems and looking for opportunities for collaboration.

For a lot of my comments today, I'm drawing from--I jokingly call them my China Environment Mafia. Many of them do energy work, and so I work with a lot of on-the-ground people so I am fairly familiar with a lot of the projects that are done.

Also, over the past eight months, I've also been working with Western Kentucky University on a project that's funded by USAID called the China Environment Health Project, which is why I will also interject some comments on the health linkage with energy.

As I noted in my written testimony, my comments are my personal opinion, not necessarily those of the Woodrow Wilson Center, and in my seven minutes I have four main areas to talk about that I would like to explore further after Dr. Ho talks, and we can have a bigger conversation.

First of all, the issue of transboundary impacts of China's air pollution and energy consumption. They are significant and they are growing both domestically and transboundary.

As I know, I'm sure you've been hearing all day, that China consumes more energy and emits more greenhouse gases than any country than U.S. They will be surpassing us, we believe, within the next year.

But besides CO2 emission, SO2 and mercury emissions, black soot from coal burning are also other major transboundary pollutants from China. Particulates, mercury and dust from China are also worsening air as far away as the U.S. west coast. We hear a lot about China's acid rain in Japan and Korea that is hurting forests and water there, but there is research done on the west coast of the United States

that I'm sure in your bulk of material have seen that there's a good chance that China's particulates are probably nullifying the progress that California and other western states are making in the Clean Air Act.

It's even been stated that possibly one-third of California's fine particulate pollution originates in Asia.

Another area besides the transboundary issue, which again we can talk more about in the Q&A, there's another area where China's energy consumption is having negative environmental impacts internationally, namely, China's going-out strategy for energy, looking for oil and natural resources in African countries, Latin America.

China's Exim Bank, until recently has had a very kind of closed policy on what their environmental and social impacts criteria were, and while we've just started at the China Environment Forum to hold some meetings on this issue, we focused initially on Africa and actually dam building, but I am actually in the process of trying to gather more exports who are looking at the environmental impacts of China's oil and other projects, but there are some positive signs.

China Exim Bank a month ago released their environmental policy. They've also agreed their working with the World Bank on how to improve meeting international standards for environment and social impacts in their investments. So these are good signs and I just mention it kind of flagging it as a possible area of also maybe collaboration.

Second area, air pollution drivers. I think that knowing some of the drivers kind of highlights other areas for collaboration that the U.S. could do with China.

We know that China, they have a large population and rapid economic growth, and it's driving their energy consumption. And they're struggling to keep up the supply. One factoid that I came across today that I think nicely illustrates this, besides just hearing about the brownouts in China, is that this year the increase in new air conditioners in China, will probably exceed the capacity of the massive Three Gorges Dam in producing energy, just to give you a kind of feeling about how big their energy growth is.

But actually it's not just the population and the speed of growth. The biggest kind of culprit, shall I say, in the air pollution coming from the energy sector is actually China's weak environmental governance system.

Now, the Chinese central government really has prioritized environmental protection and energy efficiency, and you've probably talked to some people about that already. But their capacity for actually implementing these laws is to many surprisingly weak. The success of the economic reforms in China came from decentralization

of authority to local governments.

So Beijing really has a lot of difficulty in controlling local governments and enforcing all kinds of regulations related to air pollution control and water pollution. There's a lot of protectionism at the local level that means that Beijing is weak. Also China's State Environmental Protection Administration, until recently, has been pretty weak.

They only have about 300 people. They're poorly funded. That's starting to change. There's one encouraging sign is that U.S. EPA is working with their counterparts in China to set up six regional offices to mirror what we're doing. Notably, this initiative is funded by the Asia Development Bank, and that's something that I'm also seeing that a lot of the U.S. agencies that are working in China on energy environments, this kind of cooperation hasn't sadly been very well sustained over the past 20 some years.

But in the last couple of years, I'm seeing some of the Europeans, the Asia Development Bank actually kind of helping to fund the EPA and our other agencies and doing some work in China, and that's an encouraging sign.

Over the past few years, the Chinese government with international assistance has been initiating many progressive energy policies and pilot projects as well as opening a lot of space for environmental non-governmental NGOs in this area. Notably, a lot of U.S. NGOs are doing work in China on energy issues. It's not generally supported by U.S. government funds. USAID, I mentioned I had a grant, but they're very, very few of those.

A lot of their money actually comes from the Energy Foundation out in California that has been working on promoting efficiency and clean energy development in China for the past eight years. Looking at the kind of work that the Natural Resources Defense Council has done in bringing together, for example, California Energy and Public Utilities to partner with Jiangsu Province on creating a demand side management center can help a local government build their capacity for energy efficiency. I highlight that example because I see that as a really promising direction.

As I noted, one of the main drivers is local government intransigence and on implementing policy. As you explore ways of cooperation, I think looking at local to local or working more with city provincial governments in China is a good avenue because the central government is convinced that the lack of capacity is at the local level.

Now, the economic and health costs of air pollution in China are great. And the health and environmental threats, as you probably know, are coming from coal fired power plants, but also a poorly regulated mining sector. I passed out a little newsletter from the

Wilson Center, mainly because it had a picture of Linfen, which you've probably never heard of before, but the World Bank has declared Linfen the most polluted city in the world, and it's actually because it's surrounded by dozens of coal mines and coal mines in China are extremely poorly regulated.

You've probably heard of the stat that China leads in the world in terms of deaths of coal miners, but also something that's not often brought to the forefront in looking at China's energy pollution trends is that how polluting coal mines are. Not only do they pollute local communities in terms of the dust, but also the tail minings contaminate water. They are a big contributor, particularly in northern China, of water pollution.

I know your focus is energy, but again energy and water issues are linked in China. About half of Chinese rivers are rated as grade four or five, which means you should not use it for industry, agriculture and don't drink it. So the water problems are very great. The linkage with the coal mines is something that could be noted as another area of collaboration.

Another kind of health threat from energy consumption in China is actually indoor air pollution. Indoor air pollution, the World Health Organization estimates that about 400,000 people die annually in China from indoor air pollution. They use a lot of coal briquettes. In Southwest China, the coal has naturally occurring arsenic in it as well.

So when they use the coal in their house, it's not just breathing, but drying their chili peppers and corn over it so that they're poisoning themselves also with their indoor air.

The USGS has done some work in Southwest China on indoor air pollution trying to find a quick method to test. The method was distributing some testing kits to communities so they could test their coal and try to find some that had lower level arsenic to try to, again, lower exposure.

Another really promising angle for collaboration that I don't see enough attention paid to is the energy and health nexus or just the environment and health nexus.

Besides the USGS project, U.S. EPA has been doing some really phenomenal work called the Integrated Environmental Strategies Initiative. I don't know if you heard about it this morning with the testimony there, that--it's a funny title--but the focus is energy options and health benefits.

In the late 1990s, they started a three-year study in Shanghai with local researchers and local governments looking at, well, what type of energy choices does Shanghai make in terms of cars, energy, heating, and how would that affect the public's health? And after the three-year study, they gave a presentation, which led the Shanghai

government to significantly change their 10th Five-Year Plan to put a lot more priority and investment into cleaner energy options for the city.

In my eight years at the Woodrow Wilson Center, this is one of those projects that has an impact. This has made a difference. And I think that also resonates really well with the policymakers. Local government officials are motivated to make profits. Showing the exact costs, disseminate that information more widely in your projects, to the public, the researchers, I think can really help kind of move forward some of the changes that need to happen at the local level.

EPA has continued doing this work focusing on a study in Beijing. They've done a slightly broader national study, more could go on. NIH, Lawrence Berkeley National Lab, and also EPA have also been doing some work on indoor air pollution. And NIH and obviously NSF also have done a lot of work in the health sector.

Another reason I think that the health sector is important to note is that in China in the rural area, in particular, there is ostensibly no health care system. China ranks 187th out of 191 countries in terms of access to health care.

So I have more stats about how awful, awful air quality and water quality are in China, but when you think that the people in China, they're living in a very polluted environment and lacking access to good health care, it's a coming crisis. So that's why again one of my big points is just, you know, again, tossing out there to think about the kind of energy and health nexus.

Last couple comments here. I touched on a few already. China has many challenges and many opportunities for collaboration in kind of helping to clean up China's dependence on coal. They will remain dependent on coal at least as much as they are today, about 70 percent, for the next 20 years, even though they have been, as you probably heard this morning, broadening their energy portfolio.

There's also a lot of opportunities for developing alternate energy resources. I think that the U.S. government has been over the last 20 some years of doing cooperation less involved and less consistent in working with China on energy environment than U.S. NGOs and other international organizations in China. And it just hasn't been a major priority.

But I'm seeing there's still continuing projects, but again they're not as consistent. In this cooperation, they don't need tons of money; it's just sometimes an issue of capacity building. Over my years I hear stories, EPA staffers, they can't even have money to fly over to China. But the Chinese are--also the SEPA, you know, they're picking up a lot of the costs for some of the shared training.

So I think that the Chinese are very, what I've seen over the

years, very interested in working with the U.S. government on energy environmental issues and I'm very excited that all of you are interested in looking at this kind of energy cooperation. And I'm going to stop there.

[The statement follows:]

**Prepared Statement of Dr. Jennifer L. Turner  
Coordinator, China Environmental Forum  
Woodrow Wilson International Center for Scholars  
Washington, D.C.**

*China's Energy Consumption and Opportunities for U.S.-China Cooperation to Address the Effects of China's Energy Use*

Since 1999, I have directed the China Environment Forum at the Woodrow Wilson Center. In the China Environment Forum we convene meetings and create publications that promote dialogue among U.S. and Chinese scholars, policymakers, businesses, and nongovernmental organizations (NGOs) on environmental and energy challenges in China. In the course of my work I have become acquainted with many government, NGO, business, and research representatives from the United States and Asia who are active in projects and policy development to address China's energy challenges. I draw much of my comments today from insights I have learned in working with many of these on-the-ground energy practitioners, as well as from work the China Environment Forum has been doing with Western Kentucky University on the China Environmental Health Project, an initiative supported by the U.S. Agency for International Development. I would like to note that my comments today are my personal opinion and they do not reflect the views of the Woodrow Wilson Center. In my seven minutes I have four points to make about the environmental impacts of China's energy use and I will highlight some opportunities for U.S.-China cooperation. I welcome the discussion with the commission and Dr. Ho after my comments.

- 1) ***Transboundary Impacts of China's Air Pollution and Energy Consumption.*** China already consumes more energy and emits more greenhouse gases than any country except the United States. It is expected to surpass the United States in CO<sub>2</sub> emissions sometime later this year. Carbon dioxide (CO<sub>2</sub>) emissions, sulfur dioxide (SO<sub>2</sub>) and mercury emissions from coal burning are some of the main transboundary pollutants from China. Besides pollution emissions from China, many of the China Exim Bank investments into oil and other resource extraction internationally have degraded the environment overseas, particularly in Africa. However, in recent months China Exim Bank has initiated dialogues with other international financial institutions on improving its transparency and strengthening oversight of the environmental and social impacts of its investments.
- 2) ***Air Pollution Drivers.*** The main drivers of China's air pollution problems are dependence on coal for energy, growing car use and, most crucially, the country's weak environmental governance system. Over the past few years the Chinese government, often with international assistance, has been initiating many progressive energy policies and pilot projects, as well as opening more space for international and domestic environmental nongovernmental organizations (NGOs) to work in this area.
- 3) ***Economic and Health Costs of Air Pollution in China.*** China is the largest producer and consumer of coal in the world. Abundant natural coal reserves have fueled China's booming economic development; however, the increasing domestic health threats from coal-fired power plants, a poorly regulated coal mining sector, and coal briquette use in rural homes pose significant challenges for the Chinese government to address due to local government

protectionism and a weak health care system. The serious environmental and public health problems created by coal use may nullify much of China's GDP growth.

- 4) ***Challenges and Opportunities of China's Continued Coal Dependence and Development of Alternative Energy Sources.*** Over the past few years the Chinese government has diversified its energy portfolio to expand nuclear and renewable energy development, particularly hydropower, which is slated to quadruple by 2020. However, due to exploding energy demand, the dependence on coal will remain around 70% for the next two decades. This continued dependence highlights the need for even more collaboration with China on energy efficiency initiatives, clean coal technologies and policies to help improve the capacity of China's environmental watchdogs to better monitor power plants and enforce emissions control and trading policies. International assistance could also improve the design and planning of renewable energy projects, particularly hydropower, in which the lack of local government accountability often has led to ill-conceived and poorly executed dams that do not take ecological and human livelihood costs into account. The U.S. government has been much less involved and less consistent in working with China on clean energy and energy efficiency than many other bilateral, multilateral, and nongovernmental clean energy initiatives. The fairly significant number of U.S. NGOs and bi/multilateral organizations engaged in improving China's energy development offers the U.S. government many opportunities for forming partnerships in clean energy and energy efficiency work in China.

#### **1) China's Domestic and Transboundary Air Pollution**

China has the dubious distinction of having 16 out of the world's 20 most polluted cities. Beijing's efforts to clean up the city's air before hosting the 2008 summer Olympics have highlighted China's broader challenge in addressing the serious urban air pollution from cars, coal, and dust (from desertification and construction). Rural areas also face serious indoor air pollution challenges from coal burning for household use.

Coal, most of it dirty, fuels 70 percent of China's energy and is the main source of the country's domestic and transboundary air pollution. Notably, in the 1990s as many Chinese cities shifted away from coal to natural gas heating, personal car ownership grew phenomenally (although still quite low when compared to per capita rates in industrialized countries). Today, CO<sub>2</sub> emissions from cars have replaced coal as the major source of air pollution in major Chinese cities. Despite considerable efforts to promote energy efficiency and renewables, China will remain dependent upon coal for the foreseeable future.

The lack of widespread coal washing infrastructure and scrubbers at Chinese industrial facilities and power plants highlight the potential negative domestic and global air impacts of China's plans to build 562 new coal-fired power stations by 2012. China already emits more greenhouse gases (GHG) than any country except the United States, and is expected to surpass the United States in GHG emissions sometime this year (although cumulatively, U.S. CO<sub>2</sub> emissions will be greater since it remains in the atmosphere for nearly 100 years). The expansion of China's power plants alone could nullify the cuts required under the Kyoto Protocol from industrialized countries.

Regionally, sulfur dioxide (SO<sub>2</sub>) and mercury emissions from coal burning are some of the main pollutants spreading from China. Acid rain resulting from coal and fossil fuel combustion has damaged nearly one-third of China's limited cropland and also severely degraded forests and watersheds on the Korean Peninsula and in Japan.

Particulates, mercury, and dust from China are also worsening air quality as far away as the U.S. west coast. While mercury is insoluble as it leaves smokestacks in China, by the time it reaches the U.S. west coast it transforms into a reactive gaseous material that dissolves easily in the wet Pacific Northwest. While it is difficult to track the exact sources of overseas pollutants, some U.S. researchers have estimated that approximately one-third of California's fine particulate pollution originates from Asia. There are concerns in California and other west coast states that these pollutants could potentially nullify their progress in

meeting stricter Clean Air Act requirements. In May 2006, researchers at the University of California-Davis claimed that nearly all the particulate matter over Lake Tahoe originated from China. The researchers of one study featured in *The Oregonian* posited that at least one-fifth of the mercury entering the Willamette River in Oregon comes from abroad, most likely from China. This mercury is even beginning to build up to toxic levels in the local wildlife.

Notably in China, data on carbon dioxide (CO<sub>2</sub>) and mercury emissions from coal burning have not been released since 2001. Unconfirmed data estimate that China releases 400 to 600 tons of mercury each year (U.S. emissions are approximately 48 tons each year). Coal burning in China is possibly emitting up to 25 percent of global mercury. A 2006 the Chinese State Environmental Protection Administration (SEPA) survey found that 41 percent of fish species in water bodies in eastern Jiangsu Province, where there is a high concentration of manufacturers, contained various heavy metals transmitted through polluted air fall-out. The lack of data in China on air emissions complicates efforts at promoting emissions trading and environmental information disclosure programs and highlights an area where more international collaboration could be very useful.

Another often overlooked pollutant creating hazy skies in China and beyond is black carbon (BC) soot. BC—the active ingredient in haze produced by vehicles, burning crop residues, and household stoves—is potentially the second most important global warming gas after CO<sub>2</sub>. China is the largest BC-emitting country in the world (responsible for 17 percent) and small BC particles are causing hundreds of thousands of premature deaths from respiratory illnesses each year in China. In combination with SO<sub>2</sub>, BC particles are blocking sunlight and may be lowering crop yields by 30 percent for grain crops in China. Regionally, BC emissions may be heating the atmosphere and destabilizing weather in China and in the Pacific region.

Another environmental impact linked to China's energy consumption is China's overseas investments into oil and other resource extraction. China's export credit and guarantee agencies—in particular China Exim Bank and Sinosure—have played an important role in fostering the rapid expansion of Chinese trade and overseas investment. In 2005, China Exim Bank approved loans with a volume of \$20 billion. Established only in 1994, the institution has grown to become the world's third largest export credit agency, financing many oil, mining, dam, and other infrastructure projects in the Africa and Latin America. China Exim lending practices tend to follow China's foreign policy, with package deals frequently focusing on projects that provide access to raw materials, and on concessional loans for economically and politically important countries. In Africa, China Exim Bank is investing in many much-needed infrastructure projects, but often without strict social and environmental standards, which potentially undermine efforts to bring about good governance, environmental protection and social justice. Over the past few months there have been signs that China Exim Bank is becoming more receptive to improving its oversight of investments—it recently released its environmental policy documents and has begun discussions with the World Bank on strengthening the environmental and social impacts of its investments. The U.S. government could also become involved in working with China Exim Bank to help bring it up to international standards on environmental protection.

## **2) Main Drivers of Air Pollution Problems**

While China's large population and rapid economic growth are driving its phenomenal energy consumption, it is the country's dependence on coal combined with a weak environmental governance system that explain the considerable air pollution and other ecological damage from the energy sector.

In 1979, Deng Xiaoping granted local governments considerable authority to promote economic growth, which they have, but at a major cost to the environment. Strong local governments routinely ignore the poorly funded and understaffed State Environmental Protection Administration (SEPA) and its local bureaus. As the above section indicated, China's failing environmental governance system not only poses domestic health and ecological threats, but also is creating negative environmental impacts regionally and globally.

To push better energy conservation and pollution control from power plants at the local level, the central government has passed progressive energy laws that create incentives for local officials to develop clean coal and renewable energy sources. There is also a continued, yet still unsuccessful effort to create a green GDP system to judge local officials on their environmental performance. A number of U.S. research institutions and NGOs—many with funding from the Energy Foundation—have been pursuing energy conservation and clean energy programs with both central and local governments over the past decade. Some of the most promising kinds of international projects are those working to build the capacity of local governments in the energy sector. For example, Natural Resources Defense Council and the China-U.S. Energy Efficiency Alliance have brought together the Jiangsu Provincial Economic & Trade Commission, the California Public Utilities Commission, and California Energy Commission to develop end-use energy efficiency incentive (demand-side management) programs in Jiangsu Province. Another vital local capacity building effort that could significantly improve SEPA's ability to monitor and enforce air pollution control laws is the creation of six regional environmental protection offices. The U.S. Environmental Protection Agency is working with their Chinese counterparts on this promising initiative, which is notably funded by the Asian Development Bank.

### **3) Growing Economic and Health Costs from Coal Burning**

In 2006, the Chinese State Environmental Protection Administration estimated that environmental degradation and pollution cost the economy at least 10 percent of its GDP annually. Acid rain alone is causing ecological degradation and human health problems that cost the country \$13 billion annually. Statistics in China are often difficult to find or verify, but overall studies on China's air pollution indicate serious threats to economic growth, the environment, and human health:

- Climate experts within China link greenhouse gas emissions and deforestation to the rising incidences of natural disasters witnessed in the first half of 2006, which forced the evacuation and relocation of 13.2 million people and killed more than 2,300, causing direct economic losses of \$24 billion.
- China's Meteorological Administration has estimated that air pollution is driving some extreme weather events, which hamper China's economic growth by between 3 to 6 percent of GDP, or \$70-130 billion, annually.
- Estimates on respiratory illnesses from China's air pollution leading to early deaths range from 300,000 to 500,000.
- Indoor air pollution—much from burning coal briquettes—contributes significantly to the leading cause of death among children in rural China—pneumonia. With 80 percent of the population using solid fuels (particularly coal briquettes), the World Health Organization estimates that 394,200 people die annually from indoor air pollution in China. Respiratory problems are particularly acute in China's countryside because many rural residents lack any form of health coverage and medical care has become prohibitively expensive as the industry increasingly is privatized. A recent WHO survey has ranked China 187<sup>th</sup> out of 191 countries in terms of equality to medical treatment.
- Air pollution also poses a threat to international investment in China. In February 2007 the China Environment Forum hosted a talk on air pollution and health in southern China in which Christine Loh, founder of the Hong Kong think tank Civic Exchange, suggested that Hong Kong could lose its status as the economic hub of Asia if the city does not clean up its skies. One sign the financial sector may already be fleeing smoggy Hong Kong was a statement from Merrill Lynch recommending that investors switch their real estate investments from Hong Kong to Singapore, a city with significantly cleaner air. In the long run other Chinese cities may experience a similar flight in international investment. Beijing and Shanghai are already considered hardship posts for employees of international companies due to the poor environmental quality.

*Environmental and Health Impacts of Coal Mining Sector*

Linfen—a major coalmining city in Shanxi Province—has been dubbed the most polluted city in the world by the World Bank. The coal industry has greatly boosted the city's economic development; however, it has led to the dramatic deterioration of the environment and a rise in major health problems. Crops are covered in grey dust and considered toxic, and the coal pollution dust is so great cars must use headlights during the day. City residents suffer from respiratory illnesses from the severe pollution generated by dozens of coal mines surrounding the city. Many other cities, particularly in northern China face similar problems from coal mining.

Coal production in China has increased about 66 percent over the past 5 years from 1.38 billion tons in 2001 to 2.3 billion tons in 2006. China's huge coal mining sector is strikingly antiquated and highly polluting when compared to the industry in developed countries.

China has approximately 30,000 coal mines, 80 percent of which are small mines, which are the major source of the environment, safety, and public health problems. Besides air pollution, degradation of water and land are growing environmental problems. Enforcement of laws to limit these problems is weak and mines are thus not pushed to internalize the costs of their production. Some of the key environmental impacts from coal mining include:

- *Methane Emissions.* Globally, coal mines release about 8 percent—nearly half—of all human-induced methane emissions. China is the world's leading emitter of coal mine methane. With a global warming potential 23 times greater than CO<sub>2</sub>, methane is a potent greenhouse gas, which highlights the significant impact a decrease in methane emissions could have on limiting potential global climate change. Methane in mines is also responsible for many explosions, the main cause of miner deaths in China. Besides methane, 731,300 tons of SO<sub>2</sub> and soot are emitted each year from Chinese coal mines. Soot pollution contributes to local and global climate change. In 2004, the U.S. government launched in 2004 the Methane to Markets Partnership, which includes 18 national governments and nearly 200 private sector companies that aim to help overcome the financial, regulatory, and technical barriers to coal mine methane (CMM) recovery projects. Such projects capture methane, improve safety of mines, and provide a clean energy source for communities surrounding mines. There are currently thirty CMM projects in China.

- *Water Quality and Quantity Threats.* A large amount of toxic wastewater from mines is discharged without any treatment in China. The discharged wastewater combined with runoff from mine tailings has greatly polluted surface water and groundwater in mine areas, often contaminating soils and crops. The need for water to wash coal has stressed already water-scarce regions in northern China, particularly Shanxi, one of the major coal producing provinces. In some mining areas, the underground water level has dropped considerably because of coal exploitation.

- *Expanding Waste Land and Desertification.* China has about 13.3 million hectare waste land, and about 46,667 hectares of land is destroyed by coal mining every year, 66.7 percent of which is arable land. Mining is also one of the factors exacerbating desertification in northern China.

- *Land Subsidence and Seawater Intrusion.* In Shanxi, the largest coal producing province in China, about one million people have been affected by land subsidence from mines over the past few years. Seawater intrusion has occurred in some of China's coastal mine areas due to pumping of water from mines, which contaminates freshwater resources (which are quite limited in China) and cropland surrounding the mines.

- *Human Health Risks.* Mine workers face many health risks, such as dust-related lung diseases, hearing loss, neuromuscular disorders, and rheumatism. According to China's Ministry of Health figures, of the approximately one million people in China suffering from pneumoconiosis (black lung disease), 600,000 are miners. The number of miners falling ill from pneumoconiosis increases by approximately 70,000 every year. Every year, nearly 80 percent of the world's total deaths in coal mine accidents occur in China, underscoring the poor state of safety measures and regulation of Chinese mines.

#### **4) Challenges and Opportunities of China's Continued Coal Dependence and Development of Alternative Energy Sources**

While the air quality problems linked to energy production are grim, another major area of environmental challenge linked to energy production is actually the destruction of water resources—some of which stems from coal mining tailings, fall out of air pollutants, and hydropower plant construction. These forms of water resource degradation exacerbate other pollutants in water, which have left half of China's rivers so polluted that their water cannot (or should not) be used by industry, agriculture or drinking. Twenty-five percent of the Chinese population, mainly in rural areas, is drinking unclean water. Anecdotal evidence indicates that cancer, tumor, and miscarriage rates in many of China's heavily polluted river basins are on the rise.

China is facing serious shortages of energy as its rapid economic expansion further strains its limited natural resources. Over the past few years a new round of dam building in southwest China aims to triple China's hydropower capacity by 2020. China, already the biggest hydropower user in the world, is home to 86,000 dams—22,000 of which are large dams, accounting for 45 percent of large dams in the world. Tripling China's hydropower capacity would mean:

- Fragmentation of ecosystems across China and in downstream neighboring states;
- Impoverishment of biodiversity and pristine rivers in China; and,
- Displacement of more than one million people from their ancestral homeland in the deep valleys of China's hilly southwest.

The construction on China's largest dam—the Three Gorges Dam on the Yangtze River had been debated for decades in China before the government approved the plan in 1992. The goals of the dam were to improve flood control and navigation on the river and provide nearly 11 percent of China's energy needs. In order to prevent siltation of the Three Gorges Dam, Chinese planners now aim to build 6 large dams on the trunk of the Yangtze River. In addition to these major dams on the Yangtze, along its tributaries and other rivers in southwest China there are 200+ dams planned. Chinese environmental NGOs and environmentalists worry that the current massive hydropower development will severely overexploit China's rivers and result in serious environmental and social harm.

Most of the local NGOs doing this work on this issue are not ideologically against dams, rather proponents of transparent decision-making—most of the current dams are local government initiatives that fail to carry out environmental impact assessments or involve local communities in the decision-making process.

The Nature Conservancy is one U.S. NGO that is working with the Chinese government to promote more ecological considerations in dam building. In terms of promoting transparency in construction projects like dams and factories in China, the American Bar Association, National Democratic Institute, and EcoLinX Foundation are carrying out training projects focused on strengthening China's environmental impact assessment processes and public participation in environmental decision-making.

##### *Opportunities for Energy Collaboration with China*

China's regional and global pollution is fueled both by weak environmental governance domestically and by the burgeoning demand internationally for cheap Chinese goods. This demand drives China's economic machine and its pollution. For example, there are estimates that 7 percent of China's CO<sub>2</sub> emissions are due to production of U.S. imports.

A growing number of bilateral and multilateral aid agencies and NGOs have established clean coal, energy efficiency, urban transport, and renewable energy projects in China, as well as undertaken environmental governance initiatives that strengthen local regulators and society. Chinese environmental NGOs have begun to take on more sensitive issues such as a national campaign to demand more transparency in dam-building decision-making and assisting pollution victims in class action court cases.

The Chinese central leadership has vowed to significantly reduce air pollution from the energy sector by passing ambitious laws and pronouncements prioritizing renewable energy and energy efficiency, including more fuel-efficient automobiles. China's notoriously weak environmental watchdog agency has been flexing its muscles more over the past two years, pushing for prosecuting firms for toxic chemical spills, cracking down on major polluters or environmentally damaging dam projects by using a newly strengthened environmental impact assessment law, and passing regulations to give the public a greater voice in environmental policymaking.

All of these progressive policy developments and growing international assistance in China's energy sector highlight numerous areas in which the U.S. government could become more involved. Notably, despite the alarming environmental degradation and human health trends linked to China's energy use, energy issues have not occupied a prominent position in U.S.-China relations. To the extent that energy and environmental issues have been considered at all, U.S. policy regarding cooperation with China in these areas has not been sustained or consistent, reflecting tensions in the U.S.-China relationship, disagreements between past administrations and Congress, and the higher priorities given to other issues in the relationship. There are some new opportunities for strengthening Sino-U.S. energy cooperation such as the Sino-U.S. Strategic Economic Dialogue held in December 2006. This meeting catalyzed a Joint Economic Study that is focusing on identifying cost-effective solutions to improve air quality and energy efficiency in both countries, as well as recommend policies, regulations, and institutions for China to meet its energy efficiency and clean energy targets in its Eleventh Five-Year Plan. SED also prompted the renewal of the Sino-U.S. Protocol on Energy Efficiency and Renewable Energy, which the Department of Energy had allowed to expire in February 2005. If the U.S. government prioritizes energy cooperation with China there are not only environmental and human health benefits globally, but such collaboration could play an important role in building up good will and offsetting tensions in other parts of the Sino-U.S. relationship.

#### **Resources**

*Portions of this testimony document were drawn from China Environment Forum publications and online research briefs and meeting summaries. I list some of my project's resources and other publications on China's energy challenges below.*

Bosshard, Peter. (December 2006). "Export Credit Agencies and Environmental Standards: An Invitation to Join the Dialogue." International Rivers Network International Finance Campaign. <http://www.irm.org/programs/finance/index.php?id=061220exim.html>

Buckley, Lila. (December 19, 2006). "Feeling the Warming: Villagers in Southwestern China Grapple with Climate Change." *China Watch/Worldwatch Institute*.

China.org.cn. (November 5, 2004) "Rehabilitating China's Killer Coal Mines." <http://www.china.org.cn/english/2004/Nov/111285.htm>

Casey Delhotal and Barbora Jemelkova. (2006). "Recovery and Use of Methane from Coal Mines in China." *China Environment Series*. Issue 8.

Ellis, Linden. (2007). "China Exim Bank in Africa: Opportunities for Strengthening Environmental Standards for Hydropower in Sudan." China Environment Forum Meeting Summary. [http://www.wilsoncenter.org/index.cfm?topic\\_id=1421&fuseaction=topics.event\\_summary&event\\_id=224956](http://www.wilsoncenter.org/index.cfm?topic_id=1421&fuseaction=topics.event_summary&event_id=224956)

Kim, Juli. (2007). "Transboundary Air Challenges in China." *China Environmental Health Project Research Brief*. [www.wilsoncenter.org/cef](http://www.wilsoncenter.org/cef)

Lü Zhi, Michael Totten, & Philip Chou. (2006). "Spurring Innovations for Clean Energy and Water Protection in China: An Opportunity to Advance Security and Harmonious Development." *China*

Ma Jun. (2005). "Will China's Rivers Survive the Next 20 Years? Record-Breaking Dam Building Boom Could Make Free-Flowing Rivers an Endangered Species in the World's Most Dammed Country." *World Rivers Review*. Volume 20, Number 4. <http://www.irn.org/programs/china/>

Nankivell, Nathan. (January 11, 2006). "China's Pollution and the Threat to Domestic and Regional Stability." *ZNet*.

Ng, Wei-Shiuen & Schipper, Lee. "China's Motorization Trends: Policy Options in a World of Transport Challenges" *Growing in the Greenhouse: Policies and Measures for Sustainable Development while Protecting the Climate*. Eds. Kevin Baumert, et al. <http://climate.wri.org/growingingreenhouse-pub-4087.html>.

Pottinger, M., Stecklow, S., & Fialka, John. (December 20, 2004). "Invisible Export—A Hidden Cost of China's Growth: Mercury Migration." *Wall Street Journal*. <http://www.webcitation.org/5ML0etsAk>.

Read, Richard. (November 24, 2006). "China's Dirty Exports: Mercury and Soot" *The Oregonian*.

Stern, Rachel & Hopkinson, Lisa. (2003). "One Country, Two Systems, One Smog—Cross Boundary Air Pollution Policy Challenges for Hong Kong and Guangdong." *China Environment Series 6*.

*The Edge Daily*. (November 22, 2006) "Merrill Downgrades HK Office Sector, Cites Pollution."

Turner, Jennifer L. & Juli S. Kim. (February 7, 2007). "China's Filthiest Export." *Foreign Policy in Focus*. <http://www.fpiif.org/fpiftxt/3978>

Wan, Ming. (April 1998). "China's Economic Growth and the Environment in the Asia-Pacific Region." *Asian Survey*, Vol. 38, No. 4., pp. 365-378. <http://links.jstor.org/sici?sici=0004-4687%28199804%2938%3A4%3C365%3ACEGATE%3E2.0.CO%3B2-A>

Yang Yang. (2007). "Coal Mining and Environmental Health in China." *A China Environmental Health Project Research Brief*. [http://www.wilsoncenter.org/index.cfm?topic\\_id=1421&fuseaction=topics.item&news\\_id=231749](http://www.wilsoncenter.org/index.cfm?topic_id=1421&fuseaction=topics.item&news_id=231749)

Yeh, Andrew. (April 11, 2006). "Toxic Chinese Mercury Pollution Travelling to U.S." *Financial Times*.

Zhao Xiaohui & Jiang Xueli. (November 13, 2004). "Coal mining: most deadly job in China" [http://www.chinadaily.com.cn/english/doc/2004-11/13/content\\_391242.htm](http://www.chinadaily.com.cn/english/doc/2004-11/13/content_391242.htm)

HEARING COCHAIR D'AMATO: Thank you very much. Dr. Ho.

**STATEMENT OF DR. MUN S. HO, INSTITUTE OF  
QUANTITATIVE SOCIAL SCIENCE, HARVARD UNIVERSITY,  
VISITING SCHOLAR, RESOURCES FOR THE FUTURE,  
WASHINGTON, D.C.**

DR. HO: First, I'd like to thank the Commission for inviting me to talk about the effects of China's energy use on the environment and talk about how the U.S. might help implement policies to reduce this

environmental damage.

I should point out I'm an economist and I draw on the knowledge of my colleagues in the Engineering and School of Public Health in my comments.

Let me highlight the main points of my written comments. I know it's been a long day. Many of these facts are well known but let me put them in context. One, China is still a very poor country despite many years of rapid economic growth. Its per capita income is about \$7,000 compared to, say, 11,000 for Mexico and 22,000 for Korea.

Poor people use less energy. Chinese energy consumption is only about a fifth of the Japanese level, which is already very frugal in comparison to the U.S., and in particular poor societies use a lot more coal compared to oil. Coal is 70 percent of energy use in China compared to 23 percent in the U.S., i.e., a very dirty fuel.

Poor societies also do not control the emissions of pollutants very well. So even though less fossil fuel is used per person, the emissions per person is higher--emissions of sulfur dioxide, particulate matter and other toxins. So these higher emissions combined with the high population densities mean that a big fraction of this 1.3 billion people are exposed to very high concentrations of particulate matter, sulfur dioxide and ozone. These have been found to cause respiratory problems. The sulfur dioxide turning to sulfates that go deep into the lungs and cause various problems.

So our own conservative estimate is that the number of premature deaths due to outdoor air pollution is 100,000 per year and more than a million cases of chronic bronchitis. This is the low end compared to the figure that Jennifer just mentioned of 400,000 due to indoor air pollution.

Various surveys of people's willingness to pay to reduce pollution damage have now been conducted in China similar to methodologies used by the U.S. EPA to evaluate the benefits of air pollution regulation. These surveys have found high valuations, i.e., a high willingness to pay, to forego other material goods, in order to have a more healthful environment.

This valuation, in comparison to their incomes is comparable to those found in the rich countries. And when we apply these valuations to our estimates, we would put the dollar value of this outdoor air pollution at two percent of GDP, i.e., before including the indoor air and water pollution damage. So this is a very high number.

Over the years, China has succeeded in reducing particulate matter emissions, but sulfur dioxide removal requires expensive desulfurization equipment that is now just beginning to be put in place, and emissions of SO<sub>2</sub> has actually been rising since 2000.

The worst trend is in nitrogen oxides from motor vehicles,

nitrogen oxides which cause ozone, and this is rising rapidly despite tightening regulations on vehicles.

These high and rising damages have put pollution reduction high on the government's agenda. Energy efficiency and SO<sub>2</sub> reductions are one of the few explicit targets mentioned in the 11th Five-Year Plan, the plan covering '06 to 2010.

The other target is the GDP per capita target. So this high concern combined with the international community's interest in reducing transboundary pollution makes this an important time to refine U.S. policies to sustain these energy efficiency and pollution control efforts.

These efforts also have a direct impact on greenhouse gas emissions, an issue that the current Congress is concerned with. This also fits in with the strategic economic dialogue initiated by Treasury Secretary Henry Paulson.

Given these concerns we have analyzed various policies. Historically, in the rich countries, pollution control has been in the form of emission standards and other end-of-pipe regulations. More recently, the U.S. has a market-based mechanism for SO<sub>2</sub>, this cap and trade program, which has shown quite good results.

So, in that spirit, we have examined the effects of using market-based instruments in China and we find that such a green tax policy is a very cost effective way to reduce pollution damage. At the same time, these market-based policies contribute to lower energy use and carbon dioxide emissions.

Whatever policies that are chosen, they need a strong regulatory institution that Jennifer Turner has pointed out. The incentive to cheat is very high. Running the desulfurization equipment, for example, takes two percent more electricity. Imagine how much this compares to the profit margin. So this is an enormous incentive to turn off the equipment.

How can the U.S. contribute to the development and implementation of effective policies and strong institutions? I would second what Jennifer just said. At the simplest level, analytical capacity building, i.e., promoting good cost benefit analysis. Some of this is already done by EPA and other institutions, but could be expanded. Another cheap way to do things is to share knowledge from the U.S. energy efficiency programs like energy ratings for appliances.

The next level is to address investment in control and monitoring equipment. This issue is complicated by two points. One is the high cost and the other is the intellectual property rights of countries wishing to export such equipment to China. Addressing these issues should be a part of Secretary Paulson's Strategic Economic Dialogue.

If we are willing to think on an even bigger scale, the key to

environmental improvement is investment in infrastructure, public transportation, high efficiency electricity grids, and high efficiency boilers. These are very expensive, but they last for decades, and they are currently being decided. It is important to get these big decisions correct. These issues are well discussed in a World Bank report just published titled "Sustainable Energy: A Closing Window of Opportunity."

So there is a small window of opportunity now as these big decisions are being made for the U.S. and the world to implement decisions that would mean better energy use and lower pollution in the decades to come.

Let me finally note an important link between investment and the trade surplus issue that is a source of such U.S.-China tension. Higher domestic investment in the form of control equipment or efficient power plants or huge infrastructure projects means higher absorption and higher imports and the more normal flow of international savings and investment.

That is a move towards correcting their current abnormal situation where the rich U.S. is borrowing from the poor countries. The Chinese would probably view such suggestions from U.S. with suspicion, but this is in the world's interest and the U.S. may find other interlocutors to help promote this argument.

Thank you.

[The statement follows:]<sup>8</sup>

#### **PANEL V: Discussion, Questions and Answers**

HEARING COCHAIR D'AMATO: Thank you very much, Dr. Ho. Let me start off the questioning. Dr. Turner, there are a number of places in your testimony that indicate to me that we have some pretty important data challenges in this relationship. For example, you mentioned in your prepared testimony that data on carbon dioxide emissions and mercury emissions from coal burning have not been released since 2001; is that still the case?

DR. TURNER: That's right. We can check with Dr. Ho, if he knows anything better than I do. The last time I've heard from people that there hasn't been any kind of national announcement on CO2 and mercury emissions. Have you heard of anything?

DR. HO: I'm not familiar with the mercury data, but the coal use data has recently been massively revised and so there are new estimates.

DR. TURNER: Okay.

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<sup>8</sup> [Click here to read the prepared statement of Dr. Mun S. Ho](#)

HEARING COCHAIR D'AMATO: Is what?

DR. HO: Has been massively revised from the earlier figures that had been met with much skepticism. So the new figures are more trustworthy, and so there is built into that--

HEARING COCHAIR D'AMATO: There are new more authoritative figures?

DR. HO: Yes.

HEARING COCHAIR D'AMATO: So the Chinese are working on that?

DR. HO: That's right.

HEARING COCHAIR D'AMATO: There's another area of data that I think is important. Dr. Turner, you mentioned water pollution and I'm wondering whether or not you're aware of the information about the changes that we can expect in the flow of water in the big river systems coming out of Tibetan mountains from glaciers that may be receding?

Do we have any good information about the long-term impacts of reduced water flow into China and what the impacts would be? Are the Chinese aware and paying attention to that? Or is there any kind of analysis going on in China about how that will, will transpire and will affect tens of millions of people in terms of their daily lives?

DR. TURNER: I think actually in the papers in China, when you hear reporting on climate change, there are reports within the news media in China about the glacier issue, and I know that there are studies that are starting. Actually Greenpeace China is actually involved in some of this kind of encouraging scientists to look at this issue.

I think that you're right. That's one piece of a larger kind of water crisis in China besides the pollution. China is actually a very water short country. Per capita China has a quarter of the world's resources per capita freshwater. It's one-tenth in northern China. Desertification is another air pollution issue. The sand storms that blow through come because there was overextraction for centuries of water in northern China exacerbated under development under Mao and not always enough efforts on water conservation.

You may have also heard about the South Water North Ridge Project.

HEARING COCHAIR D'AMATO: Yes.

DR. TURNER: Big canals moving water from the Yangzi up north. They're doing it. It's a desperate situation in the north. More could be done--similar to the energy issue, as well, pushing conservation. Makes me think of another issue. I had some Beijing government folks here last year with DOE and I brought some U.S. NGOs and EPA into talk to them about their energy efficiency. They

wanted to retrofit their buildings, and I suggested to them to also look into there are some programs in the U.S. like Alliance to Save Energy has this Water G Program, how conserving water saves you energy.

It's a big initiative. California has been doing a lot on this, and it was the one time in the meeting that they were jumping out of their seats with excitement. That's another area to note. Water conservation promotes energy conservation, a concept that is not well known in China. So just note that.

HEARING COCHAIR D'AMATO: Yes. Well, one of the things that we're going to try to do is advise the Congress on recommendations as to how Congress might be able to provide useful recommendations to the executive branch and in legislation to fill some of these data gaps and what agencies might be helpful in doing that.

In addition, one of the major questions that arises from all of this discussion of the weak environmental governance system, as you point out, is the lack of attention and interest and dedication and commitment at the provincial levels.

You mentioned a couple of things that may be helping to correct that such as EPA's possible six regional offices in the decentralized Chinese structure. And also the possibility of additional U.S. NGOs' work. Can you comment a little bit more? What are the kinds of things that we could recommend that would be helpful to get the provincial levels more committed as they have not been committed over not just this particular regime's life but over the history of China actually, in my opinion, from what I understand?

It's very weak commitment to the environment in provincial China. What kinds of things can we recommend? Is it strengthening the NGO operations? Is it more funding for EPA regional offices or what kinds of things could we suggest that would help that problem?

DR. TURNER: I think both. I'm not an EPA official so I can tell you, I think EPA needs a little more funding. They don't have any real dedicated resources from their congressional budgets for their China work.

They've been very innovative, it seems to me, trying to find resources. The Italians are actually going to be helping them with some work that they're doing on energy issues. So I think it's important to find partnerships. You look at like another energy area, and I'll get back to your data question, like the Methane to Markets program? Did they talk to you about that this morning? I think that's a really exciting example of addressing the issue of methane emissions from coal mines working with businesses and other international organizations.

That's exceptional, but it's also something that probably has some potential for the CDM and the carbon banking and whatnot. I

think that that's a good model to follow, but I think it will be useful if EPA could just have some more consistent resources. Over the years at the Wilson Center, my project inventories what U.S. government and U.S. and Chinese NGOs do on environment, and I have a lot of U.S. government projects, but sometimes they take a long time.

DOE, they let their energy efficiency and renewable energy protocol expire for two years. The SED helped. It got renewed and I think that's really encouraging, but in my mind we lost two years of energy efficiency and renewable energy projects, and that's unfortunate because the Chinese do want to work with us.

In terms of types of cooperation with local governments, I mentioned the example of NRDC and their partner, the China-U.S. Energy Efficiency Alliance. That's a model that should be encouraged. There are some progressive provinces in China. Jiangsu being one of them where they're working now. Liaoning. Shanghai is very progressive. Using these as models to expand, not always focusing on Beijing, is my personal opinion, in terms of capacity building.

HEARING COCHAIR D'AMATO: All right. Well, as you think of these kinds of recommendations, we'd like to know about them so that we could add them to our possible recommendations.

DR. TURNER: Yes. It helps me, when we're talking, to understand. I can come up with a stronger list to submit to you later if you'd like.

HEARING COCHAIR D'AMATO: Thank you. Dr. Ho, did you have something?

DR. HO: Yes, I would like to second that my own research has been funded by the Energy Foundation and other private foundations, and also by the U.S. EPA. There is a lot of knowledge that is inside the EPA that only government funding can provide. So the EPA has a couple of people going to China regularly and that cannot really do a lot in a decentralized system.

As the Shanghai example showed, a small amount of hundreds of thousands generates a study that changed the Shanghai Five Year Plan in the Shanghai economy that is many billions of dollars. So we are talking about low-cost analytical capacity building but spread throughout the provinces.

HEARING COCHAIR D'AMATO: Thank you. Chairman Bartholomew.

CHAIRMAN BARTHOLOMEW: Thank you very much and thank you to both of our witnesses. Dr. Turner, as you come up with some suggestions, if you could come up with some suggestions on environmental-health cooperation, that would--the nexus between the environment and health--that would be terrific.

But now I think I want to play the skeptic. As we talk about

U.S. assistance for these kinds of programs, we have an American public that is facing the reality of a trade deficit with China or \$230 billion and the Chinese government that has \$1.2 trillion in foreign currency reserves.

If these issues are important to China, shouldn't the Chinese government be picking up the cost for a lot of this?

DR. TURNER: What you just said is actually what the Japanese public said. 2008, Japan stops their yen loans to China for precisely that reason.

CHAIRMAN BARTHOLOMEW: Yes.

DR. TURNER: The assistance that I think could be useful is not putting lots of money--not giving a lot of money to China, but just as Dr. Ho mentioned, just sometimes the ability to get some of our experts to China to hold meetings, to do studies. So it's not a significant investment.

But I should note that when you compare, over the last 15, 20 years, the Japanese and the Europeans and their environmental assistance programs in China have been significant. If you look at how much energy efficiency and clean just environmental technologies that they're exporting to China, they've got the market. We're somewhere like 11 percent and they've got the rest in terms of the exports to China for these kind of technologies.

The Chinese would like to buy our technologies, but they sometimes find that because we don't tend to have that kind of steady kind of cooperation that could promote that, and I know we don't have tied--we don't generally do tied aid, but it's been helpful. The U.S. Trade, USTA, their work has helped. They focus on energy and transportation in China, and --people have told me this also helps generate business.

One argument to be made that there could be business opportunities. Clean coal, mining issues, we have technologies that they would probably buy, and again you mentioned they have the money.

CHAIRMAN BARTHOLOMEW: Dr. Ho, any comment?

DR. HO: Yes, I'd like to emphasize this. This is not an issue of U.S. spending money. This is an issue of making them see the arguments for a higher rate of investment for spending money to buy pollution control equipment, and to invest in the SEPA's provincial monitoring abilities to make sure that there is no cheating. So this is not so much a case of spending money as providing institutional support.

CHAIRMAN BARTHOLOMEW: I'll continue along that line. Are there incentives in China for local and regional governments to be honest in the data reporting about air and water quality, and if not,

how do we factor that in? How do we make sure that the data that's being collected and the data that is being reported is an accurate measure of what's going on?

DR. TURNER: Just actually two weeks ago, SEPA just passed a new regulation or a decree working towards a law on environmental information disclosure. They now last year passed regulations on public participation and environmental impact assessments.

There's a move, and these are areas, and one of the reasons how these have been pushed forward is through international assistance. The World Bank was really behind this information disclosure regulation. The American Bar Association, which did receive money from State Department to do their environmental governance work, another example, big impact in China. Small office, big impact.

They've been doing trainings of SEPA and Environmental Protection Bureau officials now about what is a public hearing? How does this work? And there are NGOs, NDI--my brain is forgetting the others--EcoLinks is another one. That's another piece in terms of some of the incentives that are also building the capacity and awareness of the NGO community and even the local officials themselves.

The Environmental Protection Bureau officials, they want to do their job a lot of times, and so sometimes helping to build their capacity and information is key, and this is a new area of movement. Some cities have passed over the last five years or so kind of freedom of information acts, and this is, again, that gets a little bit to your data issue, access to information for the public to know what's being polluted.

The World Bank's Green Watch Program in Jiangsu Province has also been instrumental in raising awareness.

CHAIRMAN BARTHOLOMEW: I smile every time you mention the World Bank because 20 years ago, we passed into law something called the Pelosi Amendment which forced the World Bank to start doing environmental impact statements and making them publicly available. So it's very interesting for me 20 years later to hear that the World Bank is the standard, the World Bank is the pusher of the standard when I know how we had to fight to get the World Bank to pay attention to these things in the first place.

One more question and then I'll end, and that's getting to the nature of the NGOs. You've mentioned NGOs a number of times, and there's a lot of skepticism or question about the nature of whether there are any independent NGOs in China or whether they're all the GONGOs, the government organized NGOs which of course is just an oxymoron right there.

But can you talk to me a little bit about the kinds of NGOs that you work with? Are they indeed independent of the government and do

they have the freedom to operate?

DR. TURNER: Yes, full disclosure, I hang out a lot with the Chinese environmental NGOs. I've had them over giving talks. I've done exchanges, bringing over Chinese NGOs to work on some of the water projects. I put on a workshop in Hong Kong in 2001 bringing Taiwanese, Hong Kong, and PRC green activists and green journalists together to talk.

So that was kind of my entree back then getting to know this community. Yes, there are independent groups. Registration is challenging. There is somewhere near 3,000 that have official registration as civil society groups, shehui tuanti, and probably as many if not more that are registered as businesses and then thousands that are just not registered, sometimes also kind of nestled under universities.

A lot of the groups that are officially registered, either as civil society groups or businesses, they do tend to depend on a lot of their funding from international organizations, not just foundations, but U.S. NGOs and also international businesses have also been giving grants to Chinese NGOs.

I've written about this in a lot of my stuff, that they are really the vanguard of civil society development. I know that you've probably heard this before, but it's actually one of the bright lights, and that's probably why, contrary to the evidence you probably hear about how bad China's environment is, that I remain an optimist because I see these eco-entrepreneurs in the NGO sector, but I also know some entrepreneurs in the government and business sectors in China that cause me, make me encouraged.

The Chinese NGOs have played it safe a lot of times, but there was a big campaign a year and a half ago against dams in southwest China. It was actually a pro-transparency push advocating for stronger environmental impact assessments. And they won a national campaign to stop for now the planning of dams on one of China's last wild rivers, and no one got arrested.

CHAIRMAN BARTHOLOMEW: That's amazing.

DR. TURNER: Sadly, in the last year and a half, there have been two arrests of Chinese environmental activists. This is, for the first time in 12 years, which when you compare it to other sectors, labor and HIV/AIDS, is pretty low. But notably these two people, trying to do watchdog work on industry polluting, and it's the local officials that arrested them.

I think I've had the SEPA, the former SEPA Minister Xie--he's talked at my center a couple of times--and he said in his first talk, when someone asked him the same question, what do you think, are there Chinese NGOs, do you like them? He said make noise; you give

me power. So SEPA has been encouraging of the NGO sector.

CHAIRMAN BARTHOLOMEW: Great. Thank you.

HEARING COCHAIR D'AMATO: Thank you. Commissioner Brookes.

COMMISSIONER BROOKES: Thank you both for being here today. Do we have a number on how much China spends on preventing environmental degradation? Do we have any sort of dollar figure?

DR. TURNER: You're my economist.

DR. HO: No, I don't have, I've never seen such a number before. The government is very decentralized. The SEPA budget itself is small, but the total estimates of sort of how much desulfurization equipment they have built, there's no such figure.

DR. TURNER: I have heard though that it's been somewhere like 1.7 percent of the GDP. That's around there, but a lot of experts say they need to do about four percent of GDP.

CHAIRMAN BARTHOLOMEW: Is that prevention or mitigation?

DR. TURNER: I have a friend in the audience from SEPA who I want to look at and say--I think that's the number that's been used for--I think they kind of lump it together. Stats are hard. If you want, we'll try to scurry around try to find it, but statistics, numbers in China is difficult, but the general consensus, though, is when you look at the five-year plans, the amount of investment by the central government, and I think that's the number that's generally tracked as this 1.7 percent, is looking at the five-year plans.

COMMISSIONER BROOKES: And where has that been? How has that progressed? What's the trend on that? Because we occasionally hear out of China around the National People's Congress certain increases like this year was 18 percent for increase in military spending. What about on environmental issues? Are there any sort of numbers in terms of--

DR. TURNER: The percentage is what I've tended to hear. Again, 1.7, two percent.

COMMISSIONER BROOKES: Has that increased, the 1.7 percent, has that increased or--

DR. TURNER: It's increased. It was like, when I started eight years ago, it was below one percent. And you have to think the GDP is growing every year. So it is getting bigger. I can dig around and try to find out, see if I can find someone that has a number.

DR. HO: My sense is that they have increased. As I said, the particulate matter, emissions have actually fallen, even in the face of this rapid economic growth. So this has to come out from spending on the equipment.

COMMISSIONER BROOKES: Are you saying that the pollution

levels are decreasing?

DR. HO: The emissions of particulate matter have decreased. The emissions of sulfur dioxide have fallen and risen. So this falling trend has also come out from increased spending.

COMMISSIONER BROOKES: Okay. I was wondering, we've had a number of different testimonies, there's a number of numbers floating around out there. How would you describe the extent to which Chinese pollution is affecting the western United States? Or even beyond that if you think it actually travels beyond that?

DR. TURNER: I think, as I noted in my testimony that, again, stats are tough, and this is actually something that, you know, the NOAA folks when I've chatted with them, they say it's actually really hard to measure, but the general consensus is that it is possibly nullifying the progress that California and Washington and Oregon are making on the Clean Air Act, which frustrates them because they don't want to lose their highway funding; right.

Mercury in Oregon, again, some studies done thinking tracing it to probably, they say Asian emissions. Chinese coal has a lot of naturally occurring mercury. So, yes, the statistics are hard, but I think the trends are that there is more. There's also the dust, and with the dust, the particulates of the dust also carries over pollutants.

COMMISSIONER BROOKES: Thank you. Commissioner Houston.

COMMISSIONER HOUSTON: Thank you. Chairman Bartholomew, you kind of stole my question proving that great minds think alike, but my question is really about the NGOs and sort of the communication wheel. You had mentioned a little while ago to some passing public hearings, and I thought to myself, if they could have nonconfrontational public hearings like this, you get the intellectual and the idea transfer in a cheerful environment, how helpful that would be if that could occur over there. So that's something we'll certainly pray for in the future.

But we had testimony last year about the environmental NGOs over there, and that they were quite passionate about what they do, and that they do work with some of the U.S. NGOs, environmental NGOs, but they don't talk to each other. They don't have a structure where the North talks to the South talks to the East talks to the West, and I'm not sure whether that is because they don't have the capacity, they don't have the technology to talk to each other, or they are disallowed by the government or prevented to talk to each other.

I wonder if you could address that a little bit, how much they are able to work together in different areas of China and what the prospects for that is continuing, and also what the barriers for those folks might be?

DR. TURNER: I think a lot of Chinese environmental NGOs are quite small. So some are very focused on very local issues. Something I've noticed in the last, particularly the last two years, is that the use of the internet has really kind of increased their communication, looking at the Nujiang Dam campaign. It was a national campaign. Chinese NGOs encouraging Chinese journalists to go down, investigate. There was the Internet. The chat rooms were live with it, and I haven't really seen anyone clamping down or closing environmental NGOs Web sites.

I think that they are coming together. There are more conferences, workshops coming together, a lot of international partners sometimes help bring them together, but again many of them are focused--think of our grass root groups. You know community groups focus on community issues. So I think it's a positive trend.

COMMISSIONER HOUSTON: But they're not fearful of it? They're not fearful of the communication?

DR. TURNER: No, not that I've seen. Again, a lot of the NGOs--most of them are doing work that the government supports which, again, a comment about mentioning whether or not they're puppets of the government, I don't see that always as the case. It's not a bad thing because the Chinese government, a lot of the environmental policies are good policies, and helping to build the capacity of communities to help enforce them is something that the central government needs and some people in the central government think they need to build the capacity.

COMMISSIONER HOUSTON: Thank you. That's cheerful.

HEARING COCHAIR D'AMATO: Commissioner Fiedler.

COMMISSIONER FIEDLER: I lived in Turkey in the 1970s during perhaps the worst of the sulfuric acid rains where along the Black Sea in copper smelter areas, there were entire villages and towns whose populations were suffering from renal disease, where in the winter, in the northern climates, in the colder climates, away from the Mediterranean, the stillbirth and the miscarriage rates went up dramatically in the wintertime.

What is going on in terms of the impact of acid rain similarly in China? I saw a little bit in Liz Economy's testimony about crops being covered with gray dust and considered toxic. What about renal disease? What about miscarriages? What about stillbirths in some of the northern colder provinces, Heilongjiang, Liaoning, and the like?

DR. HO: I'm afraid I have not heard my school of public health colleagues talk about such issues. By and large, we think that the health damage far dominates the agriculture damage, but the agriculture damage is substantial. Agriculture damage from the acid rain and from ozone, but the predominant effect is human health, the

respiratory problem, so I've not heard about the stillbirth effects, but there will be another--

COMMISSIONER FIEDLER: Acid rain causes more than respiratory problems is my point actually, and I was wondering where there were any statistics on it?

Getting away from Beijing, our witnesses this morning from the Department of Energy and EPA were knowledgeable about policy, but were less knowledgeable about what was going on in the provinces. So I didn't get an answer to my question of--outside of cities--what province is making the most progress in restoring its environmental condition? And is a meaningful difference among the provinces in their progress?

DR. TURNER: You go first.

DR. HO: Well, I don't know.

DR. TURNER: Okay. Shanghai is often cited as being--they have been very progressive in a lot of areas and sometimes there haven't been as many Chinese NGOs developing in Shanghai, and some people said because they don't need it because the government seems to be a little bit, very proactive on the environmental issue.

Some provinces like Jiangsu is another one that I believe is very progressive. Again, a lot of work with the international community. They've been, they were lead on the information disclosure. Again, they are working with NRDC. Demand side management, they want to be a lead.

Liaoning Province was the first province that really tried to experiment with--I love the term--circular economy. Have you heard that term? It's talking about trying to promote recycling, resource conservation issues more broadly. The former mayor of Dalian, he really pushed Dalian to become a very green city, wanted to be clean. It's green as well, lot of green space.

COMMISSIONER FIEDLER: We were just there.

COMMISSIONER HOUSTON: It was wonderful.

DR. TURNER: But the mayor of that city became the head of the province.

COMMISSIONER FIEDLER: Right.

DR. TURNER: So you heard these stories. So it is kind of true that Liaoning is very progressive. They do a lot with the European Union on river basin management issues. They strike me as, again, as a very holistic, they're taking a very holistic approach.

And Jiangsu being one really doing a lot of experimentation with new policies. Shanghai as well experimentation on new policies.

COMMISSIONER FIEDLER: Thank you.

HEARING COCHAIR D'AMATO: Commissioner Videnieks.

HEARING COCHAIR VIDENIEKS: Dr. Ho, did I hear you

correctly say per capita income in PRC is \$7,000?

DR. HO: That is what the World Bank--

HEARING COCHAIR VIDENIEKS: Yuan. Oh, yuan.

DR. HO: No, this is what the World Bank accountants call purchasing power parity adjusted dollars. So on the common scale, adjusting for prices, the U.S. would be--

HEARING COCHAIR VIDENIEKS: Oh, purchasing power parity maybe.

DR. HO: Yes.

HEARING COCHAIR VIDENIEKS: Okay. Fine. That was basically a question because I thought it was very high, ten times higher. It would be.

The other question I have is SEPA a central organization that has departments going down to the local level? That's an organizational question. How is that government organized over there, the Chinese Environmental Protection Agency?

DR. HO: The Chinese have a system where the provincial and local levels replicate all the agencies at the national level. So each province has its own environmental protection bureau which do not report to the SEPA.

HEARING COCHAIR VIDENIEKS: Okay.

DR. HO: So they do not have good control. That's the problem.

HEARING COCHAIR VIDENIEKS: There was something in the press, maybe two or three days ago, that some of these Chinese coal, power plants utilizing coal have scrubbers installed, but the managers choose not to use them in order to be more productive. So talk about incentives--do the production incentives so much outweigh the pollution control incentives that they may be meaningless? That's kind of a conclusory question, I guess.

DR. TURNER: I think that in terms of, to answer that also looking at the SEPA environmental protection bureau structure, local environmental protection bureaus are paid by the local governments, and there is sometimes a cat and mouse game in terms of monitoring. But sometimes, though, when SEPA will fine an industry for polluting and the local government will then pay them back. So that's where the lack of incentive comes in.

HEARING COCHAIR VIDENIEKS: But that I guess would be a root problem.

DR. TURNER: A root problem, but the issue, the regional office program that EPA is helping them with could have an extremely big impact in increasing monitoring at the local level and enforcement issues. I see that as a good hope for building the capacity of the EPBs at the local level.

HEARING COCHAIR VIDENIEKS: The other question I had, I

think you said that the pollution fighting budget is like 1.7 percent of GDP at the central level, I guess, or nationwide.

DR. TURNER: Again, the statistics, I have to wrestle with. I'm pretty sure that that percentage is focused on the central government allotment and--

HEARING COCHAIR VIDENIEKS: Right.

DR. TURNER: --I'm not quite sure. Again, it's going to vary considerably at the local level.

HEARING COCHAIR VIDENIEKS: Because it's then quite high because the military budget is like three percent, that 45 billion that we see kicked around, their official estimate. So we would, of course, kick it higher. But that would be like half the military budget. And then also today we heard numbers that pollution costs PRC eight to 13 percent of GDP, which other people said was high, but my question is, is this a--you mention the word "crisis."

Is this a time bomb that's waiting to happen? When in both of your estimation would it happen if it happens?

DR. TURNER: A lot of the costs, too, in some of those numbers--I don't really know--and I'll let him answer too--the economist here--but the health costs, those are often hard to calculate, and there is also the cost of instability. You've probably heard the stat about 85,000 protests of a hundred and more in 2005. Many of those were environmental protests in rural areas, water pollution, air pollution, that the local government wasn't responsive.

And that also has an impact. Instability costs, but how do you calculate it?

HEARING COCHAIR VIDENIEKS: Right, right.

DR. HO: I'm not familiar with this 1.7 figure, GDP figure, but the budgets of the agencies are small so we would, what we would like to count is the cost of this control equipment and this is what drives it to this close to a percent of GDP. It's not the salaries for the SEPA.

COMMISSIONER FIEDLER: It's the industrial costs.

DR. TURNER: If I could also interject, there is also the cost of loss of foreign investments, and we're seeing that. Hong Kong is a part of China. You might have heard Merrill Lynch recommended in late 2006 that investors switch their real estate investments to Singapore which is much cleaner, and they're starting to see some investors considering, well, maybe, some Chinese cities are considered hardship posts because of the poor air quality.

Since that announcement, Hong Kong has really pushed their air quality standard setting. They're going to work with Guangdong on SO2 emissions trading. We've really seen it as a catalyst in Hong Kong and maybe even with Guangdong because of the fear of losing investment. So another cost that's hard to calculate.

HEARING COCHAIR VIDENIEKS: Thank you.

HEARING COCHAIR D'AMATO: Thank you. Commissioner Houston.

COMMISSIONER HOUSTON: I just had another quick question that came on the last discussion, one of the questions Commissioner Videnieks asked. Here if a manager turned off a scrubber, he would go to jail, which is fairly significant disincentive to turning the scrubber off.

So it made me wonder if there is any action within China's judicial system vis-à-vis environmental issues? Is there any movement to punish? Are there any penalties imposed? Are they paying attention to it all? Do they have impact at all at what's happening at the environmental level either in Beijing or more importantly, probably out in the provinces?

DR. HO: I don't know if the judicial system can enter. The finding of violation has to come from the environmental bureau, and if the environmental bureau is corrupt or influenced by other economic decisions, then this wouldn't even rise to the level of a judicial action.

COMMISSIONER HOUSTON: All right.

DR. TURNER: But if I could add, two years ago, there was the big spill on the Songhua River, the benzene spill, which actually has been a really important increase in China's EPA's power. Right after that, they were able to pass regulations that criminalized if you don't report your spill. So the idea that pollution accidents now, there's a higher bar now.

But also there are cases, and I actually helped with an NGO, to give you another good example, the Center for Legal Assistance for Pollution Victims is an NGO based at a university in Beijing. They have a network of lawyers that give pro bono support to class action cases, pollution victims, and they're starting to win.

I mean out of a hundred some cases, they win over half. In terms of, they take cases away from the local courts to move it to a regional court. American Bar Association and other U.S. NGOs have been doing trainings of judges and lawyers on environmental law so that this has been, again, a very, very encouraging trend.

Some environmental protection bureaus have been, there have been attempts to sue them. They don't often succeed. There's a woman out in California did her dissertation on this, and I really want to see it because I don't--she looked way out in the provinces about this trend, again, putting pressures on EPBs.

So I'll get back to you on that one once I can read this woman's dissertation.

COMMISSIONER HOUSTON: Thank you.

HEARING COCHAIR D'AMATO: Thank you. Any further

questions on the part of commissioners? If not, this concludes today's hearing. Thank the panel very much for your attention and interest and for follow-up. And we will resume the second day of this hearing tomorrow morning in this room at 8:30 promptly. We have two governors so I ask commissioners to be prompt. That will conclude today's hearing.

DR. TURNER: Thank you.

[Whereupon, at 4:35 p.m., the hearing recessed, to reconvene at 8:35 a.m., Friday, June 15, 2007.]

**CHINA'S ENERGY CONSUMPTION AND  
OPPORTUNITIES FOR U.S.-CHINA COOPERATION  
TO ADDRESS THE EFFECTS OF CHINA'S ENERGY USE**

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**Friday, June 15, 2007**

U.S.-CHINA ECONOMIC AND SECURITY REVIEW COMMISSION  
*Washington, D.C.*

The Commission met Room 385, Russell Senate Office Building, Washington, D.C. at 8:35 a.m., Chairman Carolyn Bartholomew, Vice Chairman Daniel A. Blumenthal and Commissioners C. Richard D'Amato, Dennis C. Shea, and Peter Videnieks (Hearing Cochairs), presiding.

CHAIRMAN BARTHOLOMEW: We're going to start with opening statements from our cochairs of the hearing, and then I'll have a few remarks to make, and then we'll move into the testimony.  
Commissioner D'Amato.

**OPENING STATEMENT OF COMMISSIONER C. RICHARD  
D'AMATO, HEARING COCHAIR**

HEARING COCHAIR D'AMATO: Thank you, Madam Chairman, and welcome to the second day of our hearing on China's energy consumption and opportunities for U.S.-China cooperation to address the effects of China's energy use.

Yesterday, we heard testimony about the trends of Chinese energy use as well as analysis of the strategic and environmental effects of that use.

Today, we're asking our witnesses to take a forward-looking approach based on those analyses and pinpoint strategies that can be used to address these effects. Moreover, we will hear testimony from

witnesses engaged in U.S.-China cooperative programs on energy and the environment about what aspects of these programs have succeeded and what aspects have not, and how we can improve future cooperation.

I would like to emphasize my conviction as an individual commissioner that there is no greater challenge to the health and security of the United States than global climate change. The U.S. and China are the world's two largest emitters of greenhouse gases, and no international effort to curb the effects of carbon dioxide emissions is going to have great effect without the dedicated involvement of both countries.

I applaud the release of climate change reports by the U.S. and China both last week prior to the Group of Eight summit in Germany. While it is laudable to acknowledge the problem our planet confronts, these proposed responses so far are insufficient to ensure the worldwide curbing of greenhouse gases and manage their many-faceted aspects.

The U.S. and China can in the immediate future establish more stringent caps in an international effort to set the stage for a post-Kyoto accord, which has been identified by President Bush already as a priority in which all major polluters participate from both a developed and a developing world.

If we are to succeed in such efforts, it would be wholly insufficient to rely solely on the actions of governments, as important as those are. It will be crucial for committed, concerted actions to emerge from among the ranks of society around the globe. Communities and businesses must take an active role in addressing the problem, and I believe that public/private partnerships in both China and the United States can contribute dramatically to reduction of pollution resulting from energy consumption.

Indeed, U.S.-Chinese cooperation and leadership in this area is the critical keystone to worldwide success. Lacking such cooperation and leadership, the problem will likely go along uncontrolled pathways increasingly dire in their consequences.

The good news is it appears we have the technologies, organizing skills, and level of understanding of what needs to be done to manage the problem given the political will to do so. The bad news is we do not have the luxury of unlimited time to do this.

I would like to thank all the witnesses for sharing their time, their knowledge and their ideas with the Commission. We're especially pleased to welcome Governor Brian Schweitzer of Montana and Governor Joe Manchin of West Virginia who will discuss their states' energy-related interactions with China and strategies for mitigating the negative effects of energy use. And Mr. David Helvey from the

Department of Defense, who will join us later this morning.

Thank you for coming, and I'll turn the microphone over now to my cochair for today's session, Commissioner Dennis Shea.  
[The statement follows:]

**Prepared Statement of Commissioner C. Richard D'Amato  
Hearing Cochair**

Good morning, and welcome to the second day of our hearing on "China's energy consumption and opportunities for U.S.-China cooperation to mitigate the effects of China's energy use." Yesterday, we heard testimony about the trends of Chinese energy use, as well as analyses of the strategic and environmental effects of that use. Today, we are asking our witnesses to take a forward-looking approach based on those these analyses and pinpoint strategies that can be used to address these effects. Moreover, we will hear testimony from witnesses engaged in U.S.-China cooperative programs on energy and the environment about what aspects of these programs have succeeded and what aspects have not, and how we can improve future cooperation.

I would like to emphasize my conviction that there is no greater challenge to the health and security of the United States than global climate change. The U.S. and China are the world's two largest emitters of greenhouse gases, and no international effort to curb the effects of carbon dioxide emissions can have great effect without the dedicated involvement of both countries. I applaud the release of climate change reports by the U.S. and China last week prior to the Group of Eight summit in Germany. Yet while it is laudable to acknowledge the problem our planet confronts, these proposed responses so far are insufficient to ensure the worldwide curbing of greenhouse gases to manage their many-faceted impacts. The U.S. and China can in the immediate future establish more stringent caps in an international effort to set the stage for a post-Kyoto accord - which has been identified already by President Bush -- in which all major polluters participate, from both the developed and developing world.

If we are to succeed in such efforts, it will be wholly insufficient to rely solely on actions by governments, as important as those are. It will be crucial for committed, concerted actions to emerge from within the ranks of society around the globe. Communities and businesses must take an active role in addressing this problem, and I believe that public-private partnerships in both China and the United States can contribute dramatically to reduction of pollution resulting from energy consumption. Indeed, U.S.-Chinese cooperation and leadership in this area is the critical keystone to worldwide success. Lacking such cooperation and leadership, the problem will likely grow along uncontrolled pathways, increasingly dire in their consequences. The good news is it appears we have the technologies, organizing skills, and level of understanding of what needs to be done to manage the problem, given the political will to do so. The bad news is we do not have the luxury of unlimited time to do so.

I would like to thank all of the witnesses for sharing their time, their knowledge, and their ideas with the Commission. We are especially pleased to welcome Governors Joe Manchin of West Virginia and Brian Schweitzer of Montana who will discuss their states' energy-related interactions with China and strategies for mitigating the negative effects of energy use, and Mr. David Helvey from the Department of Defense, who will join us later this morning. Thank you for coming, and now I'll turn the microphone over to my co-chair for today's session, Commissioner Dennis Shea.

**OPENING STATEMENT OF COMMISSIONER DENNIS C. SHEA  
HEARING COCHAIR**

HEARING COCHAIR SHEA: Thank you, Commissioner D'Amato. I too would like to welcome the witnesses who will be

joining us today, and I would especially like to welcome Governor Schweitzer for attending and thank him for attending, and I'd like to welcome Governor Manchin in absentia. I'm sure he'll be here momentarily.

I want to thank both gentlemen for their willingness to share with the Commission their experiences in promoting a reliable clean energy supply and in working with China on this issue.

The strategic and environmental effects of China's energy use present a growing challenge to U.S.-China relations. This was vividly illustrated by the focus on energy and environmental issues during last month's Strategic Economic Dialogue here in Washington.

It appears that both the administration and the Chinese government recognize the high stakes involved, and realize that both nations face some of the very same challenges.

The bottom line is that there is much common ground as both of our countries try to respond to these challenges in ways that enhance our economic growth and protect our national security.

After yesterday's insightful testimony, we will have an opportunity today to hear suggestions from witnesses about how they believe our government can best approach these issues. Our expert witnesses have been asked to identify strategies both from the realm of public policy and the arena of private sector activity for addressing both the strategic and environmental consequences of Chinese energy consumption trends.

We will be depending on our witnesses' experience with China to assist us in distinguishing between what feasibly can be accomplished in China, given the current state of the government and economy and what may sound like a good idea, but may not be achievable in the near term.

I also look forward to hearing the testimony of our witnesses who currently lead U.S.-China cooperative programs on energy and the environment. Their remarks will give the Commission an opportunity to identify best practices in U.S.-China cooperative projects and better inform the Congress on how U.S.-China cooperation can be improved and expanded.

I want to thank in advance all the witnesses for participating in today's hearing and, Governor Schweitzer, again, thank you very much for attending.

I'm going to hand it over to the chairman.  
[The statement follows:]

## **Prepared Statement of Commissioner Dennis C. Shea Hearing Cochair**

Thank you, Commissioner D'Amato. I'd like to welcome the panelists who have joined us today. I especially would like to welcome Governor Manchin and Governor Schweitzer for their appearance this morning, and thank them for their willingness to share with the Commission their experiences in promoting a reliable, clean energy supply and in working with China on this issue.

The strategic and environmental effects of China's energy use present a growing challenge to U.S.-China relations. This was vividly illustrated by the focus on energy and environmental issues during the Strategic Economic Dialogue in May. It appears that both the Administration and the Chinese government recognize the high stakes involved, and realize that both nations face some of the very same challenges. The bottom line is that there is much common ground as both of our countries try to respond to these challenges in ways that enhance our economic growth and protect our national security.

After yesterday's insightful testimony, we will have an opportunity today to hear suggestions from witnesses about how they believe our governments can best approach these issues. Our expert witnesses have been asked to identify strategies—both in the realm of public policy and in the arena of private sector activity—for addressing both the strategic and environmental consequences of Chinese energy consumption trends. We will be depending on our witnesses' experience with China to assist us in distinguishing between what feasibly can be accomplished in China, given the current state of the government and economy, and what may sound like a good idea but may not be achievable in the near term.

I also look forward to hearing the testimony of our witnesses who currently lead U.S.-China cooperative programs on energy and the environment. Their remarks will give the Commission an opportunity to identify best practices in U.S.-China cooperative projects and better inform the Congress on how U.S.-China cooperation can be improved and expanded.

We thank all of you for participating, and we'll begin with today's first panel.

### **PANEL VI: GUBERNATORIAL PERSPECTIVES**

**CHAIRMAN BARTHOLOMEW:** Thank you very much. It's a real honor and a privilege for us today to have testifying several of the governors of our great nation. They are on the front lines of dealing with the energy and environment consequences. Before I do an introduction, I'd also like to thank and commend the cochairs of this hearing, particularly Commissioner Videnieks, who is the one who had the idea that we should have governors testify. Thank you very much. It was a great idea and we're thrilled to have you here.

Yesterday, we heard that pollutants from China might be negating in California all of the progress made by that state in complying with the Clean Air Act. We also heard about the indoor and outdoor health and environmental consequences of air pollution, so I think that it's a really important thing that you're here to talk to us today particularly about coal and about clean coal technology.

In our first panel, we are really pleased to welcome Governor Joe Manchin, who I understand is stuck in traffic, another hazard of the lifestyles that we lead, and Governor Brian Schweitzer of Montana.

I think I'm going to defer my introduction of Governor Manchin

until he gets here, but just briefly about Governor Schweitzer, Brian Schweitzer became the 23rd Governor of the great state of Montana on January 3, 2005.

He earned a Bachelor of Science degree in International Agronomy from Colorado State University and a Master of Science degree in Soil Science from Montana State University. He has been active in implementing national farm policy and investigating clean coal and other alternative energy sources. He is a leader in addressing the energy and environmental challenges of the nation and internationally, and I'd like to just also note, although it's not in my comments from your biography, that you've spent time working overseas in the developing world on irrigation and energy issues. I'm really pleased to see that you take the lessons learned there and brought them back here and took the lessons learned here and take them to people who really need it.

So thank you very much, Governor Schweitzer. We're going to suspend our time limits. You can speak for as long as you'd like, and had I thought ahead, we would have suspended our clothing situation and all have been here in blue jeans, but welcome.

#### **STATEMENT OF BRIAN SCHWEITZER GOVERNOR OF MONTANA**

MR. SCHWEITZER: Thank you very much for inviting me and, in fact, yes, I lived and worked in Saudi Arabia for seven years. I've been in 34 countries around the world, mostly developing irrigation in the developing world and transferring American agricultural technology. I've shipped frozen embryos. Before we get into debate about it, this is cattle. Cattle embryos and semen and live cattle, irrigation equipment, seed, and American technology all over the world.

Our situation worldwide in coal is this: the United States leads the world in coal reserves; Russia is number two; China is number three. Let's just compare China to our situation here. China has about 114 billion ton of coal reserves. Montana alone has about 120 billion ton. Montana has about 32 percent of the supply in this country and about eight percent of the world's supply.

In China, the situation is that most of the coal in China is in the north and in the northwest, and Montana is mostly in the north and northwest. They have bituminous coal; they have sub-bituminous, and they have lignite, same as Montana.

78 percent of the electricity produced in China comes from coal, and in the United States, about 50 percent of our electricity comes from coal.

Here's the situation, folks. Only about .8 of a percent of the people in China own cars. And yet they are one of the world's largest importers of oil. They will be the leaders in the world for the foreseeable future in increases of energy production and consumption. In fact, we believe that they will complete the equivalent of one 500 megawatt electricity plant pulverized coal per week for the foreseeable future.

During the next 30 years, China will produce more CO2 than the rest of the world has for the last 100 years. We talked about mercury. Already in the western United States, more than 50 percent of the non-naturally occurring mercury arrived from China.

With peak oil having arrived or soon arriving, China will increasingly rely on coal. That is the energy source that they have.

The United States must lead by example. We are the largest producers of CO2 today, and while we've managed to mitigate those increases and we are making attempts to at least discuss the question of global climate change, we actually have no standing in the world today on global climate change--no standing.

When we discuss the situation in China, we're simply discussing the situation in China because frankly how can we say to a growing economy like China that you must decrease your CO2 or you must find more expensive ways of producing energy or consuming energy because the globe has become much smaller, and what you do affects us in the United States?

China in response would say, well, but during the last hundred years, you became the wealthiest country in the history of the world because of your great consumption of fossil fuels, and we just kind of want to get on the wagon with you. So, until the United States leads, until we develop the technologies and implement them, we will not be able to say anything to China about their future.

Montana is already working with Yanzhou Coal Company. They're the second-largest coal company in China. And the bottom line here is that the United States has got to develop a carbon policy, and I am back here in Washington, D.C., where they're dang-good at discussing things. Why they discuss them and they discuss them and they pontificate, but what action have we taken?

Now, there are some fundamental problems. We're talking about carbon sequestration today. We're saying that in order for the United States to have standing, in order for coal to be a significant part of the energy future, most of us agree that coal is going to have to find a way of burying the carbon dioxide.

So where are we at today? The only carbon dioxide that we sequester in the United States today is used for enhanced oil recovery. We've been doing that for about the last 30 years. We're able to pump

carbon dioxide into these geologic zones, force the oil out of the rocks and the CO<sub>2</sub> in, and under these high pressures, actually the CO<sub>2</sub> becomes a solid and part of the rock. Why wouldn't it because, of course, the carbon came from the rocks to begin with. It came from deep in the earth. We bring it to the surface.

When you disassociate the carbon from the hydrogen, there's a burst of energy, and unfortunately then you have carbon dioxide. But if you can capture that carbon dioxide and put it right back into the earth, then coal and other hydrocarbons could indeed be part of our energy future.

Here are our challenges. Let's start with something as simple as this: now probably you know that in the United States, most states have what we call split estates, meaning the person or the entities who own the minerals under the surface may not be the same ones who own the surface land. So, in practical terms, if you come to Montana, and you want to find out who owns a piece of land, who owns that ranch, well, you go on down to the courthouse, walk into the courthouse, and all the way in the back, there's a big thick book, dusty. Dust it off a little bit, you open it up, you go to the township and range that you're interested in, you follow it down to the section, and voila. That's what title companies do everyday and the last time you bought or sold a house, that's exactly what they did.

There it is. Joe Manchin is the owner of that ranch in Montana. But does Joe Manchin own the minerals under that ranch? Maybe. Maybe not. In order to find that out, you go to the other side of the courthouse and there is another dusty book, and you open it to that township and range and that section, and now while it's true that Joe and Gayle Manchin own the ranch, you'll find out that they don't own all the minerals under it.

In fact, the federal government owns some of them and the state of Montana owns some, the railroad owns some, some dead lady from Omaha owns some, and Joe and Gayle own 12-1/2 percent of the minerals.

Okay. That's well understood. That's the legal system that we have in this country, but let me ask you this question. We're talking about CO<sub>2</sub> sequestration, trillions of tons of carbon we're going to sequester during the next 30 years. Who owns the right to pump carbon dioxide under Joe and Gayle's ranch? Joe and Gayle? They own the surface. Or the mineral owners? They have the right to extract the minerals.

But who owns the vacant space 10,000 feet below the ranch? Now, this is kind of a fundamental legal question; right. We don't know. That has not been established. Western governors have been discussing this. Some states are working toward a legal solution but,

ultimately, and unfortunately, I guess we need Congress to do something here because if Montana has one standard and Wyoming has another and we have carbon dioxide that's passing through state lines, and we have giant salt domes that are on both sides of the border in North Dakota and Montana, we have to establish a national standard.

So there's a fundamental question, and yet we're debating a carbon cap and trade system in this country. We're talking about burying trillions of tons and we don't even know who has the right. So that's a fundamental question.

Liability. Who's responsible if there's a failure in sequestered carbon dioxide during the first ten years, the next 50 years, the next 500 and the 10,000 that follow it? We haven't established the legal system.

Incentives. Some say the carbon cap and trade system is a workable system. In fact, many of the utilities in the United States are proponents of a carbon cap and trade system. I think you've seen some of the largest utilities and some of the largest technology companies, GE and some of the largest utilities, in fact, have formed a consortium, have come before Congress and said we need a carbon cap and trade system. So you say, well, how does that really work?

Well, they say it's pretty simple. We will set a cap on the amount of carbon dioxide that's produced in this country and then we will set goals to decrease the amount of carbon that you produce in the future. So, who gets the right to produce the carbon dioxide right now? Well, they straighten their tie and they say, well, we do. We're the ones who are producing the carbon right now. So we're franchised to continue to produce carbon, and as we decrease our production, then we'll be rewarded in some way with incentives.

Why wouldn't they be for a system like that? We've just offered franchises to those who produce carbon. That system may work. It may not.

Some say that we ought to just have a carbon tax and let that tax be neutral. Others, for example, some of the larger coal companies, say, oh, any kind of a carbon tax is going to destroy the competitive nature of the United States. It will increase the price of our electricity by a multiple of one or two or three times, and we simply can't afford a carbon tax. Others have proposed that we need just an energy tax, that if you are a consumer of energy, you pay a portion of what you're consuming to the federal government and the federal government will use that money to develop the research and commercialization of carbon sequestration.

I don't have the answers, but I can tell you this. We are a long ways from having the answers today, and yet we're in a position where we have got to move now because if we wait another ten years, China

and the developing world are going to continue to produce carbon dioxide and mercury at unprecedented rates.

So step one. The United States has got to have standing. The United States has got to develop those technologies that will either produce clean coal technology or somehow walk away from coal. Now there are those who say you cannot put lipstick on a pig. They don't like coal. They call coal a four-letter word. Well, I guess that's one, that's one way of looking at it, but unless you are willing to live naked in trees and eat nuts, coal is going to be part of your future.

Remember, 50 percent of the electricity produced in this country comes from coal. I have some friends who say, well, I am going to drive an electric car. I'm getting off of those hydrocarbons. I don't want anything to do with hydrocarbons anymore. Well, so that electric car has a long cord that is hooked to a tall smokestack because 50 percent of our electricity comes from coal.

Today our challenge is develop the technology; transfer the technology. Now, it was Tom Brokaw--you remember who Tom Brokaw is--he and his wife Meredith actually started in South Dakota, but now they've had the good sense to buy a ranch in Montana, and they're raising some buffalo, and Meredith is attempting to spend most of the money that Tom has made in the last 40 years buying horses. She's well on her way. Tom wrote a book, and you probably know of this book, called *The Greatest Generation*, and the premise of the book was simply this: that that generation that were reared in the Great Depression, those sophomores in high school, juniors in high school, graduating from high school in 1934 or '35 or '38, when most of the people that they knew didn't have a job unless they were working for the government, when people looked at one another in shock, and openly asked the question does democratic capitalism even work? Does this experiment have merit in the future?

The Great Depression was conquered, and then later they were challenged and they were asked to defeat tyranny in Europe. In a four-year period, we went from an also-ran military power to the number one military power in the world. We built the military industrial complex. We trained our military, and in a four-year period, less time than we've been in Iraq, we defeated tyranny in Europe and Asia.

Later, my generation, I was only six, seven years old, and people all over America were gazing into the night skies. Most of you are old enough to remember this. We were looking into the night skies and among the stars, we saw a satellite that was moving, Sputnik, and that simple satellite, one satellite, it said to the American people that we had fallen behind the Russians in probably a generation in aerospace technology.

It was President Kennedy, even though he had advisors who said

to him, Mr. President, don't go before the American people and say we're going to put a man on the moon in ten years; we don't even know if it's technically feasible. In fact, there were scientists who thought perhaps there might have been just 500 feet of dust, and when you landed some kind of a spacecraft, it would sink hundreds of meters into the dust.

There were those who said it would be impossible to land on the moon in ten years, but it was President Kennedy who did go before the American people and said this is the greatest challenge of this generation, and we will put a man on the moon in ten years. And when that Apollo mission landed, reach into your pocket, feel that cell phone, when that Apollo mission landed, it had less computing technology than your cell phone.

Now, we are faced with the greatest challenge in the history of our country, and that challenge is to produce energy for this country domestically without increasing carbon dioxide and mercury emissions, and not only developing the technology for this country, but transferring it to the rest of the world. If we get it right in this generation, we will be known for seven generations as the greatest generation. If we get it wrong, heaven help us. Thank you.

CHAIRMAN BARTHOLOMEW: Thank you very much. Thank you for a very interesting testimony. You've given us a lot to think about.

I'm pleased now to welcome Governor Manchin. Joe Manchin III is West Virginia's 34th Governor. Clearly, West Virginia has been around a little bit longer than Montana. Under his leadership, West Virginia has become "Open for Business."

Working with the legislature, he has fixed the state's workers' compensation system, instituted insurance reforms, established the first comprehensive teacher pay package in over 15 years, decreased the state's debt, strengthened its ethics laws and reduced the food tax.

He is also the Chairman of the Southern States Energy Board and supports the American Energy Security Initiative which plans to eliminate imported oil by 2030 by adopting reforms.

We're very interested to hear what you have to say today and to hear a little bit more about West Virginia and China. Thank you very much, Governor.

**STATEMENT OF JOE MANCHIN  
GOVERNOR OF WEST VIRGINIA**

MR. MANCHIN: Thank you very much for inviting me. It's good to be with my good friend Brian Schweitzer from Montana. As you have just heard, we have an awful lot in common. As the second

largest coal-producing state, West Virginia has a paramount interest in the development of world energy supplies, joint research and development programs with other nations, and the implementation of new and innovative energy technologies that ensure reliable supply, secure sources and environmental responsibilities. And I'm particularly pleased to share those with you today.

Global energy demand and the use of coal will continue with unprecedented growth. By 2030, the planet will double its use of coal and we are expected to be using about 10.5 billion tons annually.

China, in particular, is at the forefront of this demand, anticipated to be at 1.5 billion tons by 2020. By 2020, the People's Republic is expected to increase its coal production from 1.7 million tons per day to more than 3.2 million tons per day. Its pressing needs for the growth in coal use will be in electricity, coal liquefaction and syngas.

The country's electric generating capacity will double to 1,000 gigawatts by 2020. The Energy Information Administration of the U.S. Department of Energy has estimated that over 100,000 megawatts of coal-based power plants will be built in China between 2003 and 2010.

Changes in the magnitude of China's oil use also bear attention. Just seven years ago, consumption was 4.9 million barrels per day. That figure is expected to jump to 14 million barrels per day by 2025, an increase of 189 percent, approximately the production capacity of Saudi Arabia.

Oil production in China already has peaked. So, more than nine million barrels per day will be imported. This issue alone will impact the growth and development of mature and emerging economies throughout the world, impacting coal use also. For example, Beijing already has announced an outlay of \$20 billion for coal-to-liquid facilities.

This unprecedented energy growth has obvious implications for world energy markets, security and the environment. For example, the International Energy Agency's World Energy Outlook 2006 predicted that China would surpass the United States in CO2 emissions by 2009.

In face of these challenges, the question becomes what can we do collectively to ensure mutually acceptable outcomes? It is my belief that it is better to help manage a process than to watch it from the sidelines. As such, in West Virginia, our policymakers, researchers and businesses have begun to work with their counterparts in China. With several West Virginia initiatives, activities are underway to expand the role that technology can play in meeting both ours and China's energy goals.

One area is energy efficient transformers. FCX Systems, Inc., located in Morgantown, West Virginia, has been selling solid state

frequency converters and preconditioned air units to the aviation industry in China. FCX power and cooling units allow aircraft to turn off their air processing units which consume expensive jet fuel.

The FCX equipment operates on utility power at a very high efficiency rate which saves energy and also is extremely environmentally friendly. The FCX units save energy, adding no additional pollution into the environment. FCX has over 200 units in China at 15 airports.

Another area is knowledge sharing in the emerging area of coal-to-liquids, which we all are very much familiar with now. West Virginia has taken action in the planning of coal-to-liquid facilities in the state. These build upon existing knowledge and technologies to produce substitute transportation fuels from coal and from coal biomass blend.

Much can be learned as the two countries explore common challenges for using their vast coal resources to fuel their transportation.

Under the auspices of the China-U.S. Clean Energy Protocol, West Virginia University has initiated a program of research with the Shenhua Group Corporation to study the economic and environmental impacts of deploying 120,000 barrel- per-day coal-to-liquids plant in Shanxi Province in Inner Mongolia.

Based on China's need for petroleum for its transportation sector, coal-to-liquid industries may be widely deployed in China in the future. This research will be expanded to include a study of carbon sequestration associated with potential emissions from the plant.

As just noted, the area of carbon management is another opportunity, and I know that Brian has gone into this. I'll touch on it briefly. Reducing or offsetting carbon dioxide emissions is the primary objective of a new suite of technologies that are focused on carbon capture and storage. Carbon dioxide can be captured directly from industrial sources and then concentrated into a nearly pure form of energy which can be stored in geological formations below the earth's surface.

The U.S. Department of Energy has formed a nationwide network of regional partnerships to help determine the best approaches for capturing and permanently storing greenhouse gases.

The Regional Carbon Sequestration Partnerships are government/industry efforts tasked with determining the most suitable technologies, regulations and infrastructure needed for carbon capture, storage and sequestration in different areas of the United States.

It is my pleasure to serve this year as Chairman of the Southern States Energy Board, a regional organization of 16 states and two territories. The Southern States Energy Board serves as the lead

organization for one of the partnerships, the Southeast Regional Carbon Sequestration Partnership.

Additionally, the entire partnership program is managed by the DOE's National Energy Technology Laboratory in West Virginia.

Another area of opportunity for collaboration and lessons learned is that of electricity grid modernization. As I noted earlier, China is in the process of dramatically increasing its electricity-generating capacity. Smart choices in grid design and technology deployment can go a long way toward ensuring efficient, reliable and secure energy.

This is the focus of the West Virginia-based National Energy Technology Laboratory's Modern Grid Initiative. The Initiative is working toward a framework that enables utilities, vendors, consumers, researchers and other stakeholders to form partnerships and overcome barriers to grid modernization.

The initiative has accumulated valuable knowledge that could be shared with China, such as the need to design and install integrated communications and intelligence into the network from the beginning because these technologies are the foundation for advanced automation and demand response measures and knowledge about grid operations.

The first developmental field test is underway in West Virginia where Allegheny Energy is working with the Department of Energy and technology developer Augusta Systems to deploy sensor network infrastructure technologies within Allegheny's distribution system. This test bed circuit is being referred to as the circuit of the future.

These technologies will assist the grid by injecting distributed intelligence into the network, making the network smarter in terms of real-time remote monitoring and control.

Let me just say in closing that Brian and I, Dave Freudenthal from Wyoming, and all of us in coal producing states have the same goal, which is to make this country energy independent.

Brian has said, and I would reiterate, that coal will be a major factor in this. Whether people like it or not, we have to find a way to use it and use it responsibly. There's a balance to be had. I can tell you some of the problems that we're running into getting our coal-to-liquids off the ground. Everybody wants to build a coal-to-liquids facility. I have people everyday coming to our economic development office wanting to build a coal-to-liquids facility.

Brian in Montana has people coming everyday. Every state that has carbon has people that want to do these developments. The bottom line is without a sound energy policy coming out and a sound, attractive, if you will, incentive type of financial package coming out of Washington, this will not be a reality.

We have talked about getting the financial world involved. The risks are high, but the rewards are great and we must do it. Until this

government gets a handle, until the federal government says that we are going to put a base price on a barrel of oil, and we're going to use debits and credits based on lows and highs, that there is some financial security and predictable risk involved to where the financial world will get involved--these are very expensive plants--you are not going to see it move forward.

We're all going to talk about it. There is not a state that's going to step to the plate that can afford to take the risk in this high-stakes game. With that being said, we are urging the Department of Energy to encourage into the energy bill guidelines, whether it's \$45 or \$50 a barrel as a baseline. With that, I can guarantee you that there will be more development in the next year or two than you can ever imagine. I think that we'll achieve energy independence by the year 2030.

Through my initiative as being Chairman of the Southern States Energy Board, we have asked every state to sign a declaration of independence, if you will, that we'll all strive to be energy independent by no later than 2030.

With that, we start very basically, at the very basics with a baseline of doing an inventory. My little state of West Virginia depends on 1.2 billion gallons of oil a year. By May, by May of each year, we run out of our domestic produced oil. We depend on--the same as this nation does--we depend on oil from other nations, which have not been friendly towards our way of life or our policies, and it's getting more and more difficult.

With the sequestering, I know that the carbon sequestration is a big concern that we all have, but if we wait until we perfect it, we'll never do it. The bottom line is we must get started. So, we would hope that our concern and forwarding on our information that you're receiving through these testimonies, will be of great help to this nation.

I want to thank you all for the opportunity to join the U.S.-China Economic and Security Review Commission to discuss these very important issues, and I believe that issues of energy security and reliability, as well as environmental impact, are among the most critical global issues that we have facing us.

The methods with which China feeds its energy appetites will surely impact the United States. There is no doubt about that. There are surely lessons to be learned from these innovative technology deployments noted above and numerous opportunities for knowledge sharing, technology transfer and collaboration.

I'm confident that our two countries can join together in a cooperative spirit that will promote the development of efficient, environmentally responsible energy growth. I am proud that such efforts are underway in West Virginia and Montana and all the coal

producing states and am hopeful that there are expansions in the future. I want to thank you again for having me here today.  
[The statement follows:]

### **Prepared Statement of Joe Manchin, Governor of West Virginia**

Good morning and thank you for this opportunity to address the U.S.-China Economic and Security Review Commission. It is my pleasure to represent the state of West Virginia in these hearings and to assist the Commission in fulfilling its statutory mandate from Congress in Public Law 109-108.

As this Nation's second largest coal producing State, West Virginia has a paramount interest in the development of world energy supplies, joint research and development programs with other nations, and the implementation of new and innovative energy technologies that provide reliability, security and environmental responsibility.

Because of its wide availability, versatility and reasonable cost, coal will prove to be of strategic importance to many developing countries in the future, including China. For this reason, I am particularly pleased to offer my perspectives today.

Globally, energy demand and the use of coal will continue with unprecedented growth for the next twenty-five years. A number of developing nations are leading this charge because the resource is available and inexpensive. Yet we will also see growth in developed nations as well. Dramatic increases in coal use are projected in India, Russia, Japan, Indonesia and the United States. Just four years ago, our global consumption of coal was 5.4 billion tons, or about 96 million tons per week. By 2030, the planet will double its use of coal and we are expected to be using about 10.5 billion tons annually.

China, in particular, is at the forefront of this demand. China's population growth is anticipated to be at 1.5 billion by 2020. As the world's largest country (by population) grows, so will her appetite for resources.

By 2020, the People's Republic is expected to increase its coal production from 1.7 billion tons per day today to more than 3.2 billion tons per day. The pressing needs for this growth in coal use will be in electricity, coal liquefaction and syngas.

From an electricity perspective, the country's electric generating capacity will double to 1000 gigawatts by 2020. Specifically, the Energy Information Administration of the U.S. Department of Energy has estimated that over 100,000 megawatts of coal-based power plants will be built in China between 2003 and 2010. Between 2010 and 2015, another 90,000 megawatts is forecasted to be built.

Changes in the magnitude of China's oil use also bear attention. Just seven years ago, consumption was 4.9 million barrels per day. That figure is expected to jump to 14 million barrels per day in 2025, an increase of 189 per cent, which approximates the production capacity of Saudi Arabia. Oil production in China already has peaked, so more than 9 million barrels per day will be imported. This issue alone will impact the growth and development of mature and emerging economies throughout the world.

These oil figures also impact coal use. Beijing already has announced an outlay of \$20 billion for coal-to-liquid facilities, where coal is converted for use as a liquid fuel.

This unprecedented energy growth has obvious implications for world energy markets, security and the environment. For example, the International Energy Agency's World Energy Outlook 2006 predicted that China would surpass the United States in CO2 emissions by 2009.

In the face of these challenges, the question becomes: what can we do, collectively, to ensure mutually

acceptable outcomes?

Surely, collaboration has a role. It is my belief that it is better to help manage a process than to watch from the sidelines. As such, in West Virginia, our policymakers, researchers and businesses have begun to work with their counterparts in China.

### ***Highlights of Several West Virginia Related Initiatives***

In West Virginia, individual collaborations are underway that seek to expand the role that technology can play in meeting both our, and China's, energy goals.

One area is energy efficient transformers.

FCX Systems, Inc., located in Morgantown, West Virginia, has been selling Solid State Frequency Converters and Preconditioned Air Units to the aviation industry in China for over 14 years. FCX power and cooling units allow aircraft to turn off their air processing units (APU), which consume expensive jet fuel. The FCX equipment operates on utility power at a very high efficiency rate, which saves energy and also is extremely environmentally friendly. The FCX units save energy and offer no pollution into the environment thus making them more efficient and environmentally friendly than using the aircraft APU or the former means of supplying power and air with diesel-powered equipment. FCX has over 200 units in China at 15 airports.

Another area is knowledge sharing in the emerging area of coal-to-liquids.

West Virginia has activities in various stages of planning and design for coal-to-liquid facilities in the State. These build upon existing knowledge and technologies to produce substitute transportation fuels from coal and from a coal/biomass blend. Much can be learned as the two countries explore common challenges of using their vast coal resources to fuel their transportation sector.

For example, under the auspices of the U.S.-China Clean Energy Protocol, West Virginia University (WVU) has initiated a program of research with the Shenhua Group Corporation to study the economic and environmental impacts of deploying a 120,000 barrel per day coal-to-liquids plant in Shanxi Province in Inner Mongolia. Based on China's need for petroleum for its transportation sector, coal-to-liquids industries may be widely deployed in China in the future. This research will be expanded to include a study of carbon sequestration associated with the potential emissions from the plant. Carbon capture and storage will help to meet an overall goal of zero emissions for the plant. Success will also help China to develop better carbon management technologies for these emerging coal-to-liquids facilities.

In addition, WVU is developing a U.S.-China Energy Center within the university's National Research Center for Coal and Energy to coordinate energy related activities between the U.S. and China. Initial efforts will focus on coal utilization, opportunities for U.S.-China cooperation in energy related issues, business opportunities for West Virginia firms, and training, education, and research programs for WVU and other universities and colleges in the state.

The WVU-Shenhua activities and the U.S.-China Energy Center compose the current activities under Annex II of the U.S.-China Clean Energy Protocol. These activities support higher level interactions between the governments.

### ***Carbon Management Opportunities***

The activities also provide a bridge into another area for collaboration, that of carbon management.

It is important that all major coal consuming countries, China included, begin now to pursue carbon

management options that address climate change, reduce greenhouse gases and provide energy reliability and security.

Reducing or offsetting carbon dioxide emissions is the primary objective of a new suite of technologies that are focused on carbon capture and storage. Carbon dioxide can be captured directly from an industrial source and then concentrated into a nearly pure form which can be stored in geologic formations below the earth's surface. Potential storage solutions include depleted oil and gas reservoirs, saline-filled formations or unmineable coal seams. In addition, carbon dioxide can assist in enhanced oil recovery, enhanced coal bed methane recovery, or be fed to algae with the expanding biomass converted to biofuels.

I believe China, and other nations, can learn from a series of innovative carbon sequestration demonstrations underway in the U.S. The U.S. Department of Energy (DOE) has formed a nationwide network of regional partnerships to help determine the best approaches for capturing and permanently storing greenhouse gases. The Regional Carbon Sequestration Partnerships (RCSPs) are government/industry efforts tasked with determining the most suitable technologies, regulations, and infrastructure needs for carbon capture, storage, and sequestration in different areas of the United States. It is my pleasure to serve this year as Chairman of the Southern States Energy Board, a regional organization of 16 states and two territories. The Southern States Energy Board serves as the lead organization for one of the partnerships, the Southeast Regional Carbon Sequestration Partnership. Additionally, the entire partnership program is managed by DOE's National Energy Technology Laboratory in West Virginia.

### ***Grid Modernization***

Another area of opportunity for collaboration and lessons learned is that of electricity grid modernization. As I noted earlier, China is in the process of dramatically increasing its electric generating capacity. Smart choices in grid design and technology deployment can go a long way toward ensuring efficient, reliable and secure energy.

This is the focus of the West Virginia-based National Energy Technology Laboratory's Modern Grid Initiative. The initiative is working toward a framework that enables utilities, vendors, consumers, researchers and other stakeholders to form partnerships and overcome barriers to grid modernization. The initiative has accumulated valuable knowledge that could be shared with China, such as the need to design and install integrated communications and intelligence into the network from the beginning, because these technologies are the foundation for advanced automation, demand response measures and knowledge about grid operations.

The initiative also supports demonstrations of key technologies that can serve as the foundation for an integrated, modern power grid. The first developmental field test is underway in West Virginia. In my state, Allegheny Energy is working with the U.S. Department of Energy and technology developer Augusta Systems to deploy Augusta's sensor network infrastructure technologies within Allegheny's distribution system. This test bed circuit is being referred to as "the circuit of the future." These technologies will assist the grid by injecting distributed intelligence into the network; basically making the network smarter in terms of real-time remote monitoring and control.

### ***Closing***

There are surely lessons to be learned from these innovative technology deployments.

Thank you very much for this opportunity to join the U.S.-China Economic & Security Review Commission to discuss these very important issues. I believe that issues of energy security and reliability, as well as of environmental impact, are among the most critical global issues. The methods with which China feeds its energy appetites will surely impact the United States.

I believe that we must be proactive in ensuring that China's energy growth is undertaken in a manner that is acceptable to both nations. There are numerous opportunities for knowledge sharing, technology transfer and collaboration.

I am confident that our two countries can join together in a cooperative spirit that will resolve any differences and promote the development of efficient and environmentally responsible energy growth. I am proud that such efforts are underway in West Virginia and I am hopeful for their expansion in the future.

Thank you.

## **PANELVI: Discussion, Questions and Answers**

CHAIRMAN BARTHOLOMEW: Thank you very much to both of our governors. As I said, in the opening, it's really a privilege and an honor for us to have you here. We hear from all sorts of wonderful experts over the course of our hearings, but it's particularly useful to hear from people who are having to grapple with these issues on the ground and deal with the consequences for their states.

I also want to acknowledge that Governor Manchin postponed a trip to China in order to appear here today. So we thank you very much. We'll do some questions. When I get to my turn to ask questions, one of the things that I'd be very interested in hearing from both of you is a little bit of discussion about how you identify the opportunities in China to work together and what kinds of things you are going to do on this trip, which I presume you will be taking soon.

Thanks very much. I'm going to turn it over to Commissioner D'Amato.

HEARING COCHAIR D'AMATO: Thank you very much, Madam Chairman, and thank both Governor Schweitzer and Governor Manchin for your comments. The purpose of this hearing is right on point with the comments that you've made. The purpose of the hearing is to try and identify initiatives that we can recommend to the Congress for cooperative programs with the Chinese to get us off the dime of the urgent situation that you portray us as being in as a nation. The level of urgency couldn't be higher in our judgment.

The second thing is that you both come from a place that says that we have technologies and the potential to get ourselves out of this if we put our mind to it. I have a couple questions on recommendations that you mentioned, Governor Schweitzer, the idea of identifying the need to clear up the legal regime and some of these areas that we need to identify so we don't have impediments of our own to get the sequestration, new technologies, off the ground, and I would hope that we could work with your staff to identify some specifics about what that kind of proposal might be in the way of legal regimes so we could provide that recommendation to the appropriate

committees of the Congress.

I think we would be very, very open to that kind of a question and probably most members of Congress have no idea that there's an open legal issue of this kind that might get in the way.

The second thing is yesterday we heard from a number of testifiers from the executive branch about, and from our laboratories about the potential for sequestration. And our question is to what extent we can recommend the most aggressive kind of range of sequestration and including coal-to-liquefaction technologies for purposes of getting into the energy bill, energy bills that we're going to be seeing.

Congress is obviously anxious to do some things. They need some guidance and some recommendations, and it seems to me that we need to be more aggressive on sequestration, and I wondered if you agree with that?

Yesterday, we heard that the first time we could get a commercialized facility of any kind in the sequestration area would be five years or more out for us.

My question is, during World War II when we needed a U-2, between the time that we put down on paper the need for a U-2 and the time that aircraft took off from the runway, I believe it was nine months. So we've been able in the past when faced with the urgent situation to put some technologies on the ground in a lot faster fashion than we're hearing.

So my question to you is what is your assessment? Have you put together your best kind of plan for how we would most aggressively approach sequestration technologies of various kinds in demonstration projects?

MR. SCHWEITZER: Let me just say that Joe mentioned that if we wait until we have carbon sequestration/carbon capture perfect, we'll never build it.

HEARING COCHAIR D'AMATO: Yes.

MR. SCHWEITZER: Those who would suggest that we're at least 2012 before we can commercialize carbon capture need to spend a little bit more time outside of Washington, D.C., and a little bit more about where we're actually doing these things. The coal gasification plant in Beulah, North Dakota that was completed in 1984 has been piping pure stream CO<sub>2</sub> to Weyburn, Saskatchewan and pumping it back into their oil fields for some time.

So we are capturing carbon today in enhanced oil recovery. The difference is simply this: financial. Those who need CO<sub>2</sub> in the oil business will pay 25 or \$30 a ton for it. Those who are producing CO<sub>2</sub> with no home for the CO<sub>2</sub> in terms of enhanced oil recovery are probably going to pay somewhere between 30 and \$50 a ton to

pressurize the CO2 and pump it into some saline water deep or basalt or some limestone or some salt domes.

Joe mentioned that there are regional sequestration studies, and we know in Montana, and we've already identified, that we could sequester all of the carbon dioxide that is being produced in a four-state area in Montana. We call Montana the "Treasure State." We thought it was the Treasure State because we have, of course, gold and platinum and palladium and copper and oil and gas and coal and wind, but as it turns out, we also have some of the best geology for storing carbon dioxide because God spent about six days with the rest of the world and then when he got it right came to Montana. So we can store the carbon. We can technically store the carbon today, but Dr. Socolow was sitting at one of these tables before the Senate Finance Committee along with myself, and he was asked this question by Senator Bunning--Dr. Socolow, who is one of the leading authorities in carbon capture from Princeton--how much of the carbon dioxide that we're currently producing with our pulverized coal plants in America could we store? How much of it?

And he said, well the short answer is all of it, and all of it that we will produce during the next 50 years. The longer answer is we don't know exactly where and how deep, and we don't know where it will fail and where it will succeed.

And then the question was asked, well, what percent of it would succeed? He said once again the short answer is I believe that we can keep 90 percent of it under the surface for 10,000 years. Well, 90 percent, as we'd say in Montana, "ain't bad."

MR. MANCHIN: It comes down to money and the situation of we know we can do it. We know that we can build the coal-to-liquids plants. I'll give you an example of what we're working on. American Electric Power, AEP, is the largest power producer in the nation, is in West Virginia right now projecting to build a 600 megawatt gasifier, coal gasification plant, which is the newest technology and the cleanest technology of producing electricity.

The costs have risen extremely over a period of time that they've been planning to build this, and with that, they've also in some of their existing plants, been experimenting with sequestration.

So we know it can be done. But when it comes down to money, who pays for it? Do the rate payers pay for it or is it a national problem? If it's a national problem, how do you spread the cost out on a national basis?

If it's a rate-based, then does American Electric take all its rate payers and make them pay for that? Does Allegheny Energy make them pay for it or do the different energy companies around the country just be divvied out to their rate payers?

Until they settle that on a larger issue than what we're dealing with right now, you're not going to have any of them forward. During the Clean Air Act, they were selling credits, as you recall, and they used the umbrella effect. So if a utility company had ten coal-fired plants and it was under this umbrella, they'd take some that were cleaner than the others and they would trade back and forth to stay within the umbrella, if you would.

What had happened then is we started moving into phase two of the Clean Air Act; they had to start scrubbing, paying a lot of money to scrub. We worked with them through a public service commission as far as the rate recovery, that we had to pass the rates on. Then they went into the second phase, and now all the plants in West Virginia have what we call scrubbers, which is by using an injection of lime to knock out the sulfur. Now, we come along there's greenhouse gases and carbon. It's the next phase that we're into.

It's really brought everything to a halt. If it would be retroactive, where do you think we'd be as a nation if retroactively every plant has to be sequestered? Well, you couldn't. You'd shut down the whole nation. We're at that point if we don't do something, then we're going to shut down the nation by 2030 anyway because we're not going to have the oil to produce.

You're not going to be able to afford triple digit inflation. Every economist will tell you by 2020, 2025, if we continue this appetite that we have for foreign oil, that we'll be in triple digit inflation, and we'll not be able to compete as a global power.

With that being said, we know that we can do it. We know that we can perform and produce it, but until they grapple on how they're going to handle the financing of it, and that's why we're saying that the financial risk can be spread if there's going to be a baseline that we can work off of. If you think that oil is going to go below \$40 a barrel and sustain that any time soon with the rising demand around the world, and especially with China coming on the way they're going to surpass us by 2029, then we have oceanfront property in West Virginia.

And so what we're asking is a realistic approach to how we handle this. This is a problem that all have to deal with.

HEARING COCHAIR D'AMATO: Thank you very much, Governor. We'd also be interested in working with your staff to identify the kinds of incentives that you think that we ought to be recommending to the Congress to address the problem in the way that best fits it as a major national problem. If it's a national problem, it demands a national response.

MR. MANCHIN: Basically I've looked at it, and Brian since we've been governors together, we've talked about this many times. If you look at the one public policy that's been most successful in the

nation's history, it's been feeding the masses. How have we been able to feed the masses? We've doubled our population in the short period of time. We're going to add another 100 million people in the next 20 years, and yet not one of us have gone to the grocery store and said I'm sorry, the boat didn't come in, there's no food.

We've been able to do it, so how do we work with the food industry, with the agriculture industry, with the farmers? How do we keep them alive during the Great Depression and up through the '50s and '60s? If there's been a policy that has worked, look at that one and find out, and basically it was bases. They put baselines so that people would continue to produce. We're not creating those incentives right now, and I don't know why people are afraid of the word subsidy. I'm not looking for a subsidy. I'm looking for an amount of a risk. Give me a low and a high on the risk and I'll get the people to participate and put the money in. Right now it's an unknown.

And then long-term contracts. Until the federal government steps forward--if they give our little state a 25-year contract to produce Jet A fuel, we'll give them all they want. I can't do it on five years. The economics is not there, but a 25-year contract and give me a parameter, and I guarantee you we'll beat the spread on what you're dealing with right now.

And we've been saying this. We've been talking to the Defense Department, but someone has got to step to the plate. I'm committed in my little state of West Virginia that the first coal-to-liquids plant that we're going to build, that I'm going to be the total take. I'll use it for all my school buses. It will be what we call clean diesel. It will be a much better diesel than what we're producing right now from petroleum, and we'll use it in all of our school buses.

We'll use it in all of our highway department vehicles and we'll have 25 to 35 percent available for the public use, but I've got to guarantee the take from that in order to financially make the project work. The federal government needs to step to the plate, too.

HEARING COCHAIR D'AMATO: Thank you very much, Governor. Governor.

MR. SCHWEITZER: In terms of public policy, Congress is considering the energy bill right now, and one of the things that they're considering is the production tax credit that they've been offering to biofuels and other alternative sources. This is what's very interesting.

If we started today, if one of these deals that Joe is working on or we're working on in Montana of coal liquefaction, we're putting consortiums together with off-take agreements, with financing, with technology companies, with coal companies, to build plants that produce 20 to 80,000 barrels of liquid fuels, ultra-clean diesel and JP-8 aviation fuel, if we started today, if we started pouring concrete and

putting steel in the ground, none of them would be done before 2013.

These are minimum of two to \$5 billion projects. They are engineering marvels. And yet Congress is considering extending the production tax credit of 50 cents to alternative fuels all the way to 2010. Congress needs to be realistic and say the time frame on these alternative fuels, coal-to-liquids, there will be no production before 2013.

So the production tax credit should start in 2013, 2014, and extend to 2020 if we are going to encourage coal liquefaction. Joe has talked about a minimum price. Look, we import four billion barrels of oil every year. We consume 6.5 billion barrels, and I believe that we're going to be able to produce about 2.5 billion barrels. Montana and North Dakota are the only states that increased our oil production during the last year, and we're finding some great oil reserves, but it means that's 2.5 billion barrels.

So let's do a little math together. There's a four billion barrel problem we have. If we converted every single acre of corn and wheat and soybeans that we export in this country, we could produce a grand total of one billion barrels of biofuels. That's it. I'm an agronomist. That's the kind of math I can do.

So that still leaves a three billion barrel problem. Now, if we decrease our consumption by a billion barrels and we can do that--maybe some of you are economists. You've got an economist here? I wouldn't admit it either. So an economist would say, well, Brian, if you asked us to decrease our consumption of oil in this country by one billion barrels, why it will send us into a recession because everyone knows that you measure the strength and wealth of an economy by how much you consume, how much oil you consume.

Not so fast. From 1975 to 1983, the last time we had a crisis, we decreased our consumption of oil by pretty close to a billion barrels. So I think we can do it and I'm doing my part. My wife and I traded off our Montana Cadillac--wheel drive Suburban--and we bought a little diesel car and we run it 100 percent on biodiesel.

I've got farmers and high school kids and colleges all over Montana making biodiesel. Everywhere I go, somebody comes up and gives me two or three gallon jug of their local hootch. I take it home, dump it into that biodiesel car, and some of it's yellow, some of it's white, some has got floaties in it, but it all works.

I drive a pickup that runs on diesel and it's a coal-to-liquid so I'm personally off oil. How have you done during the last week? So we can decrease our consumption by a billion barrels. Now we still have a two billion barrel problem.

Now, look, I've already asked you to suspend all export of food. That's the biofuels portion. I've already asked you to decrease

consumption at a rate that we've only done one other time in the history of this country, and we're still two billion barrels short. So unless, unless you've got a better plan, we're going to have to go to our ace in the hole, and it's coal.

Now, we cannot develop these coal resources without some kind of guarantees on a base price because I'm going to tell you, and almost everybody in this room is going to disagree with me, but I have been in the commodities business my whole life, so has my father and my grandparents before them, and the price of oil will drop below \$40 a barrel. It might make it below \$30 a barrel.

You can't figure out how that could happen. We couldn't figure out how it made it to \$9 a barrel in the '90s or how it made it all the way down to \$2 a barrel after World War II. But it will, and I don't know all of the events, but that's the commodity business.

The folks who finance these projects on Wall Street, and I've been back there on my hands and knees--I know how this works--they have the money because they don't like to take risk. They like to shoot fish in a barrel. They're not going to be in the commodity business, but if this government says if it's a domestically produced fuel, if you grow it or blow it or dig it or drill it, the minimum price will be \$40 a barrel, you will unleash that capital to invest in all of these technologies.

We have the capabilities, but we need Congress to just get us started, develop the carbon sequestration law, develop a minimum price standard for all domestically produced fuels. If we do that, you will unleash the greatest investment and technologic gains in the history of this country.

HEARING COCHAIR D'AMATO: Thank you very much, Governor. Vice Chairman Blumenthal.

VICE CHAIRMAN BLUMENTHAL: Thank you both very much for coming here and for your very interesting testimony and very interesting work on these topics.

I have a question related to China and how they would fit into some of these plans. Governor Schweitzer mentioned the difficulties of the legal regime here in the United States. When we're dealing with China, we're dealing with a much more complicated situation in terms of the legal regime or lack thereof.

We have a pretty good idea of who owns the land, possibly who owns the minerals, but then we have other questions, we're starting from a crawl mode when it comes to China in that sense. We're so far ahead, with all our problems, we're so far ahead, and I'm wondering how we deal with that aspect of things in terms of cooperating with China? There's IPR issues obviously. There is getting them to sort out these sorts of things that we've been at for a couple of hundreds of

years.

And then there is this issue of the Chinese priorities. We're in a situation right now where we are a very wealthy country and can afford to start to take on some of these issues. The Chinese are in a situation where they're thinking very much about keeping people employed, unemployment, keeping the middle class happy with automobiles.

We're very differently situated, and so I would think it would be very difficult on some of these cooperative programs.

A related question or comment is this question of energy independence. Let's say that we actually achieve energy independence, and I understand all the national security arguments for that. But, I'm not an economist, but the economics of it would mean probably the price goes down for oil and petroleum if the U.S. gets that out of the market. It becomes much more attractive for--the rest of the world has to become energy independent, too. The oil producing states that, as you mentioned, Governor Manchin, are problematic for us would still be producing the oil if other countries such as China decided to buy them.

So we might solve our problem maybe, but it doesn't get to the issue of the key issue which I think you touched on, which is that these oil producing states would still be able to sell to other countries at possibly a more attractive price. So anyway, those are sort of the four observations I've had on what you've said even if we do achieve our own plans here.

MR. MANCHIN: China is building. They're not waiting for us. They can't afford to wait for us. Now, we can either work with them or sit back and watch what they do, and I think what we're doing now is we're interacting. I'm going over to Shanxi Province where they're large coal producers like the state of West Virginia, and the type of mines that we have in West Virginia are the same as what they're mining there.

So a lot of our people from West Virginia are already selling an awful lot of the product and using a lot of the technology. They are so interested in working, but they know they have to produce the energy and they're going to produce--their coal production is going to increase. We know that. They're projected to go up over to from 1.7 to 3.2 million tons per day in production by 2020. Their demand for oil is growing at just leaps and bounds. So with all that being said of how we're going to work with them, are they putting as high a value on sequestering as we are? I don't think so at this point.

Could we learn an awful lot by them being so advanced as far as their time schedule of building these plants? I think that we can learn a tremendous amount. Could we work in a joint venture sequestering to see how it does work if there's some answers in it that we are

looking for before we move forward? I believe so. And those are the things we're going to explore to see what type of relationships we can build. But--

VICE CHAIRMAN BLUMENTHAL: Wouldn't we be putting incentives in place if we became energy independent for the Chinese or the Indians to be buying oil and petroleum at lower prices?

MR. MANCHIN: I think you're going to be depleting the oil supplies. Everyone has told me that over the next 20 to 30 years, our oil supplies are going to be depleted tremendously. With that, then supply and demand will work on that. In South Africa and Sasol became energy independent, it never changed a whole lot of the world markets, and I think in this country we're always going to have oil producing states I would like to say for the far future. And we're talking about that being part of the energy independence.

Every state should look at its reserve base right now and how can the state of West Virginia or Montana be energy independent by 2030? Let's say that we reach an independency of 150 percent, and then we can help another state that only gets to 60 or 70 percent. I think Jimmy Carter in 1976 said we'd be energy independent by 2000. Where do you think we'd be today if that would have happened?

I don't think that we would be at \$3.20 or 50 cents a gallon, but it would still be increased over what it was in 1976, I'm sure of that. What happened, the market fell off in the '80s, administrations changed, priorities changed, directions changed, and we have what we have today.

I don't think we can wait and be sitting here at 2025 saying, oh, we sure intended to be energy independent by 2030, but we just didn't get it accomplished. I don't think you can afford that.

MR. SCHWEITZER: Let me just suggest to you that actually for better, for worse, China is centrally planned. And they can move faster than we do. We have the greatest system in the world, but we usually move pretty slow here in Washington, D.C. China can decide this is the direction we're going and a couple dozen people can say that is the direction we're going, and they can do things like they're doing right now, which is building coal-to-liquid plants with Sasol and Shell Oil technology in China today.

As to the legal regime, I think China is probably in a better circumstance than we are because it's centrally owned. So they can simply say we shall put CO<sub>2</sub> here and we shall deliver the coal from there. So they can actually move a little faster than us, but when we look at the oil market as we go forward, I absolutely agree with you. If the United States produces all of our liquid fuels domestically and China does and India does, and other countries do, well, then we'll be awash in oil. That would be the theory and the price of oil could drop

to \$25 a barrel.

I believe that to be true for a short period of time. The problem that we have right now is, as we look at the consumption curve, in China, .8 percent of the people there own a car. They're going to get to two percent and then five percent and then ten percent, and India is going to get there as well, and Bangladesh, and the rest of the world is moving very rapidly in their ability to consume oil.

So even if the industrialized countries of the world that have resources like coal and biofuels, as we decrease our consumption of oil, you can bet your bottom dollar that the third world is going to continue to increase their consumption of oil at a faster rate than the oil-producing countries can produce it.

So I'm optimistic that the price of oil will stay well above \$40 a barrel for most of the next 20 years.

HEARING COCHAIR D'AMATO: Can we go to a second round?

VICE CHAIRMAN BLUMENTHAL: Sure.

HEARING COCHAIR D'AMATO: Commissioner Videnieks.

HEARING COCHAIR VIDENIEKS: You both mentioned the urgency of the matter. We had testimony yesterday from a lady from Lawrence Livermore National Laboratory, and she mentioned, actually stuck pretty hard to the sequestration time frame as being ten years. Then underground gasification of coal, she was a little bit more optimistic there saying maybe five to ten years.

Recognizing we're not as efficient as an autocratic government, and we do have these legal problems, what could we recommend to Congress, the Commission, how to accelerate this process? I understand the risk factor. Subsidies may not be a good word, but someone has to maybe come up with government guarantees.

Maybe both you governors could come up with some recommendations to us we should recommend to Congress.

MR. MANCHIN: I can see two, just two very simply. The first is the financial end of it. Financially, there has to be a base to work off of or the financial world will not engage. And there's not a state nor the federal government going to take the front-end risk on this. So you have to engage the capital of this country and around the world in order to get in this venture.

Second is that this federal government has to change its policy towards long-term contracts with viable alternative energy and domestically produced. It could only be a percentage. It doesn't have to be the whole ball of wax in one arena, but basically what they could do is say that we're going to put 20 percent of our consumption out for long-term contracts based on a viable energy produced in this country, and they can identify the viable energies that can be used, whether it's ethanol biofuels or coal-to-liquids.

They've already tested coal-to-liquids in the B-52 bomber and it's worked very well. They know that will work. So they're doing all this, but until they change their policies, you're not going to have anyone again in the financial arena taking the risk. And you won't have a private developer or a state stand on the front end of this that would be able to afford to do it.

So until those two things happen, and whether they call it a subsidy or not, it's basically setting a baseline, and a subsidy basis is when you subsidize somebody not to do anything. We're saying to set a debit and credit. If it falls below prices, we don't believe it will sustain a low price, but they could artificially drive it lower.

If the world market drives the oil prices lower artificially to disrupt the financial markets, if you will, then I understood in the '80s that's pretty much what was the doom on the coal-to-liquids in that period. With that being said, we could really solidify.

MR. SCHWEITZER: Here's the greatest challenge. If you consider all of the CO<sub>2</sub> we're putting into the atmosphere today, and you wanted to create some kind of an incentive plan to get that CO<sub>2</sub> placed beneath the surface, at \$30 a ton, and that's kind of a wag that people are using for the cost of sequestering that carbon, my math shows that's plus or minus \$12 trillion a year.

Now, I believe that with time, with research, we will find ways of putting carbon beneath the surface, sequestering it in some way cheaper than \$30 a ton, because simply stated, we can't remove \$12 trillion from our economy every year for the next 20 years and be competitive with the rest of the world.

There are a few things that we've got to do right now. Now, I understand people are saying we've got to move fast; I'm one of them. But how about if we start the new facilities that we produce in this country sequestering the carbon dioxide? People are talking about cold ammonia treatment of existing pulverized coal plants so that you can remove the carbon dioxide as a liquid and sequester it. That's not 30 bucks a ton. Near as we can tell, that could be 100, more. How about if we incentivize all new production, all new production, to carbon capture, and let's start in places where you can carbon capture with enhanced oil recovery because now you have a double win. You increase domestic oil production and you're storing, capturing carbon in those geologic zones.

Now, there are those who would give up the good for the perfect. They say but enhanced oil recovery only captures 65 percent. We want to store 90 percent. Well, simply stated today, we don't have the technology to assure that we can get to 90 percent.

So set a standard at 65 percent, and I can assure you there would be a dozen of these plants built and all of that CO<sub>2</sub> would make it to

enhanced oil recovery. Let's get started. Because if we wait for the perfect, we'll lose.

HEARING COCHAIR VIDENIEKS: Okay. So basically I guess a ten-year time frame, the witness actually mentioned the liability problem, the possibility of the CO2 migrating to water supplies, maybe escaping back up, and there is, I think you mentioned a liability issue that's not resolved. The legal part, I guess, Congress can move quickly on.

But also she testified that the scale of the plants being developed at the commercial scale is huge because the pressures cannot be created in small scale situations. So I would guess a ten-year number is a, maybe not a good number but a realistic number.

MR. SCHWEITZER: It's a mark on the wall. It's a place to begin. I'm a scientist. I'm involved in these things. I'm watching the development of public policy, and I'd be surprised if we ten years from now had even completed the public policy, let alone the commercialization of these projects.

HEARING COCHAIR D'AMATO: Thank you. Thank you. Chairman Bartholomew.

CHAIRMAN BARTHOLOMEW: Thank you very much and thank you again to our witnesses for taking time out of their busy and important work in order to appear before us.

Two questions on my end. One is can you talk to me about how you identified the business opportunities that companies in your states are doing with China? Are you getting the kind of assistance from the federal government that you need to be getting in order to fully identify and take to fruition the opportunities? Are the opportunities being identified by individual businesses? How does that process work?

And then the second question is as you look to the economic future of your individual states in terms of opportunities with China, are more of the opportunities going to come from sales of coal or sales of coal-related technology?

MR. MANCHIN: In West Virginia, we do the same type of mining, which is deep mining, underground mining, that they're doing in most of China where most of their production is coming from. So with that, our people in West Virginia, the manufacturers, whether it be the conveyers, whether it be the prep plants, whether it be the machinery, whatever it takes. We've been doing this for quite some time so it was a great opportunity with the trade policies. But basically let the private sector go over and determine how their relationships are going to be. So we have people that are over there that are selling equipment, that are basically training Chinese as far as in the use of equipment.

They are also doing manufacturing, whether it be manufacturing here and assembly there, or vice versa. They can do that. They're also in joint ventures of mining. So we have West Virginia companies that have been historically mining companies, they are now mining in China or in a collaboration with the Chinese government or that province if you will.

So there's a great collaboration. I just entertained a group yesterday that came to West Virginia and I'll be going to the coal show in November. China is very serious about coal and the coal production and the resources they have and how they're going to use it for the development of their country.

We can learn an awful lot, but it's also an economic opportunity for a state like ours who does a lot of the machine work and the technical end.

CHAIRMAN BARTHOLOMEW: Governor Schweitzer.

MR. SCHWEITZER: Well, the short answer is that it will be coal technology, not coal sales, because China is already a net exporter of coal. They import some coal and they export some coal, but frankly, they're large coal producers, they'll continue to be so, and they will be exporters of coal for the foreseeable future.

As to commercializing business opportunities and assistance from the federal government, I think that once again it's states and private business who just take the lead here, and frankly China has taken the lead themselves. They are the ones who are recognizing that they have an energy crisis. They recognize that coal is going to be part of their future, and so they've been reaching out to the world's technology companies, whether that be Shell or General Electric or Sasol or RENTEC, and they have been putting partnerships together to build coal gasification and liquefaction in China.

Where does it all end? I don't know. With central planning, sometimes the result is spectacular and sometimes not so much, but we can see that they have a desire to produce domestic energy, new technologies using coal, and we have companies that are on the forefront in developing that technology.

So there is a desire for commercialization of new technologies in China, and apparently they're willing to do some of those sort of experimental commercializations that we're not. So as it turns out, we may actually be going to China to see how it worked out and not the other way around.

MR. MANCHIN: The World Energy Outlook for 2006 predicted that China would surpass CO2 emissions of the United States by 2009. That took us a long time to get where we are today, and they're going to surpass us in a very short period of time. But they're not going to slow down on the building of energy.

CHAIRMAN BARTHOLOMEW: Do your companies have the same kinds of fears that companies in other sectors of our economy have, that they're developing the technology and the Chinese are either stealing the technology or they're sort of a forced technology transfer? are the opportunities going to continue to be there for the companies in West Virginia and in Montana that are developing the technology to continue to developing technology here, and what about the manufacturing of the equipment?

MR. MANCHIN: The thing that I was encouraged about yesterday because with the tragedies we've had in the mining industry in West Virginia in the last year, we've really accelerated our mine safety laws and rules. We're about two years ahead of the federal government, and we're implementing this month some of the far-reaching advances of keeping our miners safe.

I spoke to our Chinese delegation yesterday and they were interested, very much so, which was very encouraging, so when we go there we're taking our legislation with us and showing them all the new technology that's working for underground chambers and also tracking devices so we can make sure we can keep our miners safe.

So with those type of technologies there, and the need to be able to mine coal in a much safer environment, but also the technologies, I have not heard the concerns from our companies that they have stole our latest and greatest technology. It's basically a collaborative sharing of it, and they're developing at such rapid rates they're going to increase their production from 1.7 million a day to 3.2 by 2020. That's a tremendous technology advancement that's going to be garnered in order for that to happen. You can't do it with what we're doing today.

It will be the same as happened in this country in the '40s and '50s. We had hundreds of thousands of people working in the coal industry in the state of West Virginia. Now, we have a few thousand but we're producing more coal than ever with technology. It will be the same. And it will depend on the total collaboration.

CHAIRMAN BARTHOLOMEW: Governor Schweitzer.

MR. SCHWEITZER: In coal technologies, like a lot of technologies, there are challenges because China's record in respecting intellectual property rights has not been stellar. And so I view these partnerships are commercialization partnerships, and so the companies will be partners in the production of the fuel and the production of the electricity, and they will reap the rewards through actually producing the products with the full expectation that as time goes forward, those intellectual property rights will just kind of shift into the general space in China.

It's kind of the way it works, but for a lot of the countries around the world when they do business in China, they recognize that, and so

they become equity partners in production, and I think that's what we're seeing in the energy world as well.

CHAIRMAN BARTHOLOMEW: Okay. Thank you.

HEARING COCHAIR D'AMATO: Thank you. Commissioner Reinsch.

COMMISSIONER REINSCH: Thank you, both of you, for some very interesting and helpful testimony. For a non-expert like me, it's been a real education and I appreciate that. I'd like to get you to focus a little bit on costs or sticks rather than carrots which is where you've been.

Most of the discussion has been about how to, as I interpret it, enhance coal production and use it in a way that's safe for the miners and environmentally sound, which is all important. I think we all think those are important things, but I'd like to go back to the four billion barrel problem that you mentioned, Governor Schweitzer, and ask you both to talk about the costs that are going to ensue from doing all the various things we're going to have to do to deal with that problem.

You made a good point, that we can't address the problem adequately without coal. I think likewise you would probably agree we can't address the problem solely through coal. So we're going to have to do some other things as well, some of which you alluded to.

I'm interested in any comments you might have on the costs to the economy, not the costs in appropriated funds of various R&D programs or price floors or things that the federal government can pay for, but the economic costs in terms of growth, unemployment or employment, things like that, of taking the steps that we're going to have to take to get where I think we all want to be.

MR. SCHWEITZER: It's been estimated by those in industry that to shift from pulverized coal electricity production, for example, in this country to integrated gas combined cycle so that we could produce the electricity without putting carbon dioxide into the atmosphere, in fact, we get a pure stream of carbon dioxide and pump it back into the earth, that would increase the cost of electricity to consumers by 25 to 40 percent.

Sounds like a big number. But when you consider that for the last 50 years, our energy conservation has improved by about 1.5 percent per year, it means that we would gobble up that additional cost during the next 15 years just based on our inherent ability to conserve energy, to find new systems that get more production with fewer electrons. And so some would say that 25 percent cost would have to be paid for in some other sector of the economy.

I view it completely different. I see this as an opportunity in developing new technologies, and when we invested all of this public/private partnership in the NASA program, there were very few

at that time who said, oh, my gosh, how can we afford to put a man on the moon?

And as we look in the rear view mirror today, everything from the jets that we fly in to new ways of moving energy and developing the fuel cell technology, everything to the Frisbee, it was based on that research and development at NASA.

There's very few people in this country today would say that that huge investment that we made, that public/private partnership, was a mistake. This is a greater opportunity than even the space race. This opportunity that's presented to us today could be the greatest engine for America's technology and innovation in the history of this country if we get it right.

If we get it wrong, a country like China may lead and they will be the exporters of this new technology.

MR. MANCHIN: I have to agree wholeheartedly. I just think the upside is so great that--we know the profits are there with the oil companies making record profits, unheard of, and if you look at basically those types of investments that we've make in this country to secure energy independence and the return as far as in human capital and the jobs and the investments that would be required in order to attain that, it would be a tremendous windfall for this country and for the states that would partake in it. So I see nothing but an upside to this.

COMMISSIONER REINSCH: I guess what I'm trying to get you to comment on, and I'm not succeeding, but that's all right, is that if it were that good a thing and if it were that obvious, you think we would have figured this out and started doing it a long time ago.

MR. MANCHIN: I'd just mention the profits. I think the profits that are in certain hands right now prevent this from happening.

You don't see any of the large oil companies jumping to the front trying to build coal liquification; do you?

MR. SCHWEITZER: Look, it is not going to happen without the visible hand of government stepping out and saying this is the direction we're going to go. For example, if Montana all by herself decided we're not building any new electricity generation unless it is carbon neutral, well, we would not be competitive with North Dakota and Wyoming.

It's like the lion tamer. The lion tamer goes to the center of that cage and there are four lions in all four corners. And that lion tamer can turn his back to the other three lions and put out the whip and force a lion to do something in front of him. Now, people wonder, how is it that those other three lions don't jump on his back, attack him, bite him?

It's simply that that lion tamer has four different species of cats

and all of them are natural enemies. So if anyone of them jumps on the lion tamer, one of the other lions will jump on the lion.

Now, in a competitive market, if Montana decides that we're going to produce our electrons much cheaper by spending more money, all of our neighbors who are the cats in the community, they will jump on the market and take over.

But I can tell you this. It is the states in the western United States and some other states who have taken the lead. In California, Washington, and Oregon, Arizona, New Mexico, they've said, if we're going to import new electrons, it will be carbon neutral. So it sends a signal to a place like Montana where we have coal and we have wind. If we're going to produce new electrons for them, we're going to produce them carbon neutral. It means we're going to use wind power and we're going to use zero emission coal technology.

So once the market demands these cheap-- these electrons that do not emit additional carbon, then those of us who are producers will produce it. So if the market is created by central planning, by states or by the federal government, we'll get with it. We'll produce those cleaner electrons.

MR. MANCHIN: Let me just say from the financial end of it, these windfall profits that companies have enjoyed, if those windfall profits after they meet their financial marks, and they have a windfall on top of that, where there was public policy in this country that said that they had to be reinvested in alternative energy, not--I've heard people talk about windfall taxes. Why should the federal government want to tax or penalize? Make them put that in production. Make them use those excess monies they're making, put it back in production, so the people of this country won't be hurting as bad as they are now, to relieve us and make us more competitive.

To me, that makes all the sense in the world. When is the last time that we've had a refinery? I've heard just recently that some of the refineries are down right now during the peak season that's driving the prices up. That doesn't make sense to any rational West Virginian. I can tell you that. But yet we do nothing on public policy to force these monies to be invested.

COMMISSIONER REINSCH: That raises a whole other set of issues. I think I better defer to others.

MR. MANCHIN: Did you get where you were going?

COMMISSIONER REINSCH: Part way.

HEARING COCHAIR D'AMATO: Commissioner Houston.

COMMISSIONER HOUSTON: Thanks to both of you for being here today. I feel like I've gone to coal school and I should have a diploma when we're done, but everything that you have said is very fascinating and very interesting. I would agree and disagree with many

things that you've talked about with some of your public policy solutions, but we can't recommend to Congress domestic agenda unless it has a China hat on it.

The important thing that I want to bring out of this hearing this morning is how all this relates to our relationship with China, our economic security, our national security with China.

Following up on what Commissioner Blumenthal asked a little while ago. There are differences between us and China. Our property rights are absolutely critical to who we are as a nation and our success, and China doesn't have any, which in a weird case like this, would make that almost a positive for them. I hate to say that out loud, but the other thing we have here is political pressure.

I lived in Texas and I tried to work with TXU and help them out when they were trying to change nine yucky plants into 11 plants that are using clean coal technology, and every environmental group in the country converged on TXU, hooked up with the mayors of Dallas and Houston, and it's about killed what they're trying to do.

That's another thing that China doesn't have, I believe, are these interest groups that come out and try to fight anything that has to do, if it has to do with coal, it's bad. Even if it's fixing coal, it's still bad. So that's something that we suffer under here that they don't have.

We have a paradigm with our relationship with China or so it seems at this point, which is that we go there and we give them technology and we give them advice on, in this particular case, energy policy and tech transfer, which is great.

Governor Schweitzer, you actually in a way brought up my own question when you said maybe we can benefit from what they are doing. So my question is, is it a paradigm that we should change in this particular case? Should we really closely follow what China's doing with sequestration, with the coal-to-liquid, all the new technologies that are emerging?

Are there any state-to-state relationships that you know of that really track how China is doing on advancing those technologies? Is there private sector study of what they're doing with the technologies? And we had a couple of people here yesterday who did these kinds of studies here in the U.S. on pollution, on energy, on important issues like that. Are there any studies here in the United States or any states that are looking at really an official program to track what they're doing with coal, especially with the sequestration, in China, that could help us here, that we could sort of piggyback on?

MR. SCHWEITZER: It may be a little bit more difficult to track exactly what is happening in China, because there's not public disclosure on what contracts have been signed, so we hear from the technology companies around the world that they've signed a contract.

We hear from Sasol. We hear from Shell. We hear from GE that they have contracted to build.

Our information will actually come from some of those publicly traded companies in their quest to build these new projects in China, and so while we'll probably not get such great exchange of information from the Chinese government per se, we do see a lot of Chinese government officials come to our states and vice versa.

But I think the conduit to this information will be those contracts that a central planned government is making with corporations around the world, and, yes, we will learn from their technology because instead of talking about commercialization of some of these projects, they've actually laid the money down and they're beginning to build these projects.

They'll make some mistakes. Everybody wants to be the first one to build the second plant. Well, China is in a position of saying they're going to be the first one to build the first one. And so we'll learn from some of their mistakes, and they will learn from us some of the technologies that we have that will contribute to the possibilities of commercializing some of these big IGCC plants.

There are some advantages with clean coal technology, and that's simply this: as the price of energy goes up and the price of coal goes up, Joe Manchin is in a remarkable place where their coal is worth--how much a ton in West Virginia?

MR. MANCHIN: It can go up to 80 to \$100 a ton, anywhere from 30 to 80.

MR. SCHWEITZER: In Montana, once you've got it on a rail car, you're talking six or \$8 a ton. So if you've got six or \$8 a ton coal, you're not so concerned about how much energy you get from every ton, but if you've got coal that is worth \$80 a ton or \$100 a ton, or \$120 a ton, then coal gasification which squeezes all of the energy out of the coal as opposed to only about 25 percent with our current technology, it's like with a pig. They get everything out of the pig including the squeal when you use IGCC.

But with old coal technology, you're sending 75 percent of the energy up through the stack. So, as we continue to move up in the value of our energy, we're finding that it's driving us to these new technologies simply because of the commerce of the price of energy.

COMMISSIONER HOUSTON: Governor Manchin, I'd love to hear your thoughts as well. I'm wondering if perhaps a recommendation that we should think about is one to either EPA or DOE about really trying to track the progress in China because the paradigm always comes the other way around.

MR. MANCHIN: We might have a golden opportunity. We've been talking to the Shanxi Province, which is the largest coal

producing province of China, and it's very much like West Virginia. And they're working on an agreement right now. Our economic development office is working with their economic development office. They were over yesterday, their vice governor, and they've invited us over. We're going over and if we get this working relationship and working agreement based on many facets, which will be from coal mine safety to the health and welfare of the human factor, the miners, all the way to the technology, sharing in technology, it could be things that we could try there that we can't here because of regulations.

There are so many different things, and this might be a wonderful committee to recommend where we join into a type of relationship that we share all facets of production technology and I think that we can both benefit by that. But we're very close. We've been talking and working with them. They're pursuing it very aggressively. They want that relationship and they know that West Virginia is the state that would be the most aligned with them to do that relationship.

I've basically been working with our delegation here in Washington and making sure that the policies of this government would be in sync with what we'd be trying to do, so it might be something we could further the cause of all.

COMMISSIONER HOUSTON: Great. Thank you very much. Appreciate it.

HEARING COCHAIR D'AMATO: Thank you very much. Commissioner Fiedler.

COMMISSIONER FIEDLER: I want to pursue the Chinese view of sequestration. You said earlier that you didn't think they were pushing the initiative. Have you had discussions about the economics of it with them?

MR. MANCHIN: We haven't got into that. I will when I travel over and spend time with them. I have not gotten an impression that they were holding back the construction or the forward movement of the needs that they have for liquids out of coal, trying to get more value out of their coal, being able to get more production in their coal mines.

That is the foremost thing on their minds right now from what I have been able to ascertain from this. I'm sure that we can make that part of our agreement, working with them to see if there's some other technologies. That's the question that was just asked now; how would that work in parallel to benefit us? But with that, I have not seen the concern about, well, we have to sequester before we can build a coal liquefaction plant or another coal-fired plant or IGCC plant.

COMMISSIONER FIEDLER: Yes, they're on a fast track.

MR. MANCHIN: They're on a fast track. By '29, they're going

to surpass us. They're building. We're still talking about building the first IGCC plant. How many do they have in production now?

MR. SCHWEITZER: A few. The advantage is this: while they're not talking about carbon sequestration, at least they're building plants that are carbon capture ready.

MR. MANCHIN: Right.

MR. SCHWEITZER: Take the South Africans who have been making liquid fuels from coal for some 50 years. There's been no compunction to capture the carbon, but they have a pure stream of carbon. It just runs right up a pipe and into the atmosphere.

In Uzbekistan, they've been employing in-situ coal gasification now for decades, but of course they've done it because it was inexpensive to produce the coal gas in that way, not because they could get a pure stream of CO<sub>2</sub>.

In fact, I'll bet you five years ago, there wouldn't have been a whole group of people that represented the number of people that we have in this city who were sitting around talking about CO<sub>2</sub> and carbon sequestration. So before we get so high and falutin about our leadership in carbon sequestration, let's remember we didn't even talk about it ten years ago.

MR. MANCHIN: Right.

MR. SCHWEITZER: So they at least are moving towards carbon capture ready technology and that's ahead of us. Now, we will do the research and development in carbon sequestration because that's what the economy of the United States can afford to do.

We will be the ones who take the lead in the development of this sequestering technology, not the Chinese. They may actually lead us in developing clean coal technology with carbon capture ready gases, but not in sequestering because that costs some extra money.

Right now, we don't have any standing because we're not capturing the carbon, but once we develop this technology and we start producing carbon as a pure stream CO<sub>2</sub>, and sequestering, then we can go back to our friends and competitors in China and say if we're going to be sharing all of these technologies and if we're going to continue to buy your goods and services, and you're going to continue to buy our goods and services, we need to be on a level playing field. We're spending money to capture, you're not, so let's get in the same game.

COMMISSIONER FIEDLER: So what's the principal opposition that you're facing here in Washington when you raise these issues at the executive branch level or even other members of Congress?

MR. SCHWEITZER: As you know, in this town, there are rooms full of suits who work for special interests, and special interests, for the most part, like status quo. If you represent big oil, and your client has \$60 billion in cash, simply because they have been the conduit of

delivering foreign oil to our economy and delivering the cash back to some dictator, you like the status quo. You don't want to change anything.

If you are working for a utility that has electricity generation portfolio that includes old coal technology, you don't want to change anything. If you happen to be in the wind business, you just, you don't like the coal business. If you happen to be in the nuke business, you don't like the coal business, and so the greatest challenge that we have is that this town is built on the status quo.

You want to move this town, you better take some considerable amount of money and some time and probably a worldwide crisis. Until we get one or more of those as a nexus, we probably aren't going to move this town. You ask me what the greatest challenge is, it's rooms full of suits that work for people who have a lot of money who want to keep the status quo.

MR. MANCHIN: I would agree.

COMMISSIONER FIEDLER: That's a direct answer. You were talking about earlier how you pay for it and whether the rate payer pays for it, and--

MR. MANCHIN: We're a controlled state.

COMMISSIONER FIEDLER: Yes, I understand.

MR. MANCHIN: We're still a controlled state. Public service commission controls the rates and it's a pass-through operation.

COMMISSIONER FIEDLER: The biofuels development has raised a number of concerns, and the financial, the economic impacts have been immediate. So the price of corn goes up, and folks' food prices follow very quickly, and by the way, we're not producing a lot of fuel yet with it. Yet, the economic impact on folks at the lower income level has been percentage-wise fairly dramatic, and should continue.

I don't know what the offset is on their gasoline prices or their automobile operation prices.

MR. MANCHIN: It seems like the policies of the federal government is that's become the darling because there is no CO2 emissions from the production, and with that being said, it looked like they threw caution to the wind as far as what the food chain would do and what the people on the lower end of the socioeconomic ladder are going to endure just for the sake that it seemed more acceptable without truly trying to come to the table to secure a solution. And I think we're going to pay disastrous for this.

COMMISSIONER FIEDLER: Or on the world's food supply.

MR. MANCHIN: I think the most successful that I'm told and what I've read and studied has been with sugar cane. Sugar cane has the better yield, I believe; am I right on that?

MR. SCHWEITZER: Yes.

COMMISSIONER FIEDLER: Yes, energy output. That's right.

MR. SCHWEITZER: That's right.

MR. MANCHIN: Yes, sugar cane for the ethanol, if you will, than what we are doing with corn, and corn has a rippling effect of what it's doing to the food chain.

MR. SCHWEITZER: Yes. It's fairly clear. I ran the numbers for you, that unless we get to that quantum leap of cellulosic ethanol, that all of those acres that are dedicated to export equate to 15 percent of our liquid fuel demand and none of our electricity. So it's a very small player. It gets a lot of attention frankly because I think there's focus testing all over the country, and people have gotten to a position where they like to hear the word ethanol.

So if you are in Washington, D.C., you say those words that people like to hear, and they seem to like that word.

COMMISSIONER FIEDLER: Thank you very much.

MR. MANCHIN: Just one thing, I just think that basically what we have to find every day as being CEOs of our states--and it really is what we do everyday--we make decisions every minute of every day--that we're looking for balance. For some reason, I would think that this federal government should be looking a little harder for balance than what we're finding.

You're not going to govern from the right or the left; you're going to find a balance. If we can find a balance with our energy needs and our energy ability to provide that, and we can look at other countries, your relationship and our relationship with China, if that's the country that can help us find that balance in America because they don't have the impediments we have, we can join into a cooperative relationship, I think it's something that we probably should explore.

COMMISSIONER FIEDLER: Thank you very much.

HEARING COCHAIR D'AMATO: Thank you very much.  
Commissioner Shea.

HEARING COCHAIR SHEA: Thank you, Governors, for taking the time to be here today. I'm not a scientist, I'm not an economist, but I am the grandson of a guy who worked in coal in Pennsylvania in Pittston. Question, two questions, one very specific. Governor Schweitzer, you said--correct me if I'm wrong--that one-half of the mercury emissions in Montana come from China?

MR. SCHWEITZER: No. It is estimated that half of the non-naturally occurring mercury in the surface, in the water, in the air, in the western United States arrives from China. So it's a global problem is what I'm saying about mercury.

HEARING COCHAIR SHEA: Okay. Secondly, as a non-expert in this area, my understanding of carbon sequestration is that you have

to take the gas, the CO2, and pump it underground into geological formations so that we can keep it there for 10,000 years, and Governor Schweitzer, you said that we probably could do 90 percent, have a 90 success rate in that.

Do people in your state have expertise in mapping the geological formations to--you got to know where to pump this stuff.

MR. MANCHIN: Sure.

HEARING COCHAIR SHEA: And is this an area of potential cooperation with China, the expertise of people in your respective states on--

MR. SCHWEITZER: Absolutely, and Joe mentioned the DOE has funded regional carbon sequestration studies. In Montana, it's called the Big Sky Sequestration Project. And we have mapped the geology of Montana. We know approximate depths, which salt domes, which saline aquifers, which basalt formations, where in the Madison Limestone that we're likely to be able to store it, which of those enhanced oil recovery opportunities are going to be successful, and so we've spent a little money on this, just to give you an idea.

I think Department of Energy has funded the Big Sky Sequestration Project to study the geologic structures of Montana and Wyoming, a place where we have \$12 trillion worth of coal, and they've spent approximately \$18 million in the last five years to study the carbon sequestration opportunities.

There's some earth in the balance. Well, that's economics out of balance. If we're serious about this, let's put some serious dollars into it, and I have suggested to Congress you need \$15 billion to study the carbon sequestration geologic opportunities.

HEARING COCHAIR SHEA: 15 billion?

MR. SCHWEITZER: Billion with a "B," which is very small compared to the value of the coal BTUs that we have in this country. If we're serious about using the coal in this country as a legitimate source of energy in the future, we've got to get carbon sequestration correct now. And since America has more coal than any other country in the world, and we have a competitive advantage in our coal, if we can get it correct, it seems to me that \$15 billion worth of research and development is a very small price to pay.

We can't wait ten years. We can't wait 20 years. We need to move now. \$15 billion for our resource--like I said, in two states we have \$12 trillion worth of coal at current prices. So, yes, we are studying; no, we are not investing enough.

HEARING COCHAIR SHEA: On mapping.

MR. SCHWEITZER: But we are making opportunities available.

MR. MANCHIN: There's still a lot of unknown, and I think that's the caution that everyone seems to be taking because of the

unknown. I guess when you're pressed as we've been pressed in different times in our history, we do what we have to do.

HEARING COCHAIR SHEA: Thank you.

HEARING COCHAIR D'AMATO: Thank you, Mr. Chairman, and let me just reiterate that the central purpose of this hearing is to explore the possibility of new cooperative ventures and ideas that we can put forward to the Congress. We're particularly interested in your relationships as you go forward with your counterparts in China.

You're going on a trip. We would be interested in what you find when you're there, the kind of possibilities with public and private--

MR. MANCHIN: We've been part of their international coal show since 1980s. West Virginia has taken a very active part in that, and a lot of our vendors have been there. And as things opened up and trade changed, if you will, we got more involved, and then we opened up a little bit more for capital investments and partnerships. Then we had some of our industrialists, if you will, had gone over there and put in some joint ventures with them.

So we've had a probably as long, if not longer, relationship in this arena than most. They seem to be reaching out to another venture right now with this signed agreement, this sister statehood, if you will, of how we jointly share. We need to explore that with the federal government of how West Virginia can be catalyst of seeing how we can share information, how we can try new technologies, maybe on a more rapid scale than what we do on our own, so that the unknowns that we have that are of much concern to all of us might be something that can be put to rest a little quicker there.

HEARING COCHAIR D'AMATO: And useful to other states as they explore--

MR. MANCHIN: Very much so.

HEARING COCHAIR D'AMATO: --their sister state relationship and how the United States federal government can encourage these relationships so you're not always on your own.

MR. MANCHIN: Right now you don't know--and I want to make sure that my delegation, Senator Byrd, Senator Rockefeller, and our congressional delegation, everyone is in sync. We enter into relationship and agreement through a mutual MOU, if you will, that we're all moving on the same track, and it's to the benefit of not only the state of West Virginia but the entire nation.

HEARING COCHAIR D'AMATO: Thank you. We're very much interested in staying in touch with you on how that goes.

MR. MANCHIN: Sure, please.

HEARING COCHAIR D'AMATO: Thank you. Chairman Bartholomew.

CHAIRMAN BARTHOLOMEW: Thank you very much. Thank

you, gentlemen, for your very interesting testimony. Governor Schweitzer, I think of the suits that you refer to, of course, everybody here says all they want is a level playing field, but they always want the level playing field to tilt in their direction.

Before we take a short break, let me note that we've been presented this morning with a statement from Senator Byrd addressing the effects of China's energy usage. Senator Byrd had other commitments this morning, was unable to be here in person to deliver his testimony, but we're very pleased to have his statement, and we will place it in our hearing record.

He is as everyone here well knows currently the President Pro Tempore of the Senate and Chairman of the Appropriations Committee. He has had a strong and long-standing interest in the U.S.-China relationship and was one of the primary actors in the creation of this Commission. We are very pleased to have his testimony. We're very thankful, grateful to you both for appearing before us today. We look forward to continuing to work with you, and now we'll take a short break.

MR. MANCHIN: Thank you very much.  
[Whereupon, a short recess was taken.]

## **PANEL VII: POLICY STRATEGIES FOR ADDRESSING THE EFFECTS OF CHINA'S ENERGY CONSUMPTION**

HEARING COCHAIR VIDENIEKS: We'll start with Panel VII, which deals with policy strategies for addressing the effects of China's energy consumption. And I'll introduce the panelists as presented. Our first two speakers will examine the strategies for addressing the environmental consequences of China's energy use. Our first speaker is National Resources Defense Council Senior Attorney, Barbara Finamore. She is the founder and director of NRDC's China Clean Energy Program. Ms. Finamore has over two decades of experience in environmental law and policy in the United States, China, Russia and Taiwan.

Next is Dr. Logan, Jeffrey Logan. He's a Senior Associate in climate and energy at the World Resources Institute. Jeffrey Logan has over 12 years of experience managing energy and environmental projects in an international context. His areas of expertise are clean energy market development, energy security, greenhouse gas abatement and energy policy analysis, primarily in the developing country context.

Then, finally, Mr. Thomas Donnelly. He's a Resident Fellow at the American Enterprise Institute. He'll address the policies for

mitigating the strategic consequences for the U.S. and the world of China's energy consumption. Tom Donnelly is a defense and security policy analyst for AEI, with past experience on the House Armed Services Committee, and the U.S.-China Commission.

Welcome to all panelists. We'll begin with Ms. Finamore.

**STATEMENT OF MS. BARBARA FINAMORE, DIRECTOR, CHINA PROGRAM, NATURAL RESOURCES DEFENSE COUNCIL  
PRESIDENT, CHINA-U.S. ENERGY EFFICIENCY ALLIANCE  
WASHINGTON, D.C.**

MS. FINAMORE: Thank you. Thank you for the opportunity to testify at today's hearing on China's energy consumption and opportunities for U.S.-China cooperation to address the effects of China energy use. Thank you for the kind introduction. I would like to add that in addition to heading NRDC's China Program, I am also the cofounder and president of the China-U.S. Energy Efficiency Alliance, which is a public/private partnership whose mission is to promote global sustainability by working with China to harness efficiency as a viable energy resource. Active U.S. Alliance members include all three of California's investor-owned utilities, the California Energy Commission, the California Public Utility Commissions, the Lawrence Berkeley National Lab, whom you heard from yesterday, energy service companies such as Nexant, venture capital companies such as Nth Power, Energy Foundation and other NGOs.

I would like to briefly begin by addressing one of the other issues that you are seeking testimony on, and that is the role of NGOs in supporting energy and environmental policy in China, and as the head of two of them I thought I would briefly summarize my views on what role NGOs can and are playing in these areas.

I believe, as my experience has shown, that given expertise and independence and long-time on-the-ground experience, these NGOs can and are becoming influential advisors to China, in part, because they don't have a hidden agenda or not so hidden agenda of the baggage of governmental policy or trying to make a profit. So we can become somewhat independent advisors.

We are also often able to respond more quickly to requests by the Chinese government for assistance on particular issues, and believe me, they come fast and furious. More important, we are able to make long-term commitments to working on particular issues in China and we have over the last ten years. And that is the kind of sustained effort that's necessary, both to help China develop sustainable energy environmental policies and, even more important, to implement them.

And I would add that when NGOs work in partnership with

experts from governmental agencies, multinationals, and also experts from the private sector, the impact can become even greater.

So for more than ten years, NRDC has been working in China to support domestic efforts to develop more sustainable energy and environmental policies. We build on our expertise in the U.S. on energy issues, and we partner with government agencies in China at the national level and in key provinces and municipalities, academic, nongovernmental organizations and the legal community.

We work at the national level to promote development of policies, look for ways to transform market incentives. We also work at the local level on grassroots and provincial level pilot projects that can, in turn, inform the development of national policies.

We were the first international environmental organization to establish a clean energy program in China and I'd just like to briefly highlight a couple of the successes that we've achieved over the last decade. We helped the city of Chongqing, which has 300 million people, to develop China's first residential energy code for buildings, which then became a model for the entire Yangtze River basin and then also led to the development of residential building codes for all three of China's climate zones.

We also assisted the Chinese government in developing tough lighting standards for buildings that if fully implemented could stop 60 million metric tons of carbon from being sent into the atmosphere each year.

We have been involved in a global effort to develop a single worldwide specification for energy loss from power supplies that you use to plug in your computer. Many of these are made in China, along with much other electronic equipment. We developed a single worldwide specification. It is mandatory in the U.S. It is as yet voluntary in China. But, again, fully adopted, this specification could help avoid carbon emissions in China equivalent to that of taking up to 650,000 vehicles off the road.

Third, NRDC and the Alliance have been working with Chinese experts to develop large-scale energy efficiency financial incentive programs, that use a portion of electricity rates to promote widespread adoption of energy efficiency technologies, and these incentive programs, which I'll touch on a bit later, could avoid up to one billion tons of carbon per year.

Fourth, as part of a public/private partnership, which began as a collaboration between the U.S. Department of Energy and China's Ministry of Science and Technology, we served as the project manager for the development and construction and operation of China's first internationally certified green building, which uses only one quarter of the energy and produces only 40 percent of the wastewater of a typical

office building in Beijing.

For this work, we received China's first Green Building Innovation Award. It is serving as a model for much other construction, both in Beijing and throughout the country. We have also most recently been the only nongovernmental organization to serve on the expert team for the development of China's first national green building design standard.

And finally, for the last five years, NRDC has promoted the use of technologies that can help reduce pollution and the carbon impacts of coal, such as coal gasification with carbon capture that we've been hearing so much about this morning.

Our advocacy efforts help to make coal gasification based polygeneration or coproduction one of the top priorities in China's mid to long-term National Research and Development Plan. We also supported the creation of a national roadmap on coal gasification development that calls for the construction of several large IGCC demonstration facilities to be completed by 2010.

Turning to the policies, I am going to focus my remarks on one particular area of cooperation, and that is energy efficiency. We believe and I think all the studies have shown, that energy efficiency is the largest, cheapest, fastest and greenest resource available to solve the global warming problem. And a recent study by McKinsey Global Institute found that throughout the globe increasing the energy productivity, the amount of energy we need to produce output, improving our energy productivity could cut global energy demand by half or more over the next 15 years.

This would in turn contribute up to half of the greenhouse gas emission abatement required to cap the long-term concentration of greenhouse gases in the atmosphere at 450 to 550 parts per million. But without increases in energy productivity, over one-third of the growth, projected growth in global energy demand will be in China.

But this McKinsey study found that China can contribute more to increased energy productivity than any other country because of the rapid growth that you've heard so much about, because it starts from a lower base and because it can adopt the latest technology at a lower cost.

In fact, when McKinsey came up with its five top priorities for global cooperation on improving energy productivity worldwide, two of its top three recommendations were, number one, to help China build its factories to international standards for efficiency and, number three, to help China build its new buildings to international standards for energy efficiency. So I would highlight those two areas as two of the three for global cooperation.

China recognizes that energy efficiency is key to its increased

economic growth and environmental sustainability. You'll hear a lot about its national goal for improving its energy intensity by 20 percent by 2010. But I would say that although it has the political will to achieve these goals, it lacks the way.

It faces several strong obstacles to achieving those ambitious goals: one, lack of capacity to implement the energy efficient building codes already on the books; lack of information on best practices and cost efficient technology; and perhaps most important, lack of an adequate long-term funding mechanism to help the customers afford more efficient industrial equipment, commercial lighting and cooling technologies and residential appliances.

And indeed, once more, the McKinsey Institute found that the leading barrier to energy productivity improvements throughout the world is lack of capital. So financial mechanisms are key to overcoming this

HEARING COCHAIR VIDENIEKS: Could you please try to summarize the rest?

MS. FINAMORE: We are working with private and governmental partners to break through the problems they're facing in implementing their ambitious building codes, which only ten to 15 percent of our buildings currently comply with, and what we are exploring the options of are creating a private sector code implementation network in China to supplement governmental efforts to implement these codes.

There's a system called RESNET. It's been receiving recognition in 17 states in the United States as a substitute for governmental compliance. In addition, in the U.S., the 2005 Energy Policy Act tax incentives for energy efficiency are producing very good results that we also think could be applicable to China.

Finally, demand-side management energy efficiency incentives have been proven in the U.S. and other nations to significantly reduce energy loads and reduce load growths at costs significantly less than electricity generation. China, after many years of discussion and debate has decided to adopt DSM as a key policy mechanism for achieving these goals. We have been working side by side with them, and particularly in one of their most advanced provinces, Jiangsu Province, who has already shown the benefits of adopting financial incentives in China, and this has reached the attention of the national government, which has adopted this as a national model.

And so NRDC and the Alliance have been asked to cosponsor a national conference next month with China's National Development and Reform Commission--

HEARING COCHAIR VIDENIEKS: I'm sure we'll have questions, more detailed questions, and you'll be able to fill in your

presentation.

I'd like to go to Mr. Donnelly now.

MS. FINAMORE: Okay. Thank you.

[The statement follows:]<sup>9</sup>

**STATEMENT OF MR. THOMAS DONNELLY, RESIDENT  
FELLOW IN DEFENSE AND FOREIGN POLICY STUDIES,  
AMERICAN ENTERPRISE INSTITUTE, WASHINGTON, D.C.**

MR. DONNELLY: Thank you very much, Chairman Bartholomew, Vice Chairman Blumenthal. It's a great pleasure to appear before you. Also, my former colleagues on the Commission and members newly named this year. The Commission's past year and I'm sure your work this year performs a unique function for Congress. There is no other body that considers the totality of U.S.-China relations as the Commission does, and if the Commission didn't exist, I'm sure we would want to invent it.

I've been asked to testify about ways that U.S. government policy might be adopted or changed based on the strategic consequences of China's rising energy consumption. It seems that the Commission, if this is Panel VII, you've probably heard a whole lot of about what the effects of rising Chinese energy consumption are, but if you can permit me a brief digression, I think I may have just kind of a different perspective on the whole topic.

And it will probably help place my policy recommendations in a more useful perspective. I will also try to adhere to the seven minute rule, and so I'm going to offer kind of a broad approach, a way of thinking about an American response rather than compendium of particular policies.

Briefly stated, I think that China's rising energy consumption already has a number of important strategic effects. Most obvious is just the price of energy itself for modern industrial economies, not only in the United States, but throughout the world. The price of energy is itself kind of a strategic matter, at least a quasi-strategic matter, and demand for energy, particularly that generated from fossil fuels in the Middle East, is accelerating faster than the ability to discover or develop it. So the time lines are pretty clear and pretty set.

But if the theory of market economics were purely true, the People's Republic would share with the United States a similar, possibly even a more enthusiastic commitment, to ensuring cheap and plentiful energy supplies.

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<sup>9</sup> [Click here to read the prepared statement of Dr. Barbara Finamore](#)

Whether the economic theory is imperfect I will leave to economists and I will leave to my colleagues on the panel the potentially strategic dimensions of environmental concerns, but I would like to talk about geopolitical effects of Chinese energy policies, and I think these are pretty clear, pretty well established and they really, in my judgment, ought to be the things that come at the top of the list when shaping an American response to the facts because the facts, as I see them as they now stand, are that China's increasingly enthusiastic quest for energy, is simply a reflection of the larger phenomenon of China's rise to great power status.

And I think that's the way, and certainly that was my impression from my work on the Commission, that that's the way the Chinese see things. It seems pretty clear that in recent years, Beijing views questions about energy resources from a geopolitical perspective. That is something more than the market commodity that we tend to think of energy resources as. The Chinese see other hands than the hidden hand of the marketplace at work in the global allocation of energy supplies.

This divergence is a major asymmetry in the way the Chinese look at things and the way we tend to look at things. But in my view, this is something that we might be able to use to our advantage to try to shape Chinese behavior.

The central problem or central political problem is that China's approach to natural resources has the effect, if not actually the intent, of giving support and succor to a collection of rogue states that stand well outside the norms of international society and which seek to frustrate the goals of the United States. I can partially list some of them--Sudan, Iran, Zimbabwe, Venezuela. You can probably go on as long as I could on that.

But it is also likely to encourage bad behavior on the part of states, for example, Nigeria who are not hostile to the United States and they're struggling to participate in international society, but are internally corrupt and institutionally weak. They're subject to the siren call of and prone to do bad things, as you might say.

So the most important question for us is how to mitigate these bad effects, whether they're intended or not.

I think this is an important challenge that challenges not only American interests but the cohesion of international society.

Our policy thus far seems to me is built around the hope of engaging China as a responsible stakeholder to encourage the Chinese to behave better. There's a corollary to this, the variation in the theme, slightly paternalistic effort to try to define for the Chinese what their interests are as though we could understand their interests better than they can.

But either way, the approach thus far hasn't produced what I

would regard as a satisfactory result. Iran is not only developing its nuclear capabilities but is playing an aggressive and destabilizing role throughout the region. So I would say again the trend lines are kind of getting worse and that China doesn't seem to have any interest in reining in any of its clients. They don't appear to see the risk and reward calculation in the same way that we do, in ways that we think would reflect that international responsible stakeholder.

So I think the shortcoming of our policy is that we only offer the potential rewards. We impose no costs on the Chinese. One cost-imposing approach would be to directly link U.S.-China relations, possibly even a broader economic relationship, to Chinese international behavior. The role of the United States as the guarantor of the international order is a global public good, which is hugely beneficial to Beijing, so they do have an interest in stability and security as we do.

But China's clients are among the most dangerous potential and immediate threats to that international order. There's a cost to us of responding to the bad behavior that China's clients exhibit, and if the Chinese don't see a reward for acting responsibly, maybe they would better see the situation the way we do if there were costs.

I would say there's possibly a more effective and less confrontational approach if we take a cost-imposing strategy towards China's clients. Beijing might continue to tolerate the Iranian nuclear project, but it can't really guarantee Tehran's desire to become a regional hegemon, and similarly with slightly more clever statecraft and forceful leadership on our part than we've exhibited thus far, say an international coalition of the willing for Darfur, might be cobbled together.

The basic idea would be to deny to the rogue regimes themselves the benefits of being a Chinese client, and I think that would have a dramatic effect in devaluing this quasi-client relationship, because it's my view that the rogue regimes or the international bad actors value this much more than the Chinese actually do.

So to really sum up the approach I'm recommending is to deal directly with the bad geopolitical effects of Chinese "clientitis," if I can invent that term. I think it will be less confrontationalist, directly confrontational to Beijing. It would have some effect other than simply to encourage China to behave in the ways that we would like them to behave, and of course, it would actually deal with a number of just awful situations that not only frustrate American interests but contribute to instability and to violence throughout the world.

To really just quickly sum up, I think this is an important test for the United States and for the international system. A system that can't deal with Robert Mugabe or Hugo Chavez or even the Iranian clerics or

face down ethnic cleansing in Africa doesn't look like an international system that can robustly accommodate the rise of China to great power status.

So a lot of the questions about what China's role in the world will be going forward depends on how the international system and the United States respond to this effect caused almost exclusively by China's pursuit not only of energy resources but other national resources that has the effect of promoting the worst kind of behavior from the world's worst regimes in ways that are increasingly dangerous and violent.

HEARING COCHAIR VIDENIEKS: Wrap it up, please.

MR. DONNELLY: Yes. I'll just stop there then.

[The statement follows:]

**Prepared Statement of Mr. Thomas Donnelly, Resident Fellow in  
Defense and Foreign Policy Studies, American Enterprise Institute,  
Washington, D.C.**

Chairman Bartholomew, it is a great pleasure to appear before you, my former commission colleagues and the members newly named this year. The commission's past work and, I am sure, your work this year perform a unique function for Congress; there is no other body which considers the totality of U.S.-China relations as does the commission. If the commission did not exist, we should want to invent it.

You have asked me to testify today to suggest policies our government might adopt based upon the strategic consequences of China's rising energy consumption. While I am aware that the Commission heard a panel's worth of testimony yesterday on what those strategic consequences are, please permit me a brief digression to summarize my views on the matter. It may help place the subsequent policy recommendations in a more complete perspective. And, because I intend to try to adhere to the seven-minute rule I will offer a broad approach, a way of thinking about an American response, rather than a compendium of particular policies.

In a nutshell, China's rising energy consumption already has had a number of strategic effects. The most obvious is the effect on the price of energy resources themselves; to modern, industrial economies the price of energy is itself a semi-strategic matter. Demand for energy, especially that generated from the fossil fuels of the Middle East, is accelerating faster than the ability to discover and develop it. If the theory of market economics were purely true, the People's Republic would share with the United States a similar, possibly even a more enthusiastic, commitment to ensuring cheap and plentiful energy supplies. The economic dimensions of this question I will leave to professional economists – as I will leave the quasi-strategic dimensions of environmental concerns to my fellow panelists – but it does lead me to a consideration of the geopolitical effects of Chinese energy policies. These, I think, are the most immediate and compelling issues that ought to shape any American policy response. As things now stand, the effects of rising Chinese energy consumption is simply a reflection of the larger effects of China's rise as a global great power.

This is only to try to begin to see things the way China does. It has become increasingly clear in recent years that Beijing views questions about energy resources from a geopolitical perspective – that is, involving other factors than just the price – whereas the United States believes that such resources are simply commodities and therefore governed by the hidden hands of markets. This divergence represents a major asymmetry in American and Chinese strategy-making; in my view, this asymmetry is something that

can work to our advantage.

The problem is that China's approach to natural resources has the effect – if not also the intent – of giving succor to a collection of rogue states that stand outside the norms of international society and seek to frustrate the United States: Sudan, Iran, Zimbabwe and Venezuela, for example. It is also likely to encourage bad behavior on the part of states like Nigeria that are not hostile to America or the larger international community but that are corrupt and institutionally weak. The most important question for the United States is how to mitigate these deleterious effects. The strategic stakes could not be higher: this represents a challenge to the cohesion of international society and to the America's role in the world.

Thus far, U.S. policy, built around the hope of engaging Beijing as a “responsible stakeholder,” has been to encourage China to behave better – say, by joining in U.N. efforts to end the genocide in Darfur or to restrict Iran's nuclear program. A variation on this theme is the slightly paternalistic effort to try to explain to Beijing what its true interests are – as though we in Washington better understand Chinese desires than the Chinese themselves do. To date, this approach has not produced much in the way of results; indeed, the number and nature of the problems seems to be getting worse. Iran is not only developing its nuclear capabilities, it is playing an aggressive and destabilizing role across the region, in Iraq and in Lebanon. China shows no interest in reining in any of its clients. Beijing does not appear to value the rewards of acting in the ways we think reflect their international responsibilities.

The undeniable shortcoming of current U.S. policy is that it only offers rewards; it imposes no costs. One cost-imposing approach would be to more directly link U.S.-China relations, perhaps even including economic relations, to Beijing's international behavior. The role of the United States as guarantor of today's international order is a global public good – something uniquely beneficial to Beijing. China's clients include a number of the most serious threats to international security. If the People's Republic does not see a real reward for acting responsibly, it may better see the costs of failing to do so.

But perhaps a more effective and less confrontational approach is to impose costs on China's clients. Beijing might continue to tolerate the Iranian nuclear project, but it cannot really guarantee Tehran's bid for regional hegemony. Similarly, with a modicum of clever but forceful leadership on the part of the United States, an international “coalition of the willing” might be cobbled together to act in Darfur. Strong support for Columbia and a renewed commitment to diplomacy and democracy-promotion in Latin America would do much to frustrate Hugo Chavez's ambitions. These rogue regimes are fundamentally weak and already internationally isolated. They need China much more than China needs them. By dealing more effectively with such regimes, we would be lessening the value of posing as a Chinese client state.

China's approach to securing the energy supplies it needs is one of the clearest demonstrations that Beijing wishes to change the international system to meet its political and strategic needs rather than accommodate itself to the order – the remarkably free and liberal order – that now exists. Rather than pleading with China to comply with international norms, or to meet its international obligations, or lecturing it about its real interests, the United States and its allies – the real responsible stakeholders – should strengthen the system that we have built together over the past half century. But a system that cannot withstand the challenges of Robert Mugabe or Hugo Chavez, or the Iranian clerics, or act effectively in the face of ethnic cleansing in Africa, will be hard pressed to withstand the pressures that a rising China will place upon it.

The question you are asking today – what to do about China's mercantilist attitudes toward energy supplies – are the precursors to larger questions about other kinds of natural resources and, at root, one of the largest questions of our time, that of China's rise. The answer to that question lies less in the malleability of Chinese attitudes than in the strength of the principles that preserve liberty and give order to international society.

Thank you for inviting me to appear before you. I look forward to your questions.

HEARING COCHAIR VIDENIEKS: Thanks. Dr. Logan.

**STATEMENT OF DR. JEFFREY LOGAN  
SENIOR ASSOCIATE, WORLD RESOURCES INSTITUTE,  
WASHINGTON, D.C.**

DR. LOGAN: Thank you very much, Chairman Bartholomew, Vice Chairman, Commissioners. Good morning and thank you for inviting me to testify this morning on Chinese energy collaboration. My name is Jeffrey Logan, and I'm a Senior Associate at the World Resources Institute here in Washington, D.C.

Yesterday, we heard Lee Schipper, also from WRI, give testimony, so I will not belabor a greater introduction to our organization.

One of the greatest challenges over the coming decades will be for countries to act in concert to address the linked challenges of global climate change and energy security. These are linked problems and they cannot be solved in isolation from one another.

The U.S. and China are key to any solution as they together consume about one-third of the global oil supply and emit four-tenths of all greenhouse gas emissions.

I'm here today to talk about U.S.-China energy cooperation. The most important thing the U.S. can do to mitigate the impacts of China's recent enormous growth in energy demand is to lead by example. The U.S. must demonstrate that it can address energy security and climate change simultaneously within a thriving economic context. This is our most powerful tool. Without this leadership, no incremental shift in technical assistance or policy dialogue will get the traction it needs to help move China on to a fundamentally different course.

Given greater U.S. wealth, cumulative emissions and reliance on global energy markets, this leadership is a prerequisite. I'd like to make one point about cumulative emissions before moving on to more practical areas of collaboration.

It's widely acknowledged that China will surpass the U.S. as the world's largest emitter of greenhouse gas emissions very soon. But it's also important to remember that carbon dioxide, after being emitted, lives in the atmosphere for 100 years or more. So from this perspective, over the period 1920 to 2020, the United States will have emitted more than twice as much carbon dioxide into the atmosphere as China. It will thus be many decades before China surpasses the United States as the largest emitter, and the chart in my written testimony I think illustrates this point vividly.

So I'd like to touch on four selected areas of potential U.S. and China cooperation this morning: energy efficiency; energy security; clean coal; and renewables.

As Ms. Finamore noted, efforts to improve the efficient use of energy are the most powerful measures China can take to meet its development goals, improve global energy security and reduce greenhouse gas emissions. Benefits of improved efficiency accumulate over time. China's uniquely low energy-to-GDP ratio during the 1980s and 1990s help offset the need to burn millions of tons of coal.

Some of that benefit has been offset in recent years, but China has placed deficiency, now in a political way, back at the top of its domestic energy policy agenda.

China's efficiency efforts are tied to larger global interests. The electricity shortage of 2003 to 2005, as we now know, resulted in the need for substantial oil-fired backup power generation at Chinese factories and contributed to the surge in imported oil products in 2004. This phenomenon demonstrates that China's largely homegrown and internationally insulated power sector can affect the price of corn in Iowa.

It is in the U.S. national interest to help China meet its ambitious energy efficiency target and, as Ms. Finamore mentioned, that is to lower energy intensity by 20 percent by 2010.

The U.S. should support capacity building efforts to provide the business, financial and regulatory skills needed to promote market-based energy efficiency projects and performance standards in China.

Special emphasis is needed to improve transparency in the relationship between energy, economic activity and greenhouse gas emissions.

WRI recently initiated a project to introduce the greenhouse gas protocol into China. The Protocol, which was developed by WRI and the World Business Council on Sustainable Development, is a widely used methodology to measure energy use and greenhouse gas emissions, and it serves as a foundation for carbon markets and trade. We are getting surprising interest in this product from the Chinese.

On energy security, there is a need to better integrate China into the global energy system. Greater participation in the IEA, G8 and other global bodies that coordinate energy and climate dialogue would give China a greater stake in the outcomes.

The U.S. needs to accelerate high-level dialogue with China to ensure that each other's intentions and concerns are understood more clearly. Without action, China will likely continue investing in and courting relations with countries that have dramatically different world views than our own.

China will also continue trying to build energy security through

partial solutions like coal-to-liquids. And it will use its newly built Strategic Petroleum Reserve not in concert with other stock-pilers to maximize the shared public good but to influence narrower political interests at home.

The U.S. has several efforts underway to discuss energy security concerns with China. To be frank, we lack credibility with the Chinese because we don't always walk the talk. Unocal, CAFE and Kyoto are examples of this that the Chinese often cite.

The U.S. needs to demonstrate sincerity through domestic action before China will be compelled to act. Confidence building measures are needed to regain traction.

The U.S. could link a significant increase in its Corporate Average Fuel Efficiency standards, for example, with a reciprocal action in China such as greater energy data transparency. Follow-on measures could build from these starting points.

Now, the third point: clean coal. China's use of coal is key to our ability to hold greenhouse gas concentrations at a level that avoids the most devastating impacts of climate change.

In the last three years alone, China has installed about 200 gigawatts of new coal-fired power plants that emit a billion tons of carbon dioxide each year. This is long-lived infrastructure and our global carbon budget cannot absorb this level of expansion for long.

A number of bilateral and multilateral efforts are underway to speed the deployment of carbon capture and sequestration in China. Before we can expect China to deploy CCS widely, however, industrialized countries like the U.S. must first prove that it can be done safely and under a viable business model here.

The U.S. should thus support on a much larger scale the domestic demonstration projects and policies that are needed to answer remaining questions about CCS.

China is actively developing industries around renewable energy technology and has set aggressive targets for its deployment. The national renewable energy law offers some incentives for its use.

Despite this progress, renewables will continue to make up a relatively small fraction of the energy mix in China over the next few decades. International collaboration with China to further commercialize wind, solar, biomass and other renewable energy technologies could pay significant dividends.

Chinese manufacturers can drive cost reductions that make possible more wide scale penetration of these clean options around the world. Many existing international fora such as the U.N. Framework Convention on Climate Change and the WTO are being underutilized as opportunities to discuss key issues surrounding renewable energy technology transfer including the role governments can play in

facilitating the sharing and protection of intellectual property rights.

In conclusion, China must be part of any global response to climate change and energy insecurity. The U.S. will almost certainly need to act first, however, given its greater wealth, resource endowments and historical emissions. While there is growing federal support to put a binding cap on greenhouse gas emissions in this country, China presents both real and perceived threats to our unilateral action.

The potential impacts on trade that would result from an asymmetrical carbon regime, for example, must be more thoroughly considered. Early studies suggest, however, that only a few U.S. sectors would be affected by carbon intensive Chinese imports. Policies could be developed to address these impacts.

The U.S. could intensify cooperation with China on a variety of clean energy options. Four have been discussed here. But successful collaboration will require confidence building measures that overcome mistrust and a sense of insincerity.

By demonstrating domestic action to improve global energy security and mitigate greenhouse gas emissions, the U.S. could initiate that new-found trust. Thank you.

[The statement follows:]<sup>10</sup>

## **PANEL VII: Discussion, Questions and Answers**

VICE CHAIRMAN BLUMENTHAL: Thank you all for your testimony. We've heard, as Tom Donnelly has said, six panels so far, so we are developing some sort of picture, some sort of inconsistencies, but it seems like there's a context to all of this that when Dr. Logan and Ms. Finamore say that there is political will in China.

There's a host of priorities that we've heard about. The first and foremost is keeping the economy going and making sure that jobs are created and making sure the regime stays in power. Then we've heard testimony from Mr. Donnelly and others beforehand about other types of security priorities. I wonder whether you get the sense that there is political will as compared to all the other crises and day-to-day pulls on the leadership and also in the context of suspicion of the United States, some of which we can't do anything about, and the issues of Taiwan.

I don't think that cooperative programs in the world will ever convince the Chinese that we're going to be trustworthy on the Taiwan issue.

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<sup>10</sup> [Click here to read the prepared statement of Dr. Jeffrey Logan](#)

I'm very curious about this issue of political will or this issue that the Chinese are going to lay out the costs necessary to do some of the things that you've mentioned when there are so many other priorities in China and the larger context is one of generalized suspicion about geopolitical issues vis-à-vis the United States? That's for either of you or that's for all three of you really.

MS. FINAMORE: I'd be happy to take a crack at that. It certainly depends upon the issue. There are many, many issues. You've described a number of them on which there isn't political will. I'm only referring to energy efficiency. I have seen a change in the central government level over the 17 years I've been working in China. I have never seen such attention to energy efficiency.

We've been promoting these issues in China for over ten years, and have had to go to meeting after meeting, host conferences, pay for them ourselves, pay to bring study groups to the U.S., try to talk to them about these issues and get very nice response.

But during a period where there was energy abundance, it was not of great interest. That has all changed in the past couple of years. I think what triggered it was nationwide energy shortages that China experienced over the last three or four summers. I think there are also other issues at play here in that China is beginning to feel the heat of international pressure to do something about its carbon emissions, and so it is focused on energy efficiency as one way.

China came out with a National Climate Action Plan last week that featured energy efficiency. I think it's also beginning to be concerned about the environmental impacts of its energy use, but I want to say here's some other evidence of this: China set this 20 percent energy intensity reduction goal 2005 to 2010 after the first year it didn't meet it.

This shortfall got reported around the world. It was embarrassing to China's international image, and as a result, the Premier Wen Jiabao went on national television for over an hour to berate the country for its failure to meet those goals and said if they don't meet it by the end of this year, heads are going to roll.

So I see that as a big change. When I say political will, it's important to distinguish between the central government level, which interestingly enough is taking the lead on this, and the local governments responsible for implementation, where things often fall short. So the key is to get the local governments acting to implement national policies.

One of the things they're starting to do is to develop a new system of rating the job performance of provincial leaders, not just on how well they grow the economy of their province or city, but on how well they meet these national targets.

VICE CHAIRMAN BLUMENTHAL: Just to follow up that strand. We were in northeast China. They were rating their party secretary on how quickly he built his infrastructure.

MS. FINAMORE: Right.

VICE CHAIRMAN BLUMENTHAL: And I would imagine that he's got a good future. I would also imagine that implementation of new building energy codes is very expensive versus just building a building; right. So there are some tradeoffs. When you're in northeast China and you see that the party secretary is going to get promoted by how quickly he builds up northeast China versus building clean buildings or energy codes, it still seems to me that I haven't seen that tradeoff being made in the form of laying out the cost to have clean energy.

MS. FINAMORE: Just one other example. You're right. How well their GDP grows is a key measure of job performance, but there are efforts underway to reform the way in which GDP is determined through development of a green GDP approach where the costs of developing that GDP are subtracted, and I think that is another welcome effort.

VICE CHAIRMAN BLUMENTHAL: Thank you.

MR. DONNELLY: Can I just actually add one comment?

VICE CHAIRMAN BLUMENTHAL: Yes, please.

MR. DONNELLY: I don't think that energy efficiency or even clean coal initiatives are inconsistent with the strategic approach that China is taking. It's a little bit of a caricature to say that they have this quest for energy autarky, but there is some aspect of that, so to the degree to which the Chinese feel themselves less vulnerable to an international energy market, and when they rely particularly on energy supplies from unstable places, the ability to get the biggest bang for BTU or to develop their own coal supplies or something like that I think would have strategic appeal to Chinese leadership.

VICE CHAIRMAN BLUMENTHAL: Thanks.

COMMISSIONER FIEDLER: I have two questions. One, what role does corruption play in the Chinese pollution problem and the fixes necessary to solve the problems?

We heard yesterday about unlicensed plants going up. We've long read about illegal mines. We have long read about no local enforcement of dumping stuff into rivers. So what role does corruption play in this process, and what is the prospect for fixing it?

DR. LOGAN: I'll start off with this to make a few remarks. I'm sure my colleagues will chime in. I think the difference between corruption and the lack of enforcing laws is a fairly big distinction there. The amount of corruption that probably is underway or that occurs, which allows illegal mines to continue operating or that allows

factories to pump pollutants into water or the number of coal plants that are built without the right permits, most of that is probably just due to institutional failure more than outright corruption in my view.

But clearly, it's happening. It's not to say that corruption isn't common in the energy and environmental sectors in China.

MS. FINAMORE: I'd also say that there's a lot of incentives, shall we say, for local governments to look the other way when their polluting factories are shut down yet continue to operate. I don't know as much corruption as the fact that they have a financial interest in the factories or they own shares in it.

COMMISSIONER FIEDLER: I don't know how you're defining corruption, but generally it's defined as financial interests.

MS. FINAMORE: Yes. Well, financial interest in meaning they own shares in the factory themselves, not really corruption.

COMMISSIONER FIEDLER: Yes, I understand.

MS. FINAMORE: It is a conflict of interests.

DR. LOGAN: Looking the other way.

COMMISSIONER FIEDLER: Conflict of interest and corruption distinctions on scale in China are strikingly not that different, in the sense that if I have a financial interest in a factory, I'm a local government and I'm the Party leader, and I want to make money on it, I therefore do not enforce the law.

MS. FINAMORE: Correct.

COMMISSIONER FIEDLER: I don't know how you define corruption, but I think that's corruption. And that's systemic is what I'm understanding, and so I'm trying to get at whether or not there's any prospect of success on an environmental level without solving the corruption problem?

MS. FINAMORE: It is a serious problem. You can call it whatever you want, but the fact that the government owns shares in enterprises is a serious impediment, and one way to solve that is institutionally because the government bodies and the officials responsible for enforcing the environmental laws are the Environmental Protection Bureau officials, which are ostensibly under the State Environmental Protection Agency rather than the local governments that own the shares.

But the local governments are the ones that, in fact, hire and pay those local officials, and removing that bond would give the environmental protection officials more independence and ability to enforce the laws regardless of the views of the financial interests of the local government.

COMMISSIONER FIEDLER: Let me ask a second question. I still have a minute or two. We heard yesterday, Mr. Donnelly, from one of the energy experts that the Chinese pursuit of ownership of

sources of energy is futile. And that it will be a long time or maybe they haven't succeeded in protecting their own sea lanes with their own navy, and they might not be able to ever do that in the Indian Ocean unless they were to control Taiwan.

So it seems that their interests are going to be difficult, if not impossible, to satisfy on energy, that they will have to depend on the, like the rest of us, on the international energy market to produce fuel.

MR. DONNELLY: I would say that's a widely held view amongst economists and it may actually be true in the long run.

However, in the interim, that doesn't mean that there wouldn't be geopolitical consequences of Chinese attempts, futile or successful, to seek energy autonomy. It's very difficult, for example, to explain why they would build the Kazakhstan pipeline. It certainly, absent the record prices for oil that currently exist, didn't make economic sense, but it make a whole lot of strategic sense.

So I don't know for sure whether the Chinese will ultimately fail in this, but there could be a lot of--

COMMISSIONER FIEDLER: Fallout from it.

MR. DONNELLY: And again, I would say there already have been bad consequences in the attempt to do so. They just see things differently than we do. Where we see market forces occurring, they see or smell a hint of American hegemony. So I'm simply trying to explain their behavior, and whether their strategy is ultimately a futile one, it will be a long time before we know that.

COMMISSIONER FIEDLER: Thank you very much.

HEARING COCHAIR VIDENIEKS: Madam Chair.

CHAIRMAN BARTHOLOMEW: Thank you very much and thank you to all of our witnesses today. Mr. Donnelly, it's nice to see you back with us, and Ms. Finamore and Dr. Logan, it's really interesting to hear about your on-the-ground experience over, I think you said 17 years of doing this, and how things are changing.

I always find it interesting when people talk about the relationship between the central government and the local governments. On some issues, the local governments seem to be trying to do the right thing and they're hampered by the central government. On other issues, the central government seems to be doing the right thing and is hampered by it.

I find myself constantly perplexed about just how much power the central government has and what's going on. I hold in my head the facts on intellectual property rights, and that there is no violation of, no counterfeiting of the Beijing Olympics logos. You get the sense that there are some things that the Chinese government could exert some more power on. How you get them to do it is I think an ongoing challenge.

I was going to ask, how do you identify the opportunities for the cooperation to take place. But Ms. Finamore, you described it. Through conferences and meetings and networks and all of that.

Are you finding that the ideas are now coming more from your Chinese colleagues or is this still something that your organizations end up having to pitch most of the time?

MS. FINAMORE: There is a change in that the ideas and actually some of the push now is coming from the Chinese side. For example, just last March, we were invited to attend the national annual energy planning meeting of the Jiangsu provincial government, which was quite an honor. We were a little bit stunned because they spent the meeting berating us and saying here's our work plan, and here's what we want you to do to get us to meet this target by the end of the year, and can you get us a report by next month?

And we were taken aback. That was the first time that's happened. So that's the kind of change that I'm seeing.

CHAIRMAN BARTHOLOMEW: Dr. Logan, any similar--

DR. LOGAN: I would add to that that there's tremendous competition to work with the Chinese. The Australians, the Japanese, all the Europeans, the Canadians, almost all large developing countries are trying to work with the Chinese on things, and it's often very hard to get them to agree to collaborate with you in a meaningful and new way because they'll often recycle existing work or they'll say that they're getting more money from someone else. To actually have a partner who is capable to do work with you is sometimes a challenge.

CHAIRMAN BARTHOLOMEW: That's an interesting point because there's a dilemma in development generally, of course, which has to do with on-the-ground coordination between multilateral agencies, individual donors and now clearly a lot of NGOs. Are there any mechanisms developing even amongst perhaps the non-Chinese NGO community trying to coordinate that one organization is not being played off against another, but also that there's an economy and an efficiency that's going on?

MS. FINAMORE: That was one of the reasons for forming this China-U.S. Energy Efficiency Alliance, and we're actually hoping to expand it to include other countries as well because we found, just as Mr. Logan said, that there are a lot of organizations now throughout the world trying to do the same thing. We're wasting our resources. There is so much that needs to be done. The only way to really leverage our resources is to cooperate, so that's one example of what we're trying to do.

CHAIRMAN BARTHOLOMEW: One of the dilemmas that we have found on a lot of trade issues, of course, is that it's not unknown for the Chinese government to pit one country against another in order

to get different kinds of benefits or perks or get a stand down on legislation that might be pending.

Do you think you're going to be seeing that? If the Chinese can say to you, well, we can get a whole lot more money from the Dutch or from the Norwegians or from another organization? How do you get them also to bear some of the costs of the programs from which they're benefiting?

DR. LOGAN: I would say the Chinese already do contribute costs for projects that they really consider key to their strategic interests. For example, the European Union recently initiated a multi-hundred million dollar project to improve industrial energy efficiency in China, and one of the requirements was that the Chinese government contribute "x" percent of cost to that. I think they're very willing to do that when they see it in their strategic interests, and China is no longer a poor developing country. It has tremendous resources that it can bring to focus if it's in the country's interests.

CHAIRMAN BARTHOLOMEW: Yes. \$1.2 trillion of foreign currency reserves. Ms. Finamore, any comment on that?

MS. FINAMORE: Yes. I was also encouraged to see, I believe, that China joined the Fourteen alliance and that required a substantial financial contribution. So once again, this is a big change. It was for many years the case of oh, we're a poor developing country, and you have to help us, and that's still often the case, I think, for development of coal gasification and carbon capture and storage. They're hoping for international assistance or development of international financing mechanisms, similar to the Montreal Protocols--for example, or the Clean Development Mechanism, to help them afford that additional cost.

So that's still going to be their first line, but when they have to, when it's made a condition of having to participate in an initiative, that they perceive as important, they will contribute.

CHAIRMAN BARTHOLOMEW: Right. And, of course, a country's budget is a reflection of its values. So we need to see that this matters to the Chinese, too. I recognize it has consequences for all of us, but I think that will be important. Here I am the fiscal conservative. Thank you.

HEARING COCHAIR VIDENIEKS: Any more questions?  
Commissioner Houston.

COMMISSIONER HOUSTON: Dr. Logan, something you said really, well, frankly it upset me, it worried me, and it's the second time I've heard it today. You said that it is very difficult for us as the U.S. to go to China and basically tell them what to do because we're bad actors.

There is the concept of the greater good, and although we trip

over ourselves a lot in this country, I would certainly argue that both the public sector and the private sector does try to do the right thing. We are cutting emissions. We've got clean air acts. We are doing all the right things and moving at least the right way even if we're not doing it as quickly as we would like to.

When you're in China, do they say that to you, or is that your own feeling that we can't really have standing with them? I would argue that any nation's bad act is the fault and the responsibility of that nation.

So when you are there, do they say these things to you or is that just sort of your feeling about the subject? And then I have another question for Mr. Donnelly too.

DR. LOGAN: Some of my observations that support the statements that I made were from work that I did with U.S. Department of Energy and other government agencies for a number of years collaborating with China on energy efficiency and natural gas promotion and things like that.

We've seen that the U.S. budget to support work in China is roughly, and this is from the last numbers I've seen, about a million dollars a year to focus on clean energy and environmental issues, and given what's at stake for us, that is almost an insignificant amount of money. When a U.S. delegation goes to China, and sits down and says "we want to get serious about developing natural gas or coal bed methane or enhanced oil recovery or energy efficiency in China, let's talk," and we sit and talk for two days, and then nothing really ever happens afterwards because neither one of us is ready to devote resources to it, then the Chinese start to get disillusioned, I think, about how sincere we are and how serious we are.

I've heard from a number of people--I guess mainly more westerners than Chinese--that examples like what happened with the Unocal deal and CNOOC, that we're not always practicing what we preach, and I'm not saying that we're not a perfect country. I think the U.S. does extremely well in a lot of areas. But we do send mixed messages to the Chinese, things like Unocal, things like not participating in a lot of the multinational collaborative efforts like the Kyoto Protocol, things like the failure to improve auto efficiency standards in this country for the last 20 years. The Chinese look at us and they say, "Wow, you guys are all driving around in SUVs and you're telling us to cut back on our oil demand? That's--okay, well, if that's how you feel about it, but that doesn't make sense to us."

I think it's important for us to make sure we can put ourselves in China's shoes and perceive what we look like sometimes because that will really help us to be able to sit down and talk with each other more seriously and try to really understand what the other side's perspective

is, and that's the foundation for cooperation and collaboration, I think.

COMMISSIONER HOUSTON: Well, they have-- what is it--a \$3 trillion current account surplus. If we had that, maybe we could do some rapid improvements around here too.

Mr. Donnelly, it's so nice to see you. I have a question. All the efficient light bulbs in the world are not going to save us if some of the bad actors out there in the world decide to pursue their vendetta against the U.S., in particular, Iran who has said this quite openly.

It seems to me that one of the main dangers to our national security, as you have said, is China's energy seeking, not because China is going to come attack us tomorrow, but China's energy seeking and the money that goes along with that energy seeking is propping up a lot of these regimes that don't like us very much.

In particular, al-Qaeda on its Webzine--it actually has one--said directly that Africa was its next recruiting target and that its goal was to build particularly transportation infrastructure in Africa to accommodate its recruiting goals to come basically and kill us.

So when you look at the Sudan and China's oil investment in Sudan and the infrastructure that goes along with it, that causes me great fear for our security that that trail of money is making us far more vulnerable in the world. So I'm worried about this. I know a lot of people in the U.S. are worried about this. I know you're worried about this.

My question to you, is anybody else in the world worried about this? Are other either democratic nations concerned or is there any talk on the world stage at all about the implications of the money that does go along with this energy seeking?

MR. DONNELLY: I would say just in a summary way, there's not enough concern on the part of say European countries who have a long experience, not all that happy, in both East and West Africa. Many of the European-based energy companies who have a big presence, particularly in West Africa, have been, I think, reticent or loathe to raise the question, not necessarily even in a case like Sudan where I think the record is pretty clear. But just taking Nigeria as an example--again not a hostile government, but a country that has weak governmental institutions, corrupt governmental institutions with a growing Islamist faction in the country, and a growing Chinese presence as well.

So it is, I think the response to this is it's a chance for greater international cooperation, and this is not just again what I would regard as an American issue or an exercise in American power, but an opportunity for sort of global good governance to help positively shape the outcomes in states that are at risk where Chinese actions may not be malevolent but just sort of short-sighted.

So it's very difficult actually to get Americans to look to connect these dots, as it were, and even more difficult to get others around the world. Even the most knowledgeable folks who may not be government people, but also the oil companies who do business in West Africa and are certainly pretty sophisticated about these issues.

HEARING COCHAIR VIDENIEKS: Okay. Commissioner D'Amato

HEARING COCHAIR D'AMATO: Thank you, Mr. Chairman. My question is, Ms. Finamore, about the change in what you perceive of either the strength of the organization or resources available by Chinese environmental organizations or the attitude of Chinese officials about climate change and the need to do energy efficiency initiatives at the local level.

I think the problem in all the information and writing that we have has been basically the lack of commitment to the environment at the provincial level and at the local level over time, not just during the current period, but in China's history. So I'd like to pursue a little bit more about what you see is a change, and how we can take advantage of a strengthening attention or change in China? Do you see this in terms of a growing organizing ability of NGOs and/or the commitment by private entrepreneurs or actors at the government level in the provincial level? Where is the change and how can we promote it?

MS. FINAMORE: On the environmental side, it's really a variety of factors. There is an increase in the number and the abilities of Chinese nongovernmental organizations. They're still pretty small. They're under funded, but they're growing in size and capacity, and we are in fact working with a number of them to help train them in their ability to participate in environment decision-making.

The government is opening the door a bit to allow this type of public participation. It's developed new regulations for open information and for hearings on environmental impact assessments. That's all very new, but it's just a crack and you can imagine that the government is going to be watching very carefully to see how this works, but I think they are doing so because the alternative to allowing the public to participate in environmental decision-making is violent protests. Those protests are growing in number and size.

And I think the government realizes it has to provide some avenue or that is just going to get worse. So we're trying to take advantage of those opportunities to work on regulations on how those new participatory opportunities will be actually implemented and also to train the NGOs.

On the private sector side, companies in China and elsewhere in

the world are seeing opportunities to make money through investment in clean technology. For example, through the incentives now made available through China's recent passage of the renewable energy law. China I think doubled its capacity in wind energy last year, and it is now one of the top six, I think, wind energy powers in the world.

There's an explosion in the growth of solar power simply because people see an opportunity for making money, in fact, not just to provide technology for the Chinese market, but to produce it more cheaply in China and then sell it worldwide.

In government, change I see is mostly at the central government level. It's still a problem, as you've said, at the central government level, but we attempt to work with key provinces that see the need to make change and to work with them. There's still a lot of work to be done in other local government levels. There's not much change there.

DR. LOGAN: If I could make one quick point about the potential for greater leverage through business activities, especially of multinational companies in China, that could help to overcome the failure of the central government to be able to exert control at the provincial level.

One example, I think, is seen in the U.S. Climate Action Partnership, which was a recent announcement by about 25 major corporations, including BP, GE, Alcoa, Caterpillar and others, calling for a cap and trade system here in the U.S. Those companies, of course, are also heavily invested in the supply chain of China in producing materials that again are exported in China.

Those companies, even though they are at the will sometimes of the Chinese government in terms of their investments, they can send strong signals to their own suppliers in China to green their operations and to reduce greenhouse gas emissions, for example. Those private sector investments could be used, I think, to get better traction at the provincial and local levels in how business and manufacturing is done in China.

If we demand that Chinese products have a lower carbon intensity, we can send those signals into the supply chain in China through those investments.

HEARING COCHAIR D'AMATO: Thank you.

HEARING COCHAIR VIDENIEKS: Commissioner Fiedler.

COMMISSIONER FIEDLER: Second round, you're first.

CHAIRMAN BARTHOLOMEW: Thank you. We'll fight over our space and our time. I was wondering if you could elaborate on ways that the WTO could be used to promote renewable energy and address some of these issues, and are these things on which the Chinese government would be cooperative?

As you know, the WTO is turning out to be a bit more of a tussle

place than I think it was originally envisioned to be, and there are a fair number of cases that the U.S. has either filed or should be filing relatively soon. Is this a place that the U.S. and China actually could work cooperatively to achieve some ends?

DR. LOGAN: Let's see. I'm not an expert on the WTO, but I'll try to add a few remarks, and I hope my colleagues will chime in. China, as you know, can produce things like wind turbines for much cheaper than the Europeans or the Americans. The quality, of course, isn't yet up to par, but the general idea of making some energy technologies, they can do it at a low cost.

Therefore, as I noted in my testimony, there is really an opportunity for the Chinese to help spread the deployment of renewables around the world which are often, at least in the way that current accounting is done, more expensive than other options. Whether or not we want to vest our economic interest in the Chinese to be the supplier of these technologies is another question.

But there are methods, I think, as were mentioned earlier, to be equity partners with Chinese manufacturers to share in the wealth that's generated from being the producer of these things. There are obviously intellectual property issues that a lot of companies are concerned about. The WTO might be one organization where the U.S. and China could begin to share ideas more honestly, but the idea of being equity partners in the deal can also overcome some of those things, I think.

CHAIRMAN BARTHOLOMEW: Ms. Finamore, Mr. Donnelly?

MR. DONNELLY: I'm willing to speculate with the stipulation that I don't really know what I'm talking about.

CHAIRMAN BARTHOLOMEW: Ah, Washington specialty, a fact-free congregation.

MR. DONNELLY: Yes. World's foremost expert. But, you can look at the experience that we have had with the WTO, and if there is either an American or other international attempt to introduce environmental requirements or energy efficiency requirements into trade agreements, as was suggested, if we demand products that are greener, I would tend to think that it would end up being a forum where those who weren't keen on the idea would tend to use the WTO as a mechanism to resist.

CHAIRMAN BARTHOLOMEW: To block.

MR. DONNELLY: I think the WTO is likely to be a trailing edge indicator of agreements on energy efficiency or environmental initiatives rather than a leading edge or a really useful tool to try to do that. But that just is based on observing the nature of WTO activities.

CHAIRMAN BARTHOLOMEW: Okay. Thanks. Dr. Logan, you also mentioned confidence building measures, and we have some sense

of what some of those confidence building measures could be in the military realm. I wondered if you could elaborate on what you think the confidence building measures could or should be in the environmental and energy realm?

DR. LOGAN: I mentioned one confidence building measure, and I believe that the U.S. should take the first step, at least marginally, in any confidence building measure, and I used the example of increasing our Corporate Average Fuel Efficiency requirements here in the U.S. These have been largely unchanged for the last 20 years, although we saw enormous benefit of these regulations back in the late '70s and early '80s when we cut our oil demand by about three million barrels per day very quickly.

I think that could be replicated again now because there's a lot of low-hanging fruit in that sector. That would send a very strong signal to the Chinese that we're serious about global energy security and climate change.

Other types of confidence building measures are also available. The U.S. could reengage in the international negotiations over climate change, for example, and that in itself could send a very strong signal.

It's important that whatever is done, and there is a whole list of potential bills in the Congress right now to address energy security and climate change, whatever we do, I think it's important to take advantage of it with the Chinese. Hold our hand out and say, hey, we're doing this, we're really doing it for ourselves, but we're going to at least hold hands with you and say let's do this together and let's get a commitment from the Chinese to do something in response.

I think the first thing that they should do that's most important is to improve transparency of energy data. It's critical for investment in energy markets. It's critical for China's own understanding of what's happening in the country because they often have a cloudy picture of it as well. And I think that would be a good first set of examples.

CHAIRMAN BARTHOLOMEW: Great. Thank you.

HEARING COCHAIR VIDENIEKS: Commissioner Fiedler.

COMMISSIONER FIEDLER: A couple of things. Dr. Logan, did I hear you right that you said that our failure to allow CNOOC to buy Unocal was a problem?

DR. LOGAN: I believe the Chinese often see us spouting market-based platitudes, let markets perform and solve problems. From their perspective, I think they see us speaking out of both sides of our mouth when they saw that Congress was ready to act to prevent that buyout. So to them it wasn't clear. They couldn't really see how we weren't acting in two-faced way.

COMMISSIONER FIEDLER: Are you familiar at all with the Chinese government policy, I think, it was November of 2006 where

they determined a number of industries as being absolute control industries such as oil? It's my understanding that means we can't buy their oil companies. So are you saying that they should be allowed to buy ours but we should not be allowed to buy theirs?

DR. LOGAN: I'm not sure. I don't really have an opinion on that one way or the other.

COMMISSIONER FIEDLER: Let me ask are the Chinese talking out of both sides of their mouth?

DR. LOGAN: I'm sure they do, yes.

COMMISSIONER FIEDLER: In this case?

DR. LOGAN: I don't know. Their response may have been in response to what they saw happening with the potential CNOOC and Unocal deal.

COMMISSIONER FIEDLER: I think their response was to decide that the oil energy was a strategically important industry that they did not want foreigners to buy. I think that is much more commonsense explanation.

Dr. Finamore, some caution or let's have a cautionary discussion about the allowance of activism in environmental realm versus the allowance of activism in any other realm in China. So, for instance, we have asked a couple of questions on NGOs and the space that they have to move and it's quite clear that there's greater space.

It's also clear that beyond a certain level, certain people might get arrested for their activity. You indicated that it was somewhat in response to protests. In my view, that's to be leavened somewhat against there are lots of labor protests but independent unions have not been allowed.

So in the comparison of space that exists in this country for NGOs and the space that exists in China for NGOs, what's the comparison? Is there potential for real impact or is there greater potential or risk for arrest for pressuring local authorities, especially where we have that nexus of corruption? Either that or party interests or some other interests? What is the prospect in your view for freedom of activism for environmental activists in China?

MS. FINAMORE: I think I agree with you completely that it's an area where great caution needs to be exercised because the line beyond which NGOs can and cannot operate seems to be constantly shifting, and anyone who wishes to engage as a Chinese NGO needs to be very aware of what those lines are because there are considerable risks.

I think what's another thing that's driving the space--increasing but still very small space--available to Chinese NGOs, is, in fact, the State Environmental Protection Administration, which has, of course, become the national mouthpiece as to the grave extent of China's environmental impacts and the need to take action, but still has very

limited power.

So what I see is the SEPA increasingly relying upon or seeking to use the Chinese NGOs to help them to publicize and perhaps to even help enforce environmental laws in China. So here's an entity within the Chinese government that is kind of pushing this thing forward.

This is similar to what happened in the United States, I might add, in the beginning stages of the U.S. Environmental Protection Agency, which also has limited resources to enforce U.S. environmental laws and over the years relied upon U.S. NGOs to take that one step further. For example, because our environmental laws include citizen suit provisions, groups like NRDC, for many years, were going to factories, looking at their water, monitoring things, and then bringing lawsuits based on the company's own records. And we received an award from the U.S. Environmental Protection Agency for our help to them in enforcement.

I hope that we'll be seeing more of that in China. There is one group we work with you may have heard of called the Center for Legal Assistance to Pollution Victims which, in fact, does bring suits in China on behalf of pollution victims. It's very limited, again, the scope, but it is endorsed by the central government, and so again there is development. It's slow, but it's going along the lines to some extent of what we see in the U.S., but the challenges are much greater.

HEARING COCHAIR VIDENIEKS: Commissioner D'Amato.

HEARING COCHAIR D'AMATO: Thank you, Mr. Chairman. I have two quick questions. We heard yesterday about the development of six regional EPA offices in the provinces. I wonder if you could tell me a little bit more about that, whether or not you've had some contact with them, whether they're beginning to be effective, what the status of that operation is at the provinces?

And secondly, Mr. Logan, I understand you were at time with the IEA.

DR. LOGAN: That's correct.

HEARING COCHAIR D'AMATO: I wonder if you could say something about the opaqueness of Chinese participation in IEA as to the Strategic Petroleum Reserve and their policies toward Strategic Petroleum Reserve? Do you think that it's possible to move into a more transparent relationship in IEA with regard to the Strategic Petroleum Reserve so that there isn't use of that reserve for manipulation of prices or whatever?

MS. FINAMORE: I'm familiar with the development of several regional Chinese EPA offices in China, but I understand your question to be U.S.

HEARING COCHAIR D'AMATO: U.S.

MS. FINAMORE: I'm not familiar with that at all. That's a new

development to me.

HEARING COCHAIR D'AMATO: I believe we were told yesterday that the U.S. EPA had six regional offices. Is that, isn't that, or maybe I misunderstood.

CHAIRMAN BARTHOLOMEW: No, it's the Chinese.

HEARING COCHAIR D'AMATO: Was it the Chinese EPA?

MS. FINAMORE: Yes. I believe it's the Chinese.

HEARING COCHAIR D'AMATO: All right.

MS. FINAMORE: EPA is working very closely from what I understand in helping to establish these Chinese regional EPA offices, but they are not U.S. offices.

But of course our U.S. Embassy and the consulates have environmental science and technology officers with active programs.

HEARING COCHAIR D'AMATO: Yes. So then tell us about the effectiveness of the new decentralized Chinese EPA offices.

MS. FINAMORE: I think it's a good idea. I think it could help to address the problem, the serious problem that you raised of the ineffectiveness of the provincial and city-based Environmental Protection Bureaus.

But I have to say that they're running up against resistance from those bureaus to hand the power over to them. So it's a power struggle which I would hope would end up with more power for these regional offices, but right now, it's not happened as fast as we would have hoped.

HEARING COCHAIR D'AMATO: So there is essentially resistance that's still not overcome--

MS. FINAMORE: That's right.

HEARING COCHAIR D'AMATO: --in terms of strengthening the Chinese EPA into the provinces?

MS. FINAMORE: That's right.

DR. LOGAN: Very good question about the Strategic Petroleum Reserves in China and transparency surrounding it. China has been building Strategic Petroleum Reserves storage facilities for a number of years now. There are four sites where oil will be stored. At least one of them is being filled. The IEA member countries have been collaborating with China for about five years in how member countries at the IEA operate their strategic reserves.

Some of the questions that China is grappling with include: Should you hold crude oil or should you hold products? Are these nationally held reserves? What role do private companies play in them? When do you release? How do you coordinate with other countries? A whole range of different questions, very interesting discussions, and the IEA has served as the center for that collaboration with China.

To this day, I don't think there is clarity about how the Chinese

plan to use their Strategic Petroleum Reserves. It would be wonderful if China could act in concert with IEA countries to release stockpiles in the event of disruptions around the world. That would contribute enormously to the global public good.

We don't have a clear answer from the Chinese yet how they're going to do it. We don't have a clear answer to the extent that the reserves will be controlled by national oil companies in China versus the central government. It's all unclear, but the Chinese maintain a very strong interest in collaborating with IEA member countries in talking more. I think the IEA now is creating a bigger platform for Chinese participation.

They have to acknowledge the fact that China's being the second-largest energy consumer in the world has to play a bigger role in that organization for it to be meaningful in the future. And the new executive director of the IEA is going to try to further accelerate collaboration with China and try to get them to share more information.

HEARING COCHAIR VIDENIEKS: I'd like to follow quickly on Commissioner D'Amato's question. Don't countries who have full membership to IEA other than observers have to meet certain democracy standards?

DR. LOGAN: There are two requirements to join the IEA. Number one, you must be an OECD member, and for that, you need to have a certain level of wealth per capita and you must meet generally recognized human rights standards.

The second requirement to join the IEA is that you hold 90 days worth of oil stockpiles.

HEARING COCHAIR VIDENIEKS: Only those two requirements.

DR. LOGAN: Those two requirements, exactly.

HEARING COCHAIR VIDENIEKS: So they meet one but definitely not the other one.

DR. LOGAN: Yes, there's some new members to the IEA, Russia is in line to become an IEA member. They're in the pipeline to do that. There are clearly going to be some concerns about human rights in Russia.

HEARING COCHAIR VIDENIEKS: Thank you.

COMMISSIONER FIEDLER: One quick factual question.

HEARING COCHAIR VIDENIEKS: Go ahead.

COMMISSIONER FIEDLER: Does anybody have any idea how much CO2 emissions and energy consumption have been reduced in the United States by the move of manufacturing jobs from the United States to China?

DR. LOGAN: That's an excellent question. I don't think there

has been enough research. There are a few studies out there.

COMMISSIONER FIEDLER: I don't think there has been any.

DR. LOGAN: Yes.

COMMISSIONER FIEDLER: Yes.

DR. LOGAN: Not comprehensive studies.

MR. DONNELLY: Conceivably there could be a net increase.

HEARING COCHAIR D'AMATO: You're not suggesting that as a part of our climate change policy?

COMMISSIONER REINSCH: Is this your policy, Jeff?

COMMISSIONER FIEDLER: No. I'm suggesting that the shift of pollution--okay--that the emissions that were generated in the United States were a lot less than the emissions that are currently being generated in China to produce this same product. That's what I'm suggesting. But then again I don't have any evidence, but nobody has any evidence to the contrary either.

MS. FINAMORE: If I could mention just one more area of the potential U.S.-China cooperation that I think is worth mentioning, it could be very fruitful. And it applies to both energy reduction and reduction in emissions. This is a new project launched by the U.S. Department of Commerce called P2E2, Pollution Prevention and Environmental Energy Efficiency. I don't know if you're aware of this. But it's based out of the U.S. Consulate of Hong Kong.

COMMISSIONER FIEDLER: Trading of credits?

MS. FINAMORE: Actually no. No, they've set up a system where factories in China can reduce their energy use and emissions and water use at no up-front cost by contracting in Hong Kong with EESCOs, Energy and Environment Service companies who borrow the money for the upgrades from Hong Kong banks, and then they analyze the baseline emissions and energy use, and then once they've developed the upgrades and help the factory upgrade its energy technologies and emission technologies, then the company pays back that energy service company loan over time through the money they saved for lower energy emission and water use and lower waste disposal costs.

I think this is a very promising area of cooperation that I hope you will support. Thank you.

CHAIRMAN BARTHOLOMEW: Thank you.

HEARING COCHAIR VIDENIEKS: Okay. We'll wrap up. It's noon. Thank you, panelists, for your very good testimony and we'll probably follow up and ask for more detail.

[Whereupon, at 12:00 noon, the hearing recessed, to reconvene at 1:05 p.m., this same day.]

A F T E R N O O N S E S S I O N

[1:05 p.m.]

**PANEL VII: POLICY STRATEGIES FOR ADDRESSING THE  
EFFECTS OF CHINA'S ENERGY CONSUMPTION**

HEARING COCHAIR D'AMATO: The Commission will come to order. We're now in the second afternoon of our hearing on China's energy consumption and opportunities for U.S.-China cooperation to address the effects of China's energy use.

In our next panel this afternoon, we're very pleased to welcome a representative from the Department of Defense, Mr. David Helvey, the Country Director of China, Taiwan, and Mongolia in the Office of the Assistant Secretary of Defense for Asia and Pacific Security Affairs.

Prior to this position, he was assigned to the Defense Intelligence Agency as a China military political affairs analyst in the China Strategic Issues Division, Office of China and East Asia.

Mr. Helvey will present the administration perspective on the impact of China's energy consumption on U.S. national security, the maritime implications for the U.S. Navy of China's going-out strategy, so-called "going-out" strategy, to require resources, and the geopolitical and strategic impacts of China's energy diplomacy with Central Asia and Iran.

Thank you very much for joining us today, Mr. Helvey. We look forward to your remarks. I want to apologize for Vice Chairman Blumenthal, who intended to be here, but was just called out on an emergency basis this afternoon--we hope he'll return--for him not being able to attend this particular panel.

Mr. Helvey, you may proceed. Take as much time as you like.

**STATEMENT OF MR. DAVID F. HELVEY  
DIRECTOR, CHINA, TAIWAN AND MONGOLIA AFFAIRS,  
OFFICE OF THE DEPUTY UNDER SECRETARY OF DEFENSE,  
ASIAN & PACIFIC SECURITY AFFAIRS, DEPARTMENT OF  
DEFENSE, WASHINGTON, D.C.**

MR. HELVEY: Thank you very much. Madam Chairman, members of the Commission, I'd like to thank you for inviting me to appear today to speak on this topic. My testimony this afternoon will offer some perspectives from the Department of Defense on the military strategic and geopolitical implications of China's energy acquisition strategy.

These questions have an important influence on security trends in East Asia and more distant regions of the world. I commend the

Commission for its continued interest in this topic.

In the three decades since reform and opening, China has experienced rapid, continual economic growth and development. In 2006, China became the fourth largest economy in the world. It's the world's third-largest trading nation, a major destination for foreign direct investment, and one of the world's leading manufacturers.

To sustain the growth of China's economy and to satisfy the rising expectations of a growing domestic middle class that naturally seeks the benefits of accumulated wealth, China's leaders are increasingly concerned over secure and reliable access to export markets and sources for raw materials, and energy is a big part of that.

China has become the world's second-largest energy consumer after the United States. Its demand for energy will surpass that of the United States, accounting for some 20 percent of total world demand by 2025.

China is expected to rely on coal as its primary fuel source, but consumption of petroleum and other liquid fuels is expected to grow. Nuclear power and natural gas account for growing but smaller portions of energy consumption. Since 2003, China's been the world's third-largest importer of oil and the second-largest consumer, again, after the United States.

China currently imports about 40 percent of its oil and is expected to rely on imports to satisfy 69 percent of its oil demand by 2030.

As we have noted in our reports to Congress on Military Power of the People's Republic of China, concerns over access to resources including energy have become an important influence on China's strategic behavior.

Compounding these concerns are the inherent frictions at the center of China's transformation to a socialist market economy in which the dynamic elements of China's increasingly market-based economy clash with the Chinese Communist Party's desire to retain its monopoly on political power and control its strategic industries and sectors of the economy, including energy.

China's leadership appears concerned that the rapid growth of China's oil and gas consumption and the related need to insulate China from fluctuations in global market prices could affect economic growth and domestic stability. Premier Wen Jiabao, for example, has stated that the "shortage of oil and gas resources has become a restricting factor in our country"--that's China--"in our country's economic and social development."

A no less urgent concern for Beijing is the secure transport of these materials back to China. Some 80 percent of China's crude oil imports transit the Malacca Strait.

In November 2003, China's President and the Chinese Communist Party General Secretary Hu Jintao discussed this vulnerability, the so-called "Malacca dilemma," presumably because it poses fundamental questions over whether or not China should maintain its present reliance on others for sea lane security, develop its own capabilities to protect its sea lanes or work cooperatively with others towards these ends or finally develop alternative seaborne or overland supply routes.

Confronted with the challenges of rising energy demand, China's leaders have embarked on a sophisticated strategy to address China's energy security needs. This strategy is being pursued along three principal axes.

The first is to increase energy efficiency and the use of renewable resources. The second is to increase domestic production and infrastructure development, and the third is to secure foreign resources through the so-called "go-out" strategy.

In my written statement, I discuss the first two of these in some detail. In the interest of time, I will focus on the third because when China acts as if it can lock up energy supplies in third countries it raises concerns for U.S. defense and security policy.

As recently as 1996, China had relied primarily on two countries, Oman and Indonesia, for roughly half of its imports. Since that time, China has pursued long-term supply contracts with the diverse range of supplier nations including Angola, Chad, Egypt, Indonesia, Kazakhstan, Nigeria, Oman, Russia, Saudi Arabia, Sudan, and Venezuela.

Currently, slightly over half of China's imports come from the Middle East and almost a quarter from Africa. In addition to securing long-term supply contracts, China has pursued equity positions in a variety of energy assets and investments.

Although small compared to investments by the international oil majors, China's investments have increased significantly in recent years. Chinese national oil companies have invested in oil ventures including oil field development, pipeline refinery projects in Kazakhstan, Nigeria, and Sudan and also in over 20 other countries in North Africa, Central Asia, Southeast Asia, Latin America and North America.

China's response to its energy needs has led Beijing to finance energy projects that have uncertain prospects for a positive return on investment, to ignore political risk that is prohibitive to private commerce, and to establish closer relations with problem states such as Sudan that are rich in energy but that defy international norms.

In terms of security implications, China's policies and efforts to establish special relationships with these foreign suppliers have potential negative repercussions on regional stability and security.

In some cases, China has used economic aid, diplomatic favors and the sale of military technology as incentives to secure energy deals. In the case of Sudan, Beijing's commercial ties have complicated efforts to secure more robust support from China in countering that country's defiance of international norms. Such ties may also have influence China's role in containing Iran's nuclear ambitions.

A second implication lies in the uncertainty created by China's energy acquisition strategies. As documented in the reports published by this Commission, their remains concerns and questions, both within the United States and among China's neighbors over the economic impact of China's energy policies.

Whereas, the United States tends to pursue energy security through fostering broad-based markets and diversification of resources, China has tended to see its energy security interests advanced by protecting itself from the international market through control of the supply chain beginning at the source of production.

Some have questioned whether Chinese investments in energy assets such as oil and gas fields, pipelines and refineries abroad will remove energy resources from the competitive market. On the contrary, ownership of these resources generally displaces what the Chinese would have otherwise bought on the open market.

In addition, production from Chinese owned firms often enters the market for global consumption. And lastly, to the extent that Chinese firms are investing where other international firms are not, the behavior could even expand the world's supply of trade oil and gas.

Nevertheless, the question remains over the degree to which China's behavior could affect other countries including emerging market economies, potentially creating a trend that runs counter to the process of market-oriented globalization upon which China is increasingly dependent for success.

A third implication relates to the lingering disputes that China has with several of its neighbors over sovereignty claims in the East and South China Seas. Dispute over ownership of rich energy deposits in these areas has periodically contributed to friction between China and other claimants in the past.

And we are encouraged that Beijing and the other parties remain focused on diplomacy to resolve these issues, but nevertheless, as we saw in the fall of 2005 when PRC naval vessels trained their weapons on Japanese Self Defense Forces aircraft, monitoring Chinese drilling and surveying activity in the disputed area of the East China Sea, the potential exists for miscalculation or accidents that could lead to a crisis.

In terms of defense implications, as we've discussed in our 2007

report to Congress on Military Power of the People's Republic of China, there's a question over the extent to which Beijing's concerns for the security of its access to energy supplies has begun to shape China's defense policy and force planning for the future.

China's latest defense white paper, entitled "China's National Defense in 2006," states explicitly in its description of the security environment, that, quote, "security issues related to energy, resources, finance, information and international shipping routes are mounting."

It also defines the People's Liberation Army's primary task as upholding national security and unity and ensuring the interest of national development.

China has not been forthcoming on how these concerns will be addressed through doctrinal evolution, resource allocation, force structure changes or contingency planning.

The lack of transparency and excessive secrecy that surrounds Chinese military and security affairs gives limited insight, if any, into the debates occurring within China on these fundamental questions.

We see today a PLA that's in the midst of a broad-based comprehensive military transformation. In the near term, China's focus appears to be on preparing for military contingencies in the Taiwan Strait, which would include the possibility of U.S. intervention.

Over the longer term, our report notes that official documents and writings of Chinese military strategists suggest that Beijing is surveying the landscape beyond Taiwan in the consideration of the application of China's military forces to other regional contingencies such as conflict over territory or resources.

China's ability to project and sustain military power at a distance today remains limited. This indicates that at least for the near and mid-term, China and in particular the PLA Navy faces an ambition capability gap in terms of using its military power to secure foreign energy investments or to defend critical sea lanes against disruption. In analyzing the potential capabilities that China may consider developing for these types of missions, a number of current PLA acquisition programs are of note, however.

First, new missile units outfitted with conventional theater-range missiles could be used for anti-access or area denial in a variety of regional contingencies.

Airborne early warning and control and air refueling programs could permit extended-range offensive air operations into the South China Sea.

Advanced destroyers and submarines equipped for anti-air or anti-surface and undersea warfare could enable Beijing to protect and advance its maritime interests.

New equipment, better unit-level tactics and greater coordination

of joint operations are improving China's expeditionary forces.

Investment in command, control communications, computers, surveillance, intelligence and reconnaissance, C4ISR, including space-based and over-the-horizon sensors, could improve identification, tracking and targeting of foreign military activities deep into the western Pacific Ocean.

Extended long-range patrols into the Indian Ocean are also providing the Chinese Navy with increased opportunities to become familiar with traditional sea lanes upon which their oil is shipped.

As we look to the future, a number of key trends in PLA capability developments are worth monitoring, and, in particular, those capabilities that are related to extended range power projection including aircraft carrier development, expeditionary warfare, undersea warfare, anti-air warfare, long-range precision strike, maritime C4ISR, expeditionary logistics and possible forward basing, training and exercises, especially in open water, and a more activist military presence abroad.

In summary, as China's economy grows, its demand for energy and the secure and reliable access to energy sources including oil will continue to grow. China's energy acquisition strategy based on an affinity for long-term supply contracts and equity positions in foreign ventures and its attendant belief that it must establish special relationships with foreign suppliers poses some concerns for U.S. strategic interests.

An immediate consequence is the negative impact that it has on U.S. goals favoring the spread of democracy, as well as our priorities for the promotion of human rights and the rule of law, confronting the threat of terrorism and nonproliferation.

In the mid and long term, this behavior could pose the risk of spreading instability in volatile areas to neighboring countries with ramifications for regional security.

Finally, there's the question over the degree to which increased PRC foreign energy investments might lead Beijing to develop the military capacity to protect those investments if instability threatens to put them at risk.

But there's an important role for U.S. policy to play in helping to frame China's choices and to encourage China's leaders to make responsible decisions that strengthen and support global security and prosperity.

In this regard, U.S. policy is integrating a discussion of global market dynamics into a broader discussion of China's national security priorities to help shape Beijing's views on markets and economic principles.

The number of bilateral and multilateral forums in which we're

engaging China on energy continues to expand. The list currently includes the Strategic Economic Dialogue, the Energy Policy Dialogue, the Asia Pacific Partnership on Clean Development and Climate, the Senior Dialogue, the Five Party Energy Ministerial, the APEC Energy Working Group, and the Methane to Markets Partnership.

The President's recently announced climate change strategy targets China and other major emitters of greenhouse gases with the goals of including collaboration on the broader use of clean and efficient energies in our markets.

At the same time, we must also watch closely China's energy acquisition efforts in Africa and the Middle East and the Western Hemisphere, as well as the effects of Beijing's "go-out" strategy on the behaviors of other key states of concern.

Within the Department of Defense, we must continue to monitor carefully China's military modernization and foreign military activities, particularly as they relate to capability developments that improve the PLA's power projection and anti-access and area denial forces.

Madam Chairman, members of the Commission, thank you again for the opportunity to testify today and I look forward to taking any questions you may have.

[The statement follows:]

**Prepared Statement of Mr. David F. Helvey  
Director, China, Taiwan and Mongolia Affairs, Office of the Deputy  
Under Secretary of Defense, Asian & Pacific Security Affairs,  
Department of Defense, Washington, D.C.**

Madam Chairman, Mr. Vice Chairman, members of the Commission, I thank you for inviting me to appear before you today to speak on this topic. China's rapid emergence as a political and economic power with global ambitions is a pivotal element in East Asian security dynamics. China's efforts to secure access to critical resources and markets to propel its economic growth are a central part of that dynamic. My testimony this afternoon will offer some perspectives from the Department of Defense on the military, strategic, and geopolitical implications of China's energy acquisition strategy. These questions have an important influence on security trends in East Asia and more distant regions of the world. I commend the Commission for its continued interest in this topic.

**China's Economic Growth and Energy Needs**

In the three decades since Deng Xiaoping introduced "reform and opening," China has experienced rapid, continual economic growth and development. In 2006, China became the fourth largest economy in the world, surpassing Great Britain in gross national product. It is the world's third largest trading nation, with approximately \$974 billion in exports and approximately \$777 billion in imports in 2006. It is also a major destination for foreign direct investment. The engine of China's economic performance is its manufacturing base, where China has become one of the world's leading manufacturers.

To sustain the growth of China's economy, and to satisfy the rising expectations of a growing domestic middle class that naturally seeks the benefits of accumulated wealth, China's leaders are increasingly

concerned over secure and reliable access to export markets and sources for raw material imports. Energy sources factor prominently in these calculations, as China's need for energy is projected to increase 89 percent by 2020.

According to the Department of Energy, China has become the world's second largest energy consumer after the United States. The Energy Information Administration projects that by 2025 (assuming current trends) China's demand for energy will surpass that of the United States, accounting for some 20 percent of total world demand. Although China is expected to continue to rely on coal as its primary fuel source, consumption of petroleum and other liquid fuels is expected to grow significantly due, in large part, to expansion in the transportation sector. For example, automobile ownership in China is expected to rise from 27 million cars in 2004 to nearly 400 million cars by 2030. Nuclear power and natural gas account for growing, but smaller portions of energy consumption.

China currently consumes approximately 6.4 million barrels of oil per day, and since 2003, has been the world's third largest importer of oil and second largest consumer, after the United States. China currently imports about 40 percent of its oil (2.5 million barrels per day in 2005). According to the U.S. Department of Energy, China is expected to rely on imports to satisfy 69 percent of its oil demand by 2030 – importing approximately 11 million barrels per day to support consumption of approximately 16 million barrels per day.

As we in the Department of Defense have noted in our most recent report to Congress on Military Power of the People's Republic of China, concerns over access to resources, including energy, have become an important influence on China's strategic behavior. Compounding these concerns are the inherent frictions at the center of China's transformation to a "socialist market economy," in which dynamic elements of China's increasingly market-based economy clash with the Chinese Communist Party's desire to retain its monopoly on political power and control of strategic industries and sectors of the economy, including energy.

China's leadership appears concerned that the rapid growth of China's oil and gas consumption and the related need to insulate China from fluctuations in global market prices could affect economic growth and domestic stability. Premier Wen Jiabao stated that, "[the] shortage of oil and gas resources has become a restricting factor in our country's economic and social development." A no less urgent concern for Beijing is the secure transport of these materials back to China. At present, China can neither protect its foreign energy supplies nor the routes on which they travel, including the Strait of Malacca through which some 80 percent of China's crude oil imports transit. In November 2003, China's President and Chinese Communist Party General Secretary Hu Jintao discussed this vulnerability, the so-called "Malacca Dilemma," presumably because it poses fundamental questions over whether China should maintain its present reliance on others for sea lane security, develop its own capabilities to protect its own sea lanes (or work cooperatively with others toward these ends), or develop alternative sea-borne or overland supply routes.

### **China's Response to Energy Dependence**

Confronted with the challenges of rising energy demand, China's leaders have embarked on a sophisticated strategy designed to address China's energy security needs. This strategy is being pursued along three principal axes: 1) increasing energy efficiency and use of renewable resources; 2) increasing domestic production and infrastructure development; and, 3) securing foreign resources. I will focus mainly on the latter because when China acts as if it can "lock-up" energy supplies in third countries, it raises concerns for U.S. defense and security policies.

Increasing Efficiency and Use of Renewable Resources. According to China's National Development and Reform Commission (NDRC), in 2005, China's energy efficiency was about 10 percent lower than that of mature market economies. Energy consumption per unit of product in key industries (e.g., electric power, iron and steel, non-ferrous metals, petrochemical, building material, chemical light industry, and textile

industry) is about 40 percent higher than in advanced economies. Energy consumption for space heating per building area in China is some two to three times higher than that of developed countries with similar climates. Increased efficiency and use of renewable resources would narrow the gap in energy use between China and other countries, creating significant energy savings and reducing China's overall energy demand.

Beginning with the 11<sup>th</sup> Five Year Plan (2006-2010), China's leaders called for a 20 percent reduction in energy consumption per unit of Gross Domestic Product by 2010. To support this goal, China plans to invest in a variety of conservation projects, some of which were outlined in the NDRC's 2005 "China Medium and Long-Term Energy Conservation Plan," which included alternative fuel vehicles and high efficiency motors, energy conservation projects for commercial and residential buildings, and combined heat and power cogeneration. China has sought to improve fuel efficiency standards and has planned to increase investment in alternative fuels and renewable energy sources such as hydro-electric, wind, solar, and biomass. These are ambitious aims, the implementation of which will require significant investment and follow-through. To underscore this point, in his 2007 government work report, Premier Wen Jiabao acknowledged that China was failing to date in meeting these goals.

Increasing Domestic Production and Infrastructure Development. China's largest oil field at Daqing provides for about 25 percent of China's total crude oil production; however, production at Daqing peaked in the 1970s, and has declined steadily at an average annual rate of 2.6 percent since 1997. To compensate for this decline and as energy demand increases, China has sought to expand production at other fields in China, open up reserves in western China's Xinjiang Province, increase off-shore production, and increase both on-shore and off-shore exploration. According to the Department of Energy, in 2004, China began building its strategic petroleum reserve (SPR)-in three phases, to be completed by 2020. The high oil prices of recent years prompted China to delay oil purchases to fill its strategic reserve until summer 2006. The first phase, to be completed by 2008, will hold 100 million barrels – equivalent to 25 days of China's net oil imports. The second phase is planned to add 200 million barrels, covering 42 days of net oil imports. After 2010, work on the third phase may increase the net storage capacity to 500 million barrels.

China is also investigating coal liquefaction to increase its use of coal as a direct substitute for oil. In general, however, the coal sector in China has suffered from poor and inadequate infrastructure and distribution bottlenecks leading to chronic localized power outages and the search for foreign sources of coal, despite the overwhelming abundance of this resource in China. Moreover, the environmental consequences of China's coal utilization are significant, with the country expected to surpass the U.S. as the number one source of carbon dioxide emissions this year, or the next. China plans to expand its use of nuclear power by building an additional 30 1,000 megawatt nuclear power reactors by 2020 (increasing nuclear power from 2 to 6 percent of total electricity output and prompting its search for foreign uranium supplies). It also looks to increase natural gas utilization from 3 percent to 8 percent of total consumption by 2010 and has launched a program to build the necessary infrastructure to ship domestic natural gas from deposits in western China to major demand centers along the coast.

Securing Foreign Resources. The third response from China to its growing energy needs, -- and energy security concerns – is to diversify its energy supply through a "go out strategy" to secure new foreign imports and acquire overseas assets. As noted in the Department of Energy's February 2006 report to Congress pursuant to Section 1837 of the Energy Policy Act of 2005, as recently as 1996, China relied primarily on two countries, Oman and Indonesia, for roughly half of its imports – 70 percent when including Yemen. Since that time, China has pursued long-term supply contracts with a diverse range of supplier nations to include Angola, Chad, Egypt, Indonesia, Kazakhstan, Nigeria, Oman, Russia, Saudi Arabia, Sudan, and Venezuela. Last year saw the largest annual increase in new energy contracts signed by China with new agreements with Saudi Arabia and several African countries. Currently, slightly over half of China's oil imports come from the Middle East and almost a quarter from Africa.

In addition to securing long-term supply contracts, China has pursued equity positions in a variety of energy assets and investments. Although small compared to investments by the international oil majors,

China's investments have increased significantly in recent years. Chinese national oil companies have invested in oil ventures (oilfield development, and pipeline and refinery projects) in Kazakhstan, Nigeria, Sudan, and in over 20 other countries in North Africa, Central Asia, Southeast Asia, Latin America, and North America.

### **Security and Defense Implications**

China's response to its energy needs has led Beijing to finance energy projects that have uncertain prospects for a positive return on investment; ignore political risk that is prohibitive to private commerce; and, establish closer relations with "problem states," such as Sudan, that are rich in energy, but that defy international norms and pose risks to regional stability. The continuing growth in China's economy will drive increased Chinese reliance on fossil fuels and sea-borne supply lines for the foreseeable future, and will continue to shape China's security and defense policies in ways that will affect U.S. strategic interests.

Security Implications. China's affinity for long-term supply contracts and equity positions, and its attendant belief that it must establish special relationships with these foreign suppliers, has potential negative repercussions on regional stability. China has used economic aid, diplomatic favors, and the sale of military technologies as incentives to secure energy deals. China's energy needs have led Beijing to strengthen its commercial ties with Sudan, and have complicated efforts to secure more robust support from China in countering that country's defiance of international norms. They may have also influenced China's role in containing Iran's nuclear ambitions. In recent years, China has also offered economic assistance and military cooperation to countries located astride key maritime and overland transit routes.

A second implication lies in the uncertainty created by China's energy acquisition strategies. As documented in the reports published by this Commission, there remain concerns and questions both within the United States and among China's neighbors over the economic impacts of China's energy policies. Whereas the United States tends to pursue energy security through fostering broad-based markets and diversification of resources, China has tended to see its energy security interests advanced by protecting itself from the international market through control of the supply-chain beginning at the source of production. Some have questioned whether investments by Chinese national oil companies in energy assets such as oil and gas fields, pipelines, and refineries abroad will "remove" energy resources from the competitive market. On the contrary, ownership of these resources generally displaces what the Chinese would have otherwise bought on the open market, and the production from Chinese-owned firms often enters the market for global consumption. To the extent that Chinese firms are investing where other international firms are not, the behavior could even expand the world's supply of trade oil and gas. Nevertheless, the question remains over the degree to which China's behavior could affect other countries, including emerging market economies, potentially creating a trend that runs counter to the process of market-oriented economic globalization upon which China is increasingly dependent for success.

A third implication relates to lingering disputes that China has with several of its neighbors over sovereignty claims in the East and South China Seas. Disputes over ownership of rich energy deposits, including some 7 trillion cubic feet of natural gas and up to 100 billion barrels of oil, in the East China Sea have periodically contributed to friction between China and Japan. Japan maintains that the median line should determine sovereignty, while China claims an exclusive economic zone of 200 nautical miles from its continental shelf – extending almost to Japan's shore. We are encouraged that Beijing and Tokyo remain focused on diplomacy to resolve this issue. Nevertheless, as we saw in the fall of 2005 when PRC naval vessels trained their weapons on Japanese Self Defense Forces aircraft monitoring Chinese drilling and survey activity in the disputed area, a clear potential exists for miscalculation or accidents that could lead to a crisis both sides would prefer to avoid.

In the South China Sea, China claims exclusive sovereignty over the Spratly and Paracel island groups – a claim shared either whole or in part by Brunei, the Philippines, Malaysia, Taiwan, and Vietnam. Although all parties continue to adhere to a 2002 Declaration of Conduct that commits each "to resolve their

territorial and jurisdictional disputes by peaceful means” without “resorting to the threat or use of force,” competing sovereignty claims in this area have been the source of tension and conflict in the past. Energy shocks or the discovery of extractable resource deposits could lead to renewed frictions between China and one or more of the other parties to the dispute.

Defense Implications. As we have discussed in our 2007 report to Congress on Military Power of the People’s Republic of China, there is a question over the extent to which Beijing’s concerns for the security of its access to energy supplies has begun to shape China’s defense policy and force planning for the future. That energy and resource concerns influence China’s thinking about the problem of defense planning no longer appears to be subject to debate; China’s latest defense white paper, China’s National Defense in 2006, states explicitly in its description of the security environment that, “security issues related to energy, resources, finance, information and international shipping routes are mounting.” It also defines the People’s Liberation Army’s (PLA) primary task as the “upholding [of] national security and unity, and ensur[ing] the interests of national development.” China has not been forthcoming on how these concerns will be addressed through doctrinal evolution, resource allocations, force structure changes, or contingency planning, however. The lack of transparency and excessive secrecy that surrounds Chinese military and security affairs gives limited insight, if any, into the debates occurring within China on these fundamental questions.

We see today a PLA that is in the midst of a broad-based comprehensive military transformation designed to fight and win short-duration, high-intensity conflicts against high-tech adversaries. The near-term focus of China’s force development appears to be on preparing for military contingencies in the Taiwan Strait, including the possibility of U.S. intervention. Over the longer-term, our report observes that official documents and writings by Chinese military strategists suggest Beijing is surveying the landscape beyond Taiwan in the consideration of the application of China’s military forces to other regional contingencies, such as conflict over resources or territory. At present, China’s ability to project and sustain military power at a distance remains limited. This indicates that, at least for the near and mid-term, China, and in particular the PLA Navy, faces an ambition-capability gap in terms of using military power to secure its foreign energy investments or to defend critical sea lanes against disruption.

In analyzing the potential capabilities that China may consider developing for these types of missions, a number of current PLA acquisition programs are of note:

- New missile units outfitted with conventional theater-range missiles at various locations in China could be used for anti-access/area denial in a variety of regional contingencies.
- Airborne early warning and control and aerial-refueling programs could permit extended-range offensive air operations into the South China Sea.
- Advanced destroyers and submarines equipped for anti-air, anti-surface, and undersea warfare could enable Beijing to protect and advance its maritime interests.
- New equipment, better unit-level tactics, and greater coordination of joint operations are improving China’s emergent expeditionary forces – at present, three airborne divisions, two amphibious infantry divisions, two marine brigades, about seven special operations groups, and one regimental-sized reconnaissance element in the Second Artillery.
- Investment in command, control communications, computers, surveillance intelligence and reconnaissance (C4ISR) capabilities, including space-based and over-the-horizon sensors, could improve identification, tracking, and targeting of foreign military activities deep into the western Pacific Ocean.

- Extended long-range patrolling into the Indian Ocean is providing increased opportunities for PLA Navy crews to become familiar with the traditional sea lanes upon which their oil is shipped. China has conducted two multi-ship forays into the Indian Ocean this year, including one to participate in a multilateral naval exercise hosted by Pakistan, and the other to call on St. Petersburg, Russia.

As we look to the future, a number of key trends and PLA capability developments are worth monitoring, in particular those related to extended-range power projection, including aircraft carrier development; expeditionary warfare; undersea warfare; anti-air warfare; long-range precision strike; maritime C4ISR; expeditionary logistics and possible forward basing; training and exercises, especially in open water; and, a more activist military presence abroad.

### **U.S. Government Engagement**

Energy efficiency and security is increasingly a focal point of U.S.-China relations. The number of bilateral and multilateral forums in which we engage China on energy continues to expand. The list currently includes the Strategic Economic Dialogue; the Energy Policy Dialogue; the Asia-Pacific Partnership on Clean Development and Climate; the Senior Dialogue; the Five-Party (U.S., China, ROK, Japan, India) Energy Ministerial; the APEC Energy Working Group; and the Methane to Markets partnership. The President's recently announced climate change strategy targets China and other major emitters of greenhouse gases, with goals including collaboration on the broader use of clean, efficient energies in our markets.

### **Conclusions**

In summary, as China's economy grows, its demand for energy – and the secure, reliable access to energy sources, including oil, will continue to grow. China's energy acquisition strategy, based on an affinity for long-term supply contracts and equity positions in foreign ventures, and its attendant belief that it must establish special relationships with foreign suppliers, poses concerns for U.S. strategic interests. An immediate consequence of this behavior is the negative impact that it has on U.S. goals favoring the spread of democracy, as well as priorities for the promotion of human rights and the rule of law, confronting the threat of terrorism, and non-proliferation.

In the mid- and long-term, however, this behavior could pose the risk of spreading instability in volatile areas to neighboring countries with ramifications for regional security. Finally, there is a question over the degree to which increased PRC foreign energy investments might lead Beijing to develop the military capacity to protect those investments if instability threatens to put them at risk.

There is an important role for U.S. policy in helping to frame China's choices and to encourage China's leaders to make responsible decisions that strengthen and support global security and prosperity. In this regard, U.S. policy is integrating a discussion of global market dynamics into a broader discussion of China's national security priorities to help shape Beijing's views on economics and market principles. At the same time, we must also watch closely China's energy acquisition efforts in Africa, the Middle East, and the Western Hemisphere, as well as the effects of Beijing's "go out strategy" on the behaviors of other key states of concern. And within the Department of Defense, we must continue to monitor carefully China's military modernization and foreign military activities, particularly as they relate to capability developments that improve the PLA's power projection and anti-access/area denial forces.

Madam Chairman, Mr. Vice Chairman, and Members of the Commission, I thank you again for the opportunity to testify today and look forward to taking your questions.

## **PANEL VIII: Discussion, Questions and Answers**

HEARING COCHAIR D'AMATO: Thank you very much, Mr. Helvey. And your statement will be included in the record that's written.

MR. HELVEY: Thank you.

HEARING COCHAIR D'AMATO: There's been an issue that this Commission has looked into over the last few years. I wanted to get your perspective on DOD sees the question of the long-term contractual relationship and the equity acquisition of fields.

We have been told various percentages that the Chinese import in terms of taking the oil and maintaining security of supply by importing the oil that they acquire in these fields, which is rather inefficient. Do you have any sense or has DOD done any assessment as to what actually is the amount?

There's been some dispute over that in that some people indicate that they feel that the Chinese are actually buying it on the international market more so now that they're playing as an international player. What is your understanding as to the extent to which China has continued to hoard or to try and keep supply of that oil from the fields that they acquire as opposed to playing along the lines of the normal international playbook and putting their oil on the international marketplace, buying oil on the international marketplace?

MR. HELVEY: Sir, thank you for that question. It's my understanding that China does pursue kind of a mixed strategy. It does buy oil and other energy resources off the market. Actually a smaller percentage of the resources it acquires is through these schemes that you talked about, either whether it's long-term supply contracts or doing equity investments.

There's also a question over the degree to which the percentage of the energy supplies that are acquired through that route either end up back in China or on the open market, and as I referenced in the testimony, that China does provide a measurable amount of what it acquires through these special means into the global energy markets.

I don't have the specific figures, but I would say that clearly they're not buying all their stuff through long-term supply contracts, and it is a mixed strategy.

HEARING COCHAIR D'AMATO: Is the trend toward purchasing on the international marketplace more so than in the past or is it acquire through pipeline and security of supply?

MR. HELVEY: I think one of the things that we've tried to do, both in terms of the Department of Defense, but also U.S. government agencies, is to try to help China understand the economic inefficiencies of pursuing long-term supply contracts and equity positions.

And to the extent that these efforts can help to shape China's views and recognition of the inefficiency in that, we're contributing to a more mature sense of market principles and economic dynamics in China. I don't know exactly right now what the current trend is, but certainly we'd like to see China pursue more on the open market and not engage in noncompetitive energy acquisition.

HEARING COCHAIR D'AMATO: Along the same lines, this may not be something that the Department of Defense looks into regularly, but when we had the dispute over CNOOC's attempt to acquire Unocal, there was a question of China's "going-out" strategy in terms of acquiring assets of that kind.

Now that China is flush with dollars and has a huge reserve of American currency, the question has arisen as to what kind of strategy the Chinese are going to be pursuing in terms of acquiring assets, not necessarily American assets, but international assets, assets in other countries that are the producers of hydrocarbons?

Do you see any evidence or is the department concerned or seen any evidence of that kind of a strategy on the part of the Chinese in terms of acquiring strategic energy assets by just purchasing them?

MR. HELVEY: If you mean by purchasing equity positions in foreign energy assets--

HEARING COCHAIR D'AMATO: Acquiring companies that produce energy and transmit energy, that sort of thing.

MR. HELVEY: Sure. That is part of China's strategy to do that, and to the extent that it has the resources to go out and purchase companies or equity stakes in foreign energy assets, that is part of the strategy that they're pursuing.

But I think one of the interesting questions, and this kind of gets at one of the main themes of the testimony, is some of the concerns that we have--getting back to the Unocal issue, and, of course, recognizing that the decision-making on that occurred far above my pay grade--but I think if you look at the uncertainty that was voiced over the implications of China's effort to acquire Unocal, it relates to this central concern that we have over the lack of transparency in a lot of Chinese economic decision-making.

To the extent that we have greater visibility into the relationship between the state and political apparatus and PRC commercial entities, and to the extent that there is greater transparency into the decision-making that goes behind that, I think a lot of these concerns that we and others had over these transactions could be addressed.

HEARING COCHAIR D'AMATO: Thank you. Chairman Bartholomew.

CHAIRMAN BARTHOLOMEW: Thank you very much. Thank you, Mr. Helvey, both for coming today and for your service to our

nation. We have a very valued relationship with the Department of Defense and always appreciate the insight that you and other representatives of the department bring to our hearings.

Yesterday, we heard some questions being raised about essentially the relationship between the central government and the state-owned oil companies, especially in the context of Sudan, for example. As it turns out, a lot of the oil that CNPC is getting out of Sudan, they are selling on the market, not taking back to China. There were some questions raised about how much heat the Chinese government is willing to bear, public relations problems, for example, when the oil is not coming back to China itself.

I wondered if you have any observations on that or any sense of what options, if indeed that's the case, the Chinese government might pursue vis-à-vis Chinese state-owned oil companies?

MR. HELVEY: With specific respect to Sudan, I think one of the things that we have a concern about, and I think it's symptomatic of a broader range of China's decision-making in its energy acquisition strategy, is that it's going into areas where private commerce or other international oil companies really are not, and that leads China in many ways to become more solicitous of, in this case, Sudan, the Sudanese government's interests, and what we're seeing with that, and the impact of that is a reluctance on China's part to really pressure Khartoum to change its international behavior and comply with international norms.

Now, in terms of the relationship between the central government and Chinese oil firms, I think that gets back to my part of response to the previous question where at least from my perspective I think that there's a lot of remaining concerns over the lack of transparency that really helps to explain and shed insight on the nature of the government/state interactions with some of these oil companies.

So we don't have a whole lot of insight into the decision-making and the relationships and therefore the motivations and intentions that go into some of China's energy behavior, and I'm not really in a position to recommend what China could do to improve that outside of just being a little bit more transparent in the nature of its economic and strategic decision-making.

CHAIRMAN BARTHOLOMEW: I think some of the questions really also come up in the context of if the '08 Olympics are at risk because of the continuing problems in Sudan and China's role in those problems in Sudan, is the Chinese government going to be willing to allow this CNPC, which is making profit out of this, to continue its activities?

MR. HELVEY: This is something that our two governments, China and the United States, are talking about, and we're concerned

that Beijing is not using its full weight, but this is something that we are encouraging China to do. Its access and position in Sudan in many ways carries with it unique responsibilities to help bring Sudan into compliance with international norms.

CHAIRMAN BARTHOLOMEW: Great. Thank you. Okay. If there's time for a second round, I have other questions.

HEARING COCHAIR D'AMATO: There may be time for a second round. Commissioner Fiedler.

COMMISSIONER FIEDLER: A number of questions. On the question of yesterday's testimony of CNOOC acting as an independent actor from the central government in the Sudan, I actually have serious questions whether that's the case, given the fact that Norinco is selling them weapons, the National Construction Company is building roads, and the Chinese government has decided to build infrastructure. So the appearance of an independent oil company is questionable to me, just as a matter of comment.

Two, is there a Chinese military presence in the southern Sudan to protect their investments currently?

MR. HELVEY: That's a good question. It's one that has kind of been out there for a long time.

COMMISSIONER FIEDLER: I've read both things, yes and no.

MR. HELVEY: I've seen press reports but I've never seen anything that would be able to confirm for me that there is a Chinese military presence protecting its assets or personnel in southern Sudan. It would not surprise me if there wouldn't be a security force. Now, whether that's PLA or contracted security to provide physical security for the personnel there, that's a big question, but whether or not it is PLA performing that mission, I don't know.

COMMISSIONER FIEDLER: Or PLA in civilian clothes?

MR. HELVEY: Right.

COMMISSIONER FIEDLER: You made a comment that we're trying to make the Chinese understand the economic inefficiencies of trying to secure sources of oil. Who are we trying to persuade of that? Is it the CMC? Is it the military? Is it the State Council? Is it their energy department equivalent?

MR. HELVEY: Who are we engaging? Well, speaking from the Department of Defense's perspective in April 2005, the former Under Secretary of Defense for Policy, Doug Feith, used our U.S.-China defense consultative talks to enter in a discussion on the history of energy markets with his Chinese counterpart who at the time was a deputy chief of the general staff.

In terms of the other agencies of the U.S. government, I think these types of discussions are occurring at a variety of different levels. I mentioned, for example, the Senior Dialogue, which is something that

the Deputy Secretary of State, Ambassador Negroponte, has with his counterpart. This is a continuation of the former Deputy Secretary of State Robert Zoellick's interactions, and this is primarily with the Ministry of Foreign Affairs.

I also mentioned the Strategic Economic Dialogue, which is a new forum that Secretary Paulson now leads up, interacting with individuals at the vice premier level in different elements of China's political and economic apparatus. So I think these types of interactions are occurring at all levels with the Chinese Party and government.

COMMISSIONER FIEDLER: I appreciate that. My concern is that the concept presupposes that they don't understand the economics of this. And I think that there are a lot of people who are very sophisticated economically in China and understand that. So that my suspicion is that they have made a strategic decision despite the economics and that's a different question.

Now, the strategic decision may be wrong, even from their own self-interest point. In other words, we heard testimony yesterday that their search for ownership is essentially in one analyst's view futile, that they will never be able to secure sufficient supply on their own in order to guarantee their view of their own security. If that's the case, why don't we just let them find out that they can't?

MR. HELVEY: Well, I think that I could address that answer on a couple of different levels. In the first instance, it gets back to one of the parts of the testimony I talked about, this friction between the growing dynamic elements of China's emerging market economy, but also the political and ideological imperatives that the Chinese Communist Party has in retaining a political monopoly on power and retaining control of the strategic industries. That is part of that strategic decision that you were talking about.

COMMISSIONER FIEDLER: Right.

MR. HELVEY: It's something that they feel very strongly about because it gets to their ability to, in their estimate, preserve and protect opportunities for economic growth and development which has a direct linkage to domestic stability and rolling back into the legitimacy of the Communist Party itself in the eyes of the Chinese people.

Now, I think the second part of it on why don't we just let them continue, and this gets at some of the security and defense implications that I talked about in my testimony, detailed in the written statement, is that there are consequences, and in some cases tremendous consequences that deal not solely with the economic inefficiency but on the impact on regional stability and security. To the extent that we can use our interactions with China to help them to adjust their

behavior or help to shape their views on their relationship between their political and strategic decision-making on their economic policies, to help them to or to shape their views by bringing into a broader discussion of national security priorities, we might be able to help China to maybe rebalance its risk/benefit calculus that right now is driving them in one current direction.

COMMISSIONER FIEDLER: I understand. Thank you. I too would like a second round.

HEARING COCHAIR D'AMATO: What's that?

CHAIRMAN BARTHOLOMEW: He wants a second round if there's time.

HEARING COCHAIR D'AMATO: Another bite at the apple; is that what you're saying? Commissioner Reinsch.

COMMISSIONER REINSCH: I'd like to ask you about the prospect of increased efforts by the Chinese Navy to provide sea lane protection or security in the Straits of Malacca. Have they displayed any interest in that? How would the Defense Department feel about it if they did? Do they have that capability?

MR. HELVEY: Well, I think I could answer that question very briefly. They don't have the capability right now to be able to protect the sea lanes in the Straits of Malacca. And I think that there have been forums and opportunities to kind of discuss or broach this issue and broader questions of maritime security, that it might be useful to engage in that discussion, but I don't think we're in a position yet where we would want to look at allowing China to protect those sea lanes.

I'd also point out that the host governments in the Straits of Malacca region also have a vote, and I think at this point they're very comfortable providing their own security at least for the Straits of Malacca.

COMMISSIONER REINSCH: Can you clarify one thing? Have we had any discussions with the Chinese about this?

MR. HELVEY: Not on a bilateral basis, but there have been multilateral forums and dialogues I guess through, within the region, that China has been invited to participate in.

COMMISSIONER REINSCH: Have they expressed any interest in a larger role in maritime security in the region?

MR. HELVEY: I think there has been some, there has been some discussion and debate within China, and you get to see this periodically in news articles and opinion articles and Chinese military journals where they'd be thinking about it. But I haven't seen any direct expressed opinion that they want to do this. I don't know if they've made that decision yet or not.

It's a function of, one, the lack of capability, the lack of

capability to do it right now, and it also gets back to those questions that I raised in the prepared testimony that Hu Jintao defined this as the "Malacca dilemma," and I don't know if they've necessarily figured out exactly how they want to respond to it yet in terms of whether or not they want to go unilateral or whether or not they want to go cooperative efforts with other countries in the region.

COMMISSIONER REINSCH: Thank you.

HEARING COCHAIR D'AMATO: We'll have a second round. Chairman Bartholomew.

CHAIRMAN BARTHOLOMEW: Thank you. Commissioner Reinsch asked a piece of the question that I was going to ask about the sea lines of communication. So I think I'll ask something a little bit different about it, and that is if the Chinese government believes that the U.S. is the party that has the ability, and at some point the potential interest, in cutting those off--I'm not saying that we do--but if that's what they believe, why would they engage in some sort of cooperative activity?

MR. HELVEY: Cooperative activity with us or cooperative activity--

CHAIRMAN BARTHOLOMEW: Cooperative activity with us.

MR. HELVEY: I think both sides are, certainly from our perspective, one of the things that we've been trying to do with our overall policy is to create an environment that favors cooperation over competition.

I think at the end of the day that's probably--of course we wouldn't shy away from competition--but at the end of the day, I think our objective must be to create that type of environment. To the extent that we can identify areas where our interests converge, whether it's over countering piracy or narcotics proliferation, these are the types of things that we ought to be doing while still discussing and speaking frankly about our differences.

This is something that I think if we were asked, we'd have to think about if we'd want to pursue that, but the nature of our relationship with the PLA at this point just isn't there in terms of talking about--maritime security. We're still focusing on maritime safety.

CHAIRMAN BARTHOLOMEW: Do you think that it would be possible to structure such cooperation in a way that allows us to maintain the secrecy of the things that we need to keep secret in order to keep our own edge?

MR. HELVEY: I would probably have to defer that to the Navy, and in particular, U.S. Pacific Command. But there are ways that we can structure cooperative interactions. Last year, we completed our first joint maritime search and rescue exercise. This gets back at how

we're really not in the position, the nature of our relationship isn't there yet, but we can construct and create military interactions where we can protect those things that we need to protect while at the same time deriving benefit and value that we would seek. In this instance, it was understanding how they would operate and perform some maritime security operation.

There's ways to do it. I can't give you the details on how they would do it because that's something that the PACOM guys would be able to handle, but we do that all the time.

CHAIRMAN BARTHOLOMEW: Okay. Finally, on a slightly different topic, there was a report I think last week that the Chinese government said that they were interested and willing to do a hot line, a mil-to-mil hot line, and I noticed, though, when I looked a little bit more at it, it said, well, we'll be talking about this in September and "dudda-dudda."

MR. HELVEY: Maybe, maybe, maybe.

CHAIRMAN BARTHOLOMEW: Yes. Is there any insight you can provide into whether we think this is actually going to happen and when it might happen?

MR. HELVEY: As you know, we've had this proposal on the table since 2004, and this has been one of the things that we've been offering to China. It's a tool that we have with other members of the U.N. Security Council and 30 some odd other nations that I think would be a useful mechanism and device to improve communications.

And for a long time, the PLA had either not responded or said not ready. Beginning last year, we started getting some positive indications and signals from our PLA counterparts, including Lieutenant General Zang Qinsheng, who was quoted in the newspaper last week, as saying that they would be interested in moving on to continue those talks. So we've had technical talks. We've had further political talks, and it looks like they might be ready to really move forward with this thing when we have the next round of Defense Consultative Talks, tentatively this September.

We think this would be a good and positive development to improve our ability to communicate with each other. At the end of the day, a lot of it is going to depend on implementation. Just having a defense telephone link is not in and of itself a useful device. You've got to actually be able to use it when it's needed, test it and use the proper protocols.

So we'll be looking to make sure that's part of any kind of agreement to move forward is that this is going to be a device that will be used.

CHAIRMAN BARTHOLOMEW: So we hope that this statement was really a statement of intent to act, not just a statement of intent to

talk about acting?

MR. HELVEY: We're hopeful that it's a statement of intent to act, but we'll have to see. We'll have to see what happens as we get closer to September.

CHAIRMAN BARTHOLOMEW: Right. Great. Thank you.

HEARING COCHAIR D'AMATO: Thank you. Commissioner Houston.

COMMISSIONER HOUSTON: Yes, thank you very much. Mr. Helvey, thank you so much for being here this afternoon. I'm sure it's where you wanted to spend your Friday afternoon. Maybe you can sneak out early after this.

I have a question based on something that you mentioned briefly in your remarks. You said that of course China's military is focusing on and looking at potential conflict with Taiwan, and then you said that they are taking into consideration potential conflicts with other territories or resources. What territories or resources particularly were you speaking of and do these concerns, do they relate to China's energy security in particular?

MR. HELVEY: Two of the areas where China continues to maintain territorial disputes, are in the South China Sea and the East China Sea. Both of those areas are rich in natural resources so I think in terms of looking at the power projection, anti-access/area denial capabilities that are emergent in the PLA, they could have application for contingencies in those areas. But also as I said, in the testimony, one of the things that we are encouraged by is that Beijing and the other parties to these disputes, whether it's Japan in the East China Sea or many of the Southeast Asian nations in the South China Sea, all these parties are very much focused on keeping the disputes in a diplomatic track.

But one of the questions that we would have, and granted, this is speculative, but one of the questions that we would have, is could friction or tension increase over energy in either of those areas, and I think that's an open question, but it is a possibility.

COMMISSIONER HOUSTON: So basically these conflicts are within their own backyard more or less?

MR. HELVEY: They're not conflicts now.

COMMISSIONER HOUSTON: Or--excuse me-- potential conflicts that they're concerned about.

MR. HELVEY: In the case of the East and South China Sea, yes. They're in their maritime periphery, but one of the things I also raised in the testimony is the extent to which China's more farther-flung investments--

COMMISSIONER HOUSTON: Right. That was the second part of my question, yes.

MR. HELVEY: --could kind of lead China to seek to develop the capabilities to be able to intervene to protect those investments if instability were to arise, whether that would be in Central Asia or Africa or other places.

Right now they have some significant capability limitations, but it's a question over whether those energy interests could lead them to develop the capability to do it if they so chose.

COMMISSIONER HOUSTON: Right. So at this point, they're building Navy capability for the geographical nearness. If they were to protect oil assets in, for example, Iran or Sudan, that is obviously a very different kind of opportunity for them or challenge I suppose. So in their military planning, are they also looking at non-Navy growth to protect those assets, those oil assets in far-flung places as you put it?

MR. HELVEY: It would be difficult for me to say what's in their military planning.

COMMISSIONER HOUSTON: Right.

MR. HELVEY: Because we don't really know what's in their military planning. This gets back to the lack of transparency, but looking at some of the capabilities that are emergent in China's forces you see long-range power projection forces. I think one of the key things that one would want to look at is developments of their expeditionary forces to be able to provide a land capability, whether it's airborne or amphibious expeditionary logistics.

If you put some troops in a foreign country, you got to be able to support it and sustain them, which they don't really have right now. But in terms of long-range precision strike ballistic missile forces, they're developing for conventional operations. So these are the types of things that we would need to look for or we ought to be watching to see if they're developing the capability to do that, again, if they chose.

But I think the question is still open if this is something that they would actually intend to do.

COMMISSIONER HOUSTON: Right. Thank you.

HEARING COCHAIR D'AMATO: Thank you. This Commission has been concerned in the past about the Chinese investment activities in Iran, namely the Yadavaran field in Iran, and other energy connections to Iran. What can you tell us about the current thinking of the department on the geopolitical security considerations of China's energy relationship with Iran?

MR. HELVEY: This is actually an interesting point because China is involved with Iran on a variety of different levels. It acquires energy from Iran, it sells arms to Iran, and these are the types of things that we do have concern about, but I don't know if you could necessarily lump China's energy interactions with Iran in the same categories you would with some of the other countries that we talked

about, Sudan, for example. That's because it's my understanding--I'm not an Iran expert--but it's my understanding that Iran has constitutional limitations on the extent to which Iranian oil companies or foreign companies would be allowed to establish equity positions in Iran.

So I think you've got a different dynamic there, and I don't know if energy plays as much of a role as it would--in China's interactions with Iran--as it would with a country like Sudan, for example, but that doesn't obviate our concerns over the nature of China's relationship on multiple levels with Iran and how that relationship may I guess complicate the international community's efforts to address Iran's nuclear program, support for terrorism and these types of things.

HEARING COCHAIR D'AMATO: Yes. It's my understanding that there are investments in the Yadavaran field were so potentially extensive, huge, that that would be a significant factor, just that investment alone in the long run.

MR. HELVEY: I've seen, and I think they even talked about it in the U.S. Department of Energy report that was published last year, that there was some discussion of signing an MOU. I think they did sign an MOU. That was pretty significant.

HEARING COCHAIR D'AMATO: Yes.

MR. HELVEY: Where China would be able to acquire oil and natural gas in exchange for developing the oil field that you spoke of and that is a significant development. But I just wanted to make the distinction between the oil diplomacy that it is a different category or it's a different type of relationship that they have with some of these other supplier nations.

HEARING COCHAIR D'AMATO: Just one moment.

CHAIRMAN BARTHOLOMEW: Just one administrative note. We're expecting Congressman Bartlett to come, but he's actually not supposed to be here until two o'clock. If you can give us a little bit more time if it fits into your schedule and if our next panelists wouldn't mind us starting that panel a few minutes late, I think we can fit it all together. Do you have like another five minutes you can give us?

MR. HELVEY: I sure will. I'd be happy to do it.

CHAIRMAN BARTHOLOMEW: Thanks.

HEARING COCHAIR D'AMATO: Thank you. Commissioner Fiedler.

COMMISSIONER FIEDLER: You asked my Iranian question, but let me ask a factual question. Do we know the size of the Chinese Strategic Petroleum Reserve? And do we know the size to which they want to grow maximally?

MR. HELVEY: Yes, actually I addressed it in my written

statement, but I'll have to address that directly.

COMMISSIONER FIEDLER: All right.

MR. HELVEY: They started constructing the Strategic Petroleum Reserve in 2004, but because of high oil prices, at the time, they didn't actually start filling it until last year in 2006.

They want to develop the Strategic Petroleum Reserve in three basic phases, the first of which is to be completed by 2008 with about 100 million barrels which would be equivalent of about 25 days of China's net oil imports. That would be by 2008.

The second phase is to add another 200 million barrels of oil, which would cover 42 days of net oil imports, and then once you get beyond 2010, the third phase may increase the net storage capacity up to 500 million barrels of oil.

COMMISSIONER FIEDLER: I didn't do the math, but so another month or two?

MR. HELVEY: There's another month.

COMMISSIONER FIEDLER: 125 days total?

MR. HELVEY: There has been some discussion that China might want to go up to 90 day standard, International Energy Agency standard of 90 days, but there's always a question on that because when you're trying to project down in the future, it has a lot to do with what their consumption rates are going to be at that time, GDP growth, and so I think, based on the information that we've got right now that I've included in the testimony, I got it from Department of Energy, and those are the experts on that--but I think that's what we're looking at right now.

COMMISSIONER FIEDLER: And how does that compare to our reserve?

MR. HELVEY: I actually don't have data on our Strategic Petroleum Reserve. I could get that for you if you'd like.

COMMISSIONER FIEDLER: That's all right. I can get it. Thank you.

HEARING COCHAIR D'AMATO: I don't think we've got any further questions. Thank you so much for your testimony. And we'll take a five minute break. We know the next panel is in the bullpen here waiting and warming up. We're expecting to have Congressman Bartlett shortly. We're going to wait on him for a couple minutes, and we'll take a five minute break.

Thank you very much, Mr. Helvey.

MR. HELVEY: Thank you very much.

[Whereupon, a short recess was taken.]

## **PANEL IX: PRIVATE SECTOR STRATEGIES FOR ADDRESSING THE EFFECTS OF CHINA'S ENERGY CONSUMPTION**

HEARING COCHAIR D'AMATO: The Commission will come to order. We're about to begin our next panel although we are waiting for Congressman Bartlett. We don't know exactly when he'll arrive, so we'll go ahead and introduce the panel and even begin testimony, and then if Representative Bartlett, when he comes, we'll interrupt that panel's testimony to hear from him, and then resume.

This next panel examines how the private sector can contribute toward improvements in China's energy use, and we have several interesting panelists with us today. On my left, Mr. John Sie is Founder and Chairman of Starz Entertainment Group of Denver, Colorado. Mr. Sie, a native of China, came to the United States at the age of 14 in 1950 and stayed in Staten Island until he graduated from high school.

He began his professional career in 1958 when he joined the RCA Defense Electronics Division on advanced microwave solid state devices. He's an engineer. In 1960, he co-founded Micro State Electronics Corporation, later as president, as a subsidiary of the Raytheon Corporation. In 1972, Mr. Sie joined Jerrold Electronics Corporation, a subsidiary of General Instrument Company, as Senior Vice President of the CATV division. In 1977, he joined Showtime Entertainment as Senior Vice President of Sales and Marketing.

And as I said, he's a Founder and Chairman of the Starz Entertainment Group. Recently the Anna and John J. Sie Foundation was created, which sponsored the opening of the University of Denver Institute for Sino-American International Dialogue.

He created an institution in Denver at the University of Denver for the very purpose of examining the kind of public/private partnerships that can be created in addressing energy with China, between the United States and China in energy and environmental issues, and as I understand, the building that he's founded at the University of Denver has the distinction of being a platinum--he's contributing his own mark to climate change in the United States--a Platinum Lead Certified Green Building Council Group.

Not only does his building have no carbon footprint but apparently is associated with the building next to it, which is actually draining that building of its carbon footprint. So congratulations to you on that.

Next to him is Dr. Kelly Sims Gallagher, who is Director of the Research Group on Energy Technology Innovation Policy at Harvard University's Belfer Center for Science and International Affairs, at the

Kennedy School of Government.

Her research encompasses energy technology innovation policy, international energy cooperation, energy policy, climate change policy, international environmental policy and technology transfer/economic development questions.

Dr. Gallagher received her Master's degree and Ph.D. from the Fletcher School of Law and Diplomacy at Tufts University.

And next to her, Mr. Wayne Rogers is a partner in the Public Law and Policy Strategies Group of the law firm Sonnenschein, Nath & Rosenthal. He has directed energy definitional missions to Grenada, Honduras, Brazil, Argentina, Ecuador, Peru, Guatemala, Costa Rica, Dominican Republic, Jamaica, Pakistan and India.

He has also been influential on influential trade missions such as President Clinton's historic visit to India, Energy Secretary Hazel O'Leary's mission to Pakistan, Commerce Secretary Daley's mission to India, and most recently was in China at the same time that the Commission was this past April on a special Commerce Department Clean Energy Trade Mission to China and India.

He's also the CEO of his own alternative energy firm dealing with hydropower and wind power in Annapolis, Maryland. We welcome all of you and look forward to your testimony, and if it's all right, we'll start with Mr. Sie, if you would proceed, and then we'll go from there.

**STATEMENT OF MR. JOHN SIE  
INSTITUTE FOR SINO-AMERICAN INTERNATIONAL  
DIALOGUE, UNIVERSITY OF DENVER, DENVER, COLORADO**

MR. SIE: Good afternoon. I'm very honored to be with such an august group this afternoon. I'd like to just at least review the data that's been summarized today but perhaps with a different perspective.

First, let's define the problem in the area of energy. We all know that the United States which has 4.5 percent of the world's population consumes about 21 percent of the world's energy. China, 20 percent of the world's population consumes about 14 percent. On the per capita basis, the United States' is 7.9 ton of oil equivalent per year versus China's 1.2, or 6.6 times more energy consumption per capita.

I think that's the scope of the problem. Over the next 12 years, probably 300 million more Chinese will enter the middle class rank, and--

HEARING COCHAIR D'AMATO: I think we'll go ahead and interrupt your testimony, if you don't mind, Mr. Sie.

MR. SIE: Sure. Absolutely.

## **PANEL: CONGRESSIONAL PERSPECTIVES**

HEARING COCHAIR D'AMATO: Today we are pleased to welcome Congressman Roscoe Bartlett from Maryland's 6th Congressional District. Congressman Bartlett was first elected in 1992--I remember when that happened--to represent Maryland's 6th District, and is now serving his eighth term in the U.S. House of Representatives.

He serves on the House Armed Services Committee, the House Small Business Committee, and the House Committee on Science and Technology. He holds a Ph.D. in physiology from the University of Maryland and is no stranger to energy policy as he is on the Science Committee Subcommittee on Energy and Environment, and he is one of only three scientists serving in the U.S. Congress.

He has also authored a congressional resolution, H. Res. 12 which calls on the U.S. to collaborate with international allies on an energy project. I want to point out that Congressman Bartlett serves as the ranking member of the Seapower and Expeditionary Forces Subcommittee and is a member of the Subcommittee on Oversight and Investigations of the Armed Services Committee.

He's well placed to talk about both the military and security consequences of China's energy issues, and energy consumption and the consequences for all of us of China's increased energy consumption.

Prior to his election in Congress, he pursued successful careers as a professor, a research scientist, an inventor, a small business owner and a farmer. We welcome you, Congressman Bartlett and look forward to your testimony.

### **STATEMENT OF ROSCOE BARTLETT A U.S. REPRESENTATIVE FROM THE STATE OF MARYLAND**

DR. BARTLETT: Thank you very much. I appreciate the opportunity to testify before the members of the U.S.-China Economic and Security Review Commission concerning energy. The Commission has been charged to examine and report to Congress about energy, considering the effect of the large and growing economy of the People's Republic of China on world energy supplies, and the role the United States can play including joint research and development efforts and technological assistance in influencing energy policy of the People's Republic of China.

Energy is a topic of intense interest and concern to me. I've been studying energy and in particular oil for the past 40 years. I believe that energy will be the dominant issue affecting our nation and

our world in the 21st century. In 8,000 years of recorded history, we are about 150 years into the age of oil.

In another 150 years, we will be through the age of oil. It will have been just a blip in the long history of man. This period of 150 years has lulled Americans, but not our counterparts in China, into a false sense of complacency. We conduct ourselves as if oil is forever.

I am among not very many people in America and the West who believe that we are about halfway through the age of oil. This is in spite of the fact that all petroleum experts acknowledge that the world will peak in oil production, that is reach a maximum, with declining production at ever-increasing cost after that time.

It's not if; it's when. Everybody agrees that it will happen. Most petroleum experts reviewed in a March 27 '07 GAO report that I commissioned project that for all practical purposes, peak is imminent. That it will occur before 2020. Global peak oil might not be a problem if demand were not increasing exponentially, about two percent per year. Because demand is increasing and the U.S. is the most oil dependent economy in the world, large economy, GAO predicts the consequences of peak for the U.S. will be devastating.

After the world peaks in oil production, we'll continue to use oil for about another 150 years but in declining amounts instead of the increasing amounts that we're used to.

Most people in the world and certainly most Americans are ignorant of peak oil. The Chinese are not. Peak oil was first publicly identified as a phenomenon by American oil geologist M. King Hubbert in what I think will become the most famous speech of the last century, given on March 8 in 1956, in San Antonio, Texas to a group of oil geologists.

He had noticed that all oil field production follows a bell curve. It increases, reaches a peak in production and declines thereafter. He reasoned that if you added up all the peaks from many fields, you could calculate the peak for the large regions, countries, and the world. In 1956, he projected that the lower U.S. 48 would peak in production in about 1970. At that time, the world was king of oil. I think we were the biggest producers and the biggest consumers of oil in the world.

Hubbert was vilified, but he was right. The U.S. peaked in oil production in 1970, and in spite of drilling more oil wells in all the rest of the world put together, we today produce about half the oil that we did in 1970.

M. King Hubbert predicted the world would be peaking about now. If Hubbert was right about the United States, and the United States is certainly a microcosm of the world, why wouldn't he be right about the world? As a matter of fact, 35 of the 48 major oil producing

companies in the world have already peaked in oil production.

I led a delegation of nine members of the House Armed Services Committee in a trip to China over the New Year that focused on energy. Without exception, every Chinese official that we met began our discussions by telling us that they were planning for post-oil. Wow. Post-oil. The Chinese are planning for global peak oil in about 2012. They're planning now for a world without oil as a major energy source.

I wish our government leaders and Americans understood the necessity to prepare for a post-oil world.

The Chinese understand that the age of oil will be but a blip in world history. Global peak oil will not be the end of oil, but it will be the end of cheap oil and cheap energy. Because we have built a lifestyle and a civilization in the United States that is totally dependent upon cheap oil and cheap energy, peak oil poses a huge challenge that our country must overcome.

I referred earlier to a report that I commissioned by the GAO. This was the fourth federal government report warning about peak oil. The Department of Energy commissioned two reports about peak oil, by a team led by Robert Hirsch, so they're known as the Hirsch Reports. The first Hirsch report was released in February of '05. The U.S. Army Corps of Engineers commissioned a report released in September of '05.

I also recommend that the commissioners read an incredibly prescient speech about energy given by Admiral Hyman Rickover, the "Father of our Nuclear Submarine," just 50 years ago on May 14, 1957, to a group of physicians at St. Paul, Minnesota. He was amazingly prophetic. He actually predicted that we would have the corn ethanol debacle that we have just gone through.

You may have noted the article in the Washington Post several weeks ago that noted that if we use all of our corn for ethanol, discounted it for the fossil fuel input, which they said was 80 percent, it would displace just 2.4 percent of our gasoline. And they noted that you could save that much gasoline if you tuned up your car and put air in the tires.

What concrete steps can we observe that China is taking to prepare for peak oil and post-oil? They have a five-point plan. Everybody we talked to talked about this five-point plan and the first part of it begins with conservation. The second and third are increase the proportion of domestic sources of energy and diversify, which you absolutely have to do. And the fourth one was really interesting, be kind to the environment. They were apologetic that they are now per energy use probably the biggest polluters in the world, but they have 1.3 billion people, 900 million people in what they call rural areas that

they're intensely committed to improve their lifestyle.

The fifth point was international cooperation. These are exactly the correct steps and steps that the U.S. should be undertaking. I've attached to my testimony a chart called "A World of Oil," that depicts countries based--how big countries would be based upon the oil that they have. That's in front of you I think. I don't know if you've seen that before. But this is really striking.

The United States, of course, dwarfed by countries of the Middle East. Saudi Arabia has almost a fourth, between a fifth and a fourth of all the oil in the world, and look at China. China has very little oil energy. They know that, and there's another chart that I think you may have, and this is China has been scouring the world for oil. They're buying up oil everywhere in the world that they can buy it.

At the same time, they are aggressively building a blue water navy. Now, one of their major concerns is Taiwan and you don't need a blue water navy for Taiwan. A brown water navy will serve very well there, thank you. I wonder if these two things are related? You see in today's world, you have no option but to share energy and the only way not to share energy is to make sure that you can protect your energy sources.

That sharing of energy is very interesting, by the way. We have 250 years of coal at current use rates. But if you increase the use of coal only two percent, that shrinks to 85 years. You see at two percent increase, it doubles in 35 years, four times bigger in 70 years, eight times bigger in 105 years.

This is the power of compound interest, exponential growth. Then if we use some of that energy from coal to turn it into a gas or liquid, you've now shrunk to 50 years. And since we have little option but to share it with the world and we're a fourth of the world's economy and use a fourth of the world's energy, that 250 years of coal shrinks to 12-1/2 years with only two percent growth and we share it with the world.

I ask why are the Chinese doing that, buying all that oil? And I was told they just don't understand. They don't understand economy and the world's economy, that it doesn't matter who owns the oil today, the person who has the dollars buys the oil. For a country that's growing at 11.4 percent, the last quarter that I saw the statistics for, I am disbelieving that China doesn't understand world markets.

And I think they are buying the oil with a lot of foresight. I think that China is preparing for a world where resource nationalism, not market forces, govern the allocation of energy. China is preparing for a cooperation or confrontation to address a post-oil world. The United States is not preparing at all.

I hope that we're involved with China in cooperation for this oil,

not in confrontation for the oil. By the way, in closing, one of the real experts in this area is Kenneth Deffeyes from Princeton, and he says the least bad outcome of peak oil is a deep worldwide recession that may make the '30s look like good times. He says if you don't like that, try the Four Horsemen of the Apocalypse--war, famine, pestilence, and death. I hope it's not war.

I think we face a huge challenge with energy, and we face a really big opportunity in cooperating with China. They are ready. They want to cooperate. They are now the second-largest importer of oil in the world of oil, and very shortly, they may be equal with us in the importation of oil. They have a huge economy, rapidly growing. Their streets were crowded with cars, by the way. I was late to an appointment because of traffic jams in Beijing; would you believe that?

The last time I was there, bicycles are now banned in many parts of Beijing. Yes. Thank you very much for inviting us.

HEARING COCHAIR D'AMATO: Thank you.

DR. BARTLETT: I have a couple statements. I just want to read something that Condoleezza Rice says. We do have to do something about the energy problem. I can tell you that nothing is really taken me aback more as Secretary of State than the way that the policies of energy is I will use the word "warping" diplomacy around the world.

It's given extraordinary power to some states that are using that power in not very good ways for the international system, states that would otherwise have very little power. It is sending some states that are growing very rapidly in an all-out search for energy. States like China, states like India. It is really sending them into parts of the world where they have not been seen before and challenging, I think, for our diplomacy.

It is, of course, an energy supply that is still heavily dependent on hydrocarbons. On the energy side, we have simply got to do something about the warping now of diplomatic effort by the all-out rush for energy supply. So I think the Secretary of State understands what a huge problem that is.

I think I have one little quote here from Hyman Rickover, and I'd really encourage you to read that article. There is nothing that man can do to rebuild exhausted fossil fuel reserves. They were created by solar energy 500 million years ago and took ions to grow to their present volume. In the fact of the basic fact that fossil fuel reserves are finite, the exact length of time these reserves will last is important in only one respect: the longer they last, the more time do we have to invent ways of living off renewable or sustainable energy sources and to adjust our economy to the vast changes which we can expect from such a shift.

Fossil fuels resemble capital in the bank. A prudent and responsible parent will use his capital sparingly in order to pass on to his children as much as possible of his inheritance. A selfish and irresponsible parent will squander it in riotous living and care not one whit how his offspring will fare. I will submit that future generations will look back and ask how could we have done it?

When we found this incredible wealth under the ground, we should have stopped to ask what can we do with it to provide the most good for the most people for the longest time? That's not what we did. With no more responsibility than kids who found the cookie jar or the hog who found the feed room door open, we just pigged out, and we're continuing to do that.

They're asking me to vote to drill in ANWR and offshore. I've ten kids, 15 grandkids and two great-grandkids. I'm going to give them a nation with the largest intergenerational debt transfer in the history of the world. Will I also give them a world largely devoid of energy? We may not have much energy in our country. We have even less responsible leadership in energy.

Thank you very much.  
[The statement follows:]<sup>11</sup>

### **Panel Discussion, Questions and Answers**

HEARING COCHAIR D'AMATO: Thank you very much, Congressman Bartlett. I apologize for calling you Joe Bartlett when you came in, but I served with your son in the General Assembly of Maryland.

DR. BARTLETT: Yes.

HEARING COCHAIR D'AMATO: I have a good excuse. In a short period of time, you've given us the script of a fairly scary movie, a very succinct and very cogent, I must say, with the appropriate charts here. But what I'm wondering is where is the part that bails us out? What's the prescription? Where are we going to go to fix this? How do you see it?

DR. BARTLETT: What we need is a program that has the total commitment of World War II. I am 81-years-old. I lived through World War II. Everybody was involved. There's no war since that that's touched everybody.

I think for the first time we had Daylight Savings Time. Everybody had a victory garden. You saved your household grease. Not a single car was made for domestic consumption. We need a program that has the technology focus of putting a man on the moon

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<sup>11</sup> [Click here to read the prepared statement of Representative Roscoe Bartlett](#)

and the program with the urgency of the Manhattan Project. We are the most creative innovative society in the world. Challenged we can, I think, have a less bumpy ride than we would otherwise have.

My wife says I shouldn't be talking like this. Don't I remember that in ancient Greece, they killed the messenger that brought bad news. And I tell her, well, this is a good news story because if we start today the ride will be less bumpy than if we start tomorrow. I think that Americans--by the way, there's a chart--I wish I'd put it in here--that on the abscissa has how much energy you use and on the ordinate it has how satisfied you are with life.

We obviously use more energy per capita than any other country in the world. But there are 24 countries that feel better, where their citizens feel better about their quality of life than we feel about ours, and some of them use less than half as much energy as we use.

You don't have to use anywhere near as much energy as we use to feel good about life. I look to see where people are smiling. In Las Vegas I see almost nobody smiling, by the way, but when I go into the restaurants and so forth of Europe, I see a lot of people smiling there.

I can imagine Americans going to bed at night saying, gee, I used less energy today than I did yesterday. I'm just okay. And tomorrow I'm going to do even better. There is no exhilaration like the exhilaration of meeting and overcoming a huge challenge.

The Hirsch report, SAIC report, they said that the world has never faced a problem like this. There is no precedent in history that we can use to determine how we should respond to this. But I think we're up to it. We need to harness the creativity and entrepreneurship of the American people. We can't do that by legislation in Congress. This has to come from leadership at the White House.

They've now commissioned a fifth report, by the way, and I've got an embargoed summary of it, and this is by the National Petroleum Council. All the reports so far and the fifth one will not be meaningfully different have indicated that peaking of oil is either present or imminent with potentially devastating consequences.

China is looking for international cooperation, and everybody we talked to, not just the energy people, everybody in their government we talked to, talked about this five-point program. They had it down. And they started the discussion by talking about peak oil. When I first heard it, I couldn't believe it. Nobody in this country talks about peak oil.

We behave as if it is forever when obviously it cannot be. The earth isn't made out of oil. It will end. And Hyman Rickover understood that. He talked about the "golden age" that we are in. And every housewife in his day--what would it be today--had the help of the equivalent of 33 faithful household servants. Every barrel of oil

has the energy equivalent of 12 people working all year.

I didn't believe that when I first read it, and then I looked at, I drive a truck which I drive very infrequently, only when I have to, and I drive a Prius. And my Prius goes--we've now been averaging for thousands of miles, it's 49 miles per gallon. How long would it take me to pull my Prius 49 miles? Now, I could do that. But that's one gallon of gasoline costs less than a gallon of water in the grocery store; right? At \$3 a gallon, it's still less than water in the grocery store.

Another thing that helped me understand the tremendous energy density of these fossil fuels. If you worked really hard all day long in your yard, your wife will get more work out of an electric motor for less than 25 cents worth of electricity. Now, it may be humbling that you're worth less than 25 cents a day. In terms of work, but that's where we are, and this incredible lifestyle we live. Hyman Rickover mentioned that we live better than ancient kings. There's no ancient king that lived as well as the average person in our world today, and this is all due to our ability to harness and use energy.

The age of oil will not last forever. We're about halfway through it, facing enormous challenges. I think one of our best opportunities is to cooperate with China. They this year will graduate more American-speaking engineers than we graduate engineers and half of our American engineers graduating are Chinese engineers, you may have noticed when you go to our schools.

So we face a huge challenge and I think a huge opportunity in looking for cooperation with China.

HEARING COCHAIR D'AMATO: Thank you so much, Congressman. The purpose of this hearing is to explore ways to cooperate with China in terms of energy and the environment and to provide recommendations to the Congress in respect to the kinds of things that we can do now and start moving us out of what appears to be a slow-moving emergency to most people. It's not hitting them right in the face so it's very difficult for us to grapple it. Any additional ideas you may have in terms of what we can recommend to the Congress this time in terms of recommended legislative or policy prescriptions to start moving us in the right direction, we would very much appreciate.

DR. BARTLETT: Thank you very much.

HEARING COCHAIR D'AMATO: Thank you.

CHAIRMAN BARTHOLOMEW: Congressman Bartlett, thank you so much. We'll take a look at the speeches that you have suggested to us going back to the time before some of us were born. Some of us.

HEARING COCHAIR D'AMATO: Some of us.

CHAIRMAN BARTHOLOMEW: But we really appreciate your leadership on this issue and look forward to working with you more. Thank you for your time today.

DR. BARTLETT: Thank you. Thank you very much.

**PANEL IX: Continuation of Panel with Mr. Sie's statement**

HEARING COCHAIR D'AMATO: On that note, we'll continue, Mr. John Sie.

MR. SIE: As I said, based on per capita basis, we consume almost seven times that of a Chinese. Over the next 12 years, conservative estimates, 300 million more will move into the middle class rank, and what do they want? They want what we have. Cars, air-conditioning, bigger rooms, houses, and even if they get within the next ten years a half of our per capita expenditure, it would take up 50 percent of all of the world's capacity. It is simply not sustainable.

And that is the problem that China recognizes very well, but we are absolutely the largest consumer of energy on a per capita basis. A corollary to that obviously is the greenhouse gases and CO<sub>2</sub>. We always mentioned that China is almost going to overtake us. We're the largest emitter of CO<sub>2</sub>, but if you look at it on a per capita basis, we are five times more on a per capita basis because we have higher GDP and higher standard of living.

So therefore the pollution that we create is far exceeds China even though in absolute terms they're going to overpass us.

And today, the whole world emits about 27 billion tons of CO<sub>2</sub> annually, and that creates about six parts per million of CO<sub>2</sub> in the universe atmosphere, and with a sink about three parts per million, so the net increase is about three parts per million.

Same analysis if China just reaches half of our energy use, it would almost double the amount of PPM in the atmosphere. And it will raise probably another one-and-a-half degrees centigrade, which is a catastrophe. So these are the things facing us on the per capita basis.

To paraphrase a song, between United States and China, "we've got the world in our hands" for better or worse, and I would submit listening today to a lot of security issues and intersection of various push and pull, I would say in many areas, in the areas of energy, environment and water, actually, that we are joined at the hips. That it is a win/win situation, whatever we do together.

So I would recommend that we, if we can as a policy matter, be sophisticated enough to compartmentalize this from the security issue, if we can. I think we have a different perspective because mutual cooperation works throughout most of the alternative solutions. And I think if we can take the lead because of our technology, our

entrepreneurship, and China's willingness, we should move towards merging the per capita expenditure of energy as well as emission so that we can meet at some future point where we can create a sustainable future.

I would like to quickly go over two things that's been gone over. One is in the area of clean energy, and I think we are again together in the area of coal. We heard that we have more than 200 years of supply. China has more than 100 years of supply. The IGCC plan, the sequestration plan, all sounded like a very important cooperative efforts, and we need the government to either provide subsidy standards as well as putting things together, like sequestration.

At least in the northeast Atlantic, the Oslo-Paris-London convention have recently okayed--they use the word "dumping of the wastes," but it's really sequestration--we use a nice term--into the ocean. So the United States should really look at passing the laws that defines the sequestration so that we can catch up at least with our European allies.

I heard this morning about guaranteed prices. I don't think I like that idea, but at least something that worked here was the cap and trade on the sulfur dioxide. I'm just wondering if we set the right cap, then it seems like you ought to fit into this modality where the benefits or negative impact is shared. If CO<sub>2</sub> goes up in the atmosphere, everybody, cumulative effect, so it really works well, particularly the mitigation are different from different sources of energy.

So it just seems we should try to look at the cap and trade, set tight caps, not like in Europe, where really people abuse the system.

The second thing which is more in the renewable area in China. China along the Yangtze River has really focused itself on hydroelectric power as a main push, and there we are working through our NGO, the Nature Conservancy, has been working with the Yangtze River Development Commission and the Three Gorges Company. They've invited them and our institute is supporting the Nature Conservancy in trying to figure out blueprint where it involves water, energy and the environment.

The Yangtze River with its pollution as well as the Three Gorges Dam had created several endangered species, and the famous Baiji river dolphin is now extinct. So they are willing to listen because up till now they hadn't thought through that, and I think that the main goal there was to have flood control. And the Three Gorges Dams which are almost finished now would actually have a capacity of 18 gigawatts of capacity. The actual production maybe it's about 12 gigawatts. But upstream from it, the Chinsasjung [ph] basin, which is near the Tibetan foothills, there are every larger dams there. The three dams produce 36 gigawatts, and now China recognizes that there is a

tradeoff between human existence, species survival, as well as the environment, and the flood control.

So we're convening a workshop in July at the invitation of these two organizations with Nature Conservancy, and we are very much supportive of that, and I think they want to look at which dams could be eliminated, and there's hundreds of dams in the tributaries that would provide the proper balance between all the constituencies. And I think it's a good sign. I think once it's implemented, actually it will teach us a lot about dams in America because we've gone to the Army Corps of Engineers and they have no clue in many of the same issues that faces China.

In conclusion, I will say in collaborating with the United States, China who has invented the compass hopefully could steer us to a sustained global future.

HEARING COCHAIR D'AMATO: Thank you very much, Mr. Sie. Dr. Gallagher.

**STATEMENT OF KELLY SIMS GALLAGHER, Ph.D.  
DIRECTOR, ENERGY TECHNOLOGY INNOVATION POLICY  
BELFER CENTER FOR SCIENCE & INTERNATIONAL AFFAIRS  
JOHN F. KENNEDY SCHOOL OF GOVERNMENT  
HARVARD UNIVERSITY, CAMBRIDGE, MASSACHUSETTS**

DR. GALLAGHER: Thank you so much, Madam Chairman and members of the Commission. It's an honor to be here. The main points I'd like to make to you are as follows:

First, significantly enhanced energy cooperation between the United States and China is highly desirable on both environmental and security grounds. The two highest priorities in my view are energy efficiency across all sectors and low carbon coal technologies, and I'll explain that in much more detail later.

Foreign direct investment can be a very effective mechanism for the transfer of advanced energy technologies, but it does not automatically occur. It does not automatically bring advanced energy efficient or clean technologies along with it.

FDI must be combined with a policy incentive framework in order to provoke cleaner and more efficient energy technologies to be transferred. I think that both the Chinese and U.S. governments can establish elements of this policy framework and one could also be negotiated at a multilateral level although we've seen a lot of difficulties trying to do that.

In China, we've seen remarkable technological leapfrogging in some areas in some sectors, and a distinct lack of leapfrogging in other cases. Where it occurs, the lack of leapfrogging can be attributed to

the lagging Chinese technological capabilities and/or the absence of these incentive policy frameworks that I described.

Let me talk briefly about the challenges in China with respect to energy. They are many including: the need for energy to sustain economic development and growth; China's rapidly increasing foreign dependency for oil and gas; the need to provide modern forms of energy to China's rural poor; the increasingly severe urban air pollution in China cities; the mass acid deposition across most of China's land area, particularly in the southeast; growing concerns about global climate change and the need to rapidly reduce greenhouse gas emissions during this century; and access to advanced energy technologies to address all of the above challenges.

Only with development and deployment of advanced energy technologies can China achieve its targets for development and economic growth while avoiding energy conflicts and global climate change.

The big questions, therefore, are how will China develop or acquire those advanced technologies? Will China and the United States deploy these technologies in time to prevent climate change and conflict over energy resources? And what are the win/win policies that allow the United States to reap benefits from being a technology provider to China and also allow China to deploy advanced energy technologies more quickly?

In terms of the role of foreign direct investment, I recently published a book called *China Shifts Gears: Automakers, Oil Pollution, and Development*, where I examined the role of foreign direct investment and the Chinese automobile industry.

In this book I documented that foreign direct investment can be very effective in transferring technologies, but in the case of the Chinese automobile industry, the technology transfer of pollution control technologies and energy efficient technologies did not happen automatically. In fact, you saw no transfer of pollution control technologies until it was required by the Chinese government when they passed their first emission standards in the year 2000.

Prior to the year 2000, no pollution control technologies were transferred from foreign companies to their Chinese counterparts.

Other incentives that theoretically could be effective include consumer demand in the recipient country for cleaner and more efficient technologies; requirements that cleaner and more efficient technologies be transferred in the private contracts or licensing agreements; concern about a company's image and failing to transfer clean technologies to a developing country; or some sort of international agreement for foreign direct investment.

Beyond the automobile industry, we've seen a lack of

leapfrogging in other major energy consuming sectors. Most worrying from a climate change point of view is the power sector which is dominated by coal, where more than half of China's power plants are smaller than 300 megawatts. In fact, there are more than 5,000 plants that are smaller than 100 megawatts which means they're very inefficient.

There are a handful of supercritical plants, which are much more efficient plants, and the first ultra-supercritical power plant went on line in November 2006. 34 more ultra-supercritical plans are under construction.

But because of the strong imperative to provide sufficient electricity so that China doesn't experience the shortages that they were experiencing in prior years, the Chinese have been building relatively inexpensive, inefficient, sub-critical power plants as fast as they can.

Last year, China built 101 gigawatts of new power, 90 gigawatts of which was coal-fired power, and to put that number in perspective, India's entire electricity generation system is about 130 gigawatts. So in one year, China built almost that much power.

Most of China's plants are highly polluting in terms of SO<sub>2</sub> and NO<sub>x</sub>, and they are obviously carbon dioxide intensive.

For many years now, the Ministry of Science and Technology in China in coordination with U.S. Department of Energy has supported an aggressive research and development program for advanced coal technologies, and this is beginning to bear fruit with these new ultra-supercritical plants and China's announcement last year that they intend to build three integrated gasification combined cycle coal plants.

But, in general, the significantly higher cost of the more advanced efficient power plant technologies from the foreign companies has proven prohibitively expensive and, in fact, China's last effort to build an IGCC demonstration plant was halted because of the cost of foreign technologies.

So I would recommend four priorities for enhancing U.S.-China energy cooperation to address the effects of China's energy use and to encourage private sector adoption of greater energy efficient and cleaner technologies.

First, as soon as the United States has established a domestic mandatory program to reduce greenhouse gas emissions, the United States should ask China to adopt one as well that's unique to its own circumstances.

Meanwhile the United States should consider forming a bilateral or multilateral investment fund to accelerate the deployment of low carbon technologies in China. This fund could provide low or no

interest loans or direct grants for major new industrial facilities or power plants that utilize low carbon technologies.

Without policies in place that effectively require the use of low carbon technologies or incentive programs like an investment fund that make the use of low carbon technologies financially attractive, the private sector will have no incentive to develop, transfer, and deploy low carbon energy technologies in China.

Second, there's much scope for enhanced energy technology cooperation between the two countries. Joint research development demonstration plants can be valuable for both countries and they are also a mechanism for bringing the U.S. private sector into contact with Chinese partners.

While there's been ongoing technology cooperation between DOE and MOST, it has been inadequate and under funded. In my view, the high priority areas include RD&D of carbon capture and storage, renewable energy, energy storage and energy efficient technologies.

Third, U.S. government should negotiate a bilateral agreement with the Chinese on oil security. Since China is not a member of the IEA, but it is one of the world's largest oil consumers, U.S. should negotiate an agreement with China on oil reserve and stockpile data disclosure, and on the release of oil stockpiles in the event of an emergency.

Finally, and perhaps most difficult, I believe the United States should significantly bolster its cooperative activities related to capacity building for energy and environmental data collection and reporting, for policymaking, institution building and enforcement.

As a developing country, China still lacks many of the necessary institutions, policies and enforcement mechanisms that are needed to foster vibrant markets, technology transfer and environmental protection. This is particularly the case at the provincial level in China although it's also true at the central level as well.

Thank you very much.

[The statement follows:]<sup>12</sup>

CHAIRMAN BARTHOLOMEW: Thank you very much, Dr. Gallagher. Mr. Wayne Rogers.

**STATEMENT OF MR. WAYNE L. ROGERS  
PARTNER, SONNENSCHN NATH & ROSENTHAL, LLP  
WASHINGTON, D.C.**

MR. ROGERS: Thank you, Madam Chairman and members of the

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<sup>12</sup> [Click here to read the prepared statement of Dr. Kelly Sims Gallagher](#)

Commission. I'm pleased to be here today to discuss what I see is the greatest challenge and perhaps the greatest opportunity that we have, and that's to engage China in a cooperative dialogue on the issue of the global effect of their energy demand.

You've heard lots of testimony I'm sure over the last day about the breathtaking pace at which China is growing, specifically their energy demand increase. For the United States, this presents three challenges: strategic, economic and environmental.

From the strategic perspective, we find ourselves increasingly in competition with China for energy resources. The projections show 43 percent of their oil imported last year, going to 75 percent of oil imports by 2030. If we simply look at that, then we're clearly going to be in competition with China. Whether that evolves into, as Congressman Bartlett said, cooperation or confrontation depends on how we deal with it.

A generic mistrust of by China of the "oil market" and the fact that 85 percent of the world's trading oil market is really controlled by governments has led China to engage in energy security through soft power within countries themselves. It's also led them to governments like Sudan and Iran with whom we could say, as Americans, we have some issues.

From the economic perspective, the majority of the GDP in China comes from manufacturing. That's really important when we start quoting things like per capita use of energy going forward. It's a very highly energy intensive economy at this point. It has yet to develop the number of cell phones, the number of automobiles, the number of goods that we have in America today, and that's very important.

With the U.S. trade deficit with China over \$600 million a day already, the impact to the U.S. economy of increased costs, either directly in energy costs, or indirectly through the imported manufactured goods, is going to be significant. If you look at coal, oil and natural gas reserves per capita in China, it's one-half, one-tenth and 1/20th of the global average.

China recognizes it has a long-term shortage of oil, natural gas, and even coal. So on all those maps, if you made one for every energy resource, the government of China knows out into the future, energy is going to continue as an issue for the country.

From the environmental perspective with over 75 percent of the electricity coming from coal, China consumes more coal than the United States, Europe and Japan combined. That's today, not moving forward. China's predicted air emissions are going to exceed the United States within two years. We are not going to make significant progress on the issue of global warming unless we engage China as part of this process.

I should note that I believe that the Chinese “get it.” This isn't something they're unaware of. They understand completely what is going on. I've had meetings with executives in the electric power sector where, without prompting, they are able to say how many grams of coal it takes to generate a kilowatt hour of electricity, what it was two years ago, how they've reduced that amount and gains in efficiency. They're very clearly focused on emissions, on amounts of coal used, on energy uses, et cetera.

They're not just blindly going out and doing it. They know at the top levels exactly what's happening. They have made improvements both in efficiency and emissions. The government, however, is really faced with a conundrum, a very difficult problem. Energy is a basic requirement for them to build their society. They recognize there are technology choices to improve the environment; however, these aren't perceived as benefits to the environment. These are perceived as costs that the economy is going to have to bear.

They realize there is a strategic requirement to adjust the energy structure of the economy. However, how can you accomplish that without jeopardizing the security, modernization and economic development of the country itself? The Premier has set 2010 priorities to include a 20 percent reduction in energy intensity and a ten percent reduction in environmental pollutants.

Now, it's an easy thing for us in the developed world to say to China: “you need to reduce the energy intensity in your manufacturing base.”

Second, “you need to adopt new and expensive technologies to control emissions.” You need to develop renewable energy and put in newer technologies for power generation.

However, we must realize we're really presenting an impossible situation to the Chinese by simply saying this. No country in the world has increased per capita GDP without increasing energy use per capita. It has not happened in any economy throughout history. So to just simply say that you're going to reduce the energy usage per capita going forward is not going to get us there.

Decreases in overall energy intensity have only accompanied large energy cost increases, a spike in energy prices or a recessionary economy, and certainly that is not the Chinese case at this point.

Although China has the foreign currency reserves in excess of \$1.2 trillion, any many companies in China are profitable and flush with cash, we should still realize that the per capita income (as opposed to per capita GDP), of the people in China is only about \$1,800 a year. So the ability of the general population to absorb these costs is just simply not there.

If we look at energy alternatives, and we've heard some from

other people at this hearing, the announcement of their \$13 billion investment plan in March for coal-to-oil projects, converting coal to oil, was followed by an announcement a couple weeks ago that this program is being suspended due to concerns the projects are too expensive and too energy intensive.

For U.S.-China policy, the bottom line is, “engage we must; lecture we must not.” While in the short time available it is not possible to discuss all China’s energy options, I'd really like to focus on three of them: renewable energy, particularly wind power; venture capital; and policy engagement.

The Chinese government does understand renewable energy has not been raised to the strategic level. They had policies that lacked recognition of the technology, and investment financing mechanisms weren't there. In 2005, they passed their new Renewable Energy Law, and it became effective only in 2006. There are 12 major tasks to formulate regulations on this new energy law. Today, about half of those have been completed. So they're making progress in that area.

If you look at the 2020 renewable energy goals, hydropower is supposed to expand from 35,000 megawatts to 300,000. That's a ten-time increase. Bio-power, from 2,300 megawatts to 30,000 megawatts, 15 times the capacity. Photovoltaics, from 70 to 1,800 megawatts. Solar water heaters--when you drive in the countryside in China, you're going to see solar water heaters on houses everywhere--and other items: ethanol, biodiesel, energy efficiency.

I want to have you look at one microcosm: wind power. Wind is the fastest growing renewable energy source in the world. The Chinese government says it wants 30,000 megawatts by 2020. What is this going to require? Probably \$50 billion probably.

The wind energy industry has said if they had the right conditions in China, this could be increased probably to 170,000 megawatts because the potential exists.

In 2006, China installed more electric capacity than the total installed electric capacity of the UK and Thailand combined, done so in a single year.

China installed 90,000 megawatts of coal-fired generation, but only 1,300 megawatts of wind.

In contrast, India installed 1,836 megawatts of wind on a total system capacity of 130,000 megawatts. Said a different way: China installed coal stations equal to two-thirds of the total installed capacity of India in a single year. In contrast, India installed 40 percent more wind capacity in 2006 and has total wind capacity two-and-a-half times that China does.

In Europe, in 2006, 7,600 megawatts of wind was installed, six times what was installed in China. In the United States, 2,556, or

twice the amount. You can see that the power of the right policy framework is clear, when the policy framework is in place, these things happen.

The Renewable Energy Law was a step forward although there are still concerns about how this framework is going to actually foster rapid development. I have included in my written testimony issues with the law. Much depends on how they implement it.

In many of the countries in Europe, over 90 percent of the wind capacity that went forward was based on a "feed-in" tariff. They would say "I will pay you so much for wind, and then you connect."

In China, they've implemented a bidding process which combines low price with locally owned manufacture. In some cases, up to 70 percent. So a bidder coming in has to bid the amount of local manufacture, at the same time the lowest price you can get. What that has meant is mainly the bidders are state-owned companies that bid prices that are probably not sustainable in the market. At the same time, the manufacturing capability does not exist.

Globally, the expansion of the wind industry has created a shortage of turbines. If you wanted to buy a turbine today, they're almost sold out by all manufacturers through 2008. So certainly with China's manufacturing capability, that's an area again of engagement to actually not only develop wind turbines but to manufacture those going forward. But these policies should be separate.

The private sectors, both domestic and international, is keen to engage in renewable sector. However, enhanced policy frameworks are the key to opening the market. U.S. engagement to create win/win situations with China and the United States in the area of renewable energy is viable.

Venture capital is another area. Private sector involvement in bringing about new technology is generally done through venture capital. Venture capital brings the seed funding for fledgling enterprises to allow technology to flourish, simply said: cash to fund companies to allow them to grow.

As a threshold matter in China, the Chinese economy mainly is focused on fixed asset investments and exports.

So HSBC reports that Chinese companies depend on the stock market for only six percent of their outside investment. So 94 percent is internally generated. Many Chinese companies are very profitable and most make investments from internally generated cash. They're in a position to buy technology if they wanted to buy it. So overall, venture capital has to really be taken in the Chinese context. The availability of the Chinese government to put together a \$200 billion equity fund, that they're about to do right now, to invest in private equity offshore, and a single \$3 billion investment in Blackstone really

has to be a comparative data point when we start talking about venture capital within China.

To obtain actual data on venture capital flows in China is somewhat difficult. I had to go out to many sources to try to compile an accurate picture.

In the first quarter of 2007, 67 enterprises received \$419 million. That's a 26 percent increase year on year, so we're seeing venture capital raising dramatically. In 2006, the total venture capital investment in China was about \$1.8 billion.

So, again, we look at total venture capital from all sources from all countries, \$1.8 billion. Single investment in Blackstone, \$3 billion. It gives you an idea.

The United States is by far the largest venture capital investor in China. We represent 89 percent of all foreign-venture capital and 66 percent of the total China investment pool in 2006. So we are a big player in this market, and it should be another area for us to engage.

A point to consider, however, is over 90 percent of the companies that were funded in venture capital were already shipping products or had already achieved profitability. This is not generally the venture capital market in the United States. It's new technology that's going to ship product. Our venture capital flow is now going into projects that are already shipping goods into the market or are already profitable.

In the energy sector, if we try and drill down in venture capital, what does it mean for energy?

In 2001 and 2002, there were no energy deals. In 2003, there were two deals for a total of \$3.5 million. The first three years, total venture capital in energy was about \$3.5 million, virtually nothing.

In 2005, there was a single deal, the Suntech Power deal where they received 80 million to further develop silicon solar cells and photovoltaics. In 2006, this has taken off dramatically. It must be noted that it is hard to differentiate publicly available information on how to define alternate energy, clean energy, clean tech, other energy, and how they classify all investments.

But we can illustrate where it's going. At the close of the third quarter, Dow Jones/Ernst & Young reported there were nine clean tech deals for \$74 million. That's in 2006. The Clean Tech Group said there were 26 clean tech deals for \$420 million. Zero2IPO, said for 2006, there were six deals in Clean Energy for \$39 million and six deals in "Other Energy" for \$37 million which adds up to about \$76 million.

But certainly you can conclude the number of these deals is increasing dramatically. The amount is increasing dramatically, although in the macro picture, it's still not a large number.

The tremendous growth potential seen, even if you use the high estimate, the Clean Tech number, \$420 million in Chinese clean tech deals; comparable investment in the United States is \$2.9 billion. So what U.S. is putting into clean energy, which venture capital type investments, is over five times what was done in China, even using the highest number.

Suntech Power Company, is a good example of how venture capital could be part of solving the equation. Suntech was founded in 2001 as a Chinese-based photovoltaic manufacturing company to produce panels to convert sunlight to electricity.

They originally were backed by \$6 million from state-owned enterprises to get the company going. Their revenue went from zero in 2001 to \$14 million in 2003, to \$226 million in 2005, to nearly \$600 million in 2006. Of that \$600 million they're earning before interest, taxes and depreciation, (their EBITDA) is \$113 million, on \$600 million in revenue. So it's incredibly profitable, and to take a company from zero to \$600 million in five or six years is really incredible in this space.

In May 2005, venture capitalists financed the exit of state shareholders with an \$80 million investment. Venture capital, including Goldman Sachs, came in and took out the state shareholders. Later, in 2005, the company went public on the New York Stock Exchange. Today, the company is valued at more than \$5 billion.

Dr. Shi, the founder of the solar company, has a fortune in excess of \$1.7 billion. This makes him the richest person living in mainland China, based on clean technology, and in a five-year period.

The U.S., as China's largest venture capital investor, can engage with China on the policy--

HEARING COCHAIR D'AMATO: Go ahead and try and wrap up.

MR. ROGERS: We can engage in the venture capital. In terms of policy, I would also say one other thing, too, we have the issues surrounding Kyoto Treaty. The Clean Development Mechanism is able to put money into China to actually deal with emissions. We are not part of Kyoto Protocol. Its future is uncertain. But clearly China has been the biggest market for this Clean Development Mechanism emission reductions.

So lots of money has been entering China to allow them to buy these cleaner technologies. The U.S., I think, should engage in a dialogue on this issue, whether it's U.S.-China bilateral or multilateral, on that to create some kind of mechanism to financially deal with emissions.

To sum up, Confucius said "don't impose on others what you yourself do not desire," and further guided that the "superior man is modest in his speech but exceeds in his actions."

I think it's important we engage China in a positive dialogue to solve our shared problems, the neglect of which will really have global consequences. Thank you for this opportunity to appear today. [The statement follows:]<sup>13</sup>

## **PANEL IX: Discussion, Questions and Answers**

HEARING COCHAIR D'AMATO: Thank you very much for that testimony. I have an observation I want to run by the panel in terms of the testimony of all three of you, and that is despite the obvious need and the attention and understanding in China as to climate change problems and the need to move into alternative energy, sequestration and other kind of coal-related energies and so on, I'm getting the impression based on the testimony that the cost of the technologies that are involved here are such that the Chinese are not ready to put the kind of investments, despite the fact that they have tremendous foreign reserves, to put the kind of investments and resources into these technologies, and so that it's necessary for-- somehow if we're going to engage the Chinese and to move in a cooperative fashion toward a whole variety of pilot programs and sequestration and coal liquefaction and other things, somehow we're going to have to find a way to fund this other than just asking the Chinese to do it.

And this is a problem because I can assure you that my knowledge of the Congress and others on this panel, if we go to the Congress and say the United States has got to fund it, the reaction is going to be in the face of these kind of reserve accounts in China, as a result of the balance in trade, the Congress will not be very receptive to that.

So we've got to be somehow creative in developing the institutional and financial mechanisms to move into this direction. Does the panel basically agree with that assessment and do you have any ideas as to how we're going to do that? Any one of you?

DR. GALLAGHER: I'd like to make two comments. I think that there's a lot that can be done in terms of funding on the R&D side, and I actually think we could benefit, the United States could benefit from joint R&D projects on carbon capture and storage, for example, and I think the Chinese are willing to put money into that together with us.

But you're quite right, that in terms of actually going into the market with advanced technologies like IGCC, it's very difficult for them to justify these higher cost technologies. We've been trying to study this in my group, what exactly is the economic hurdle and from

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<sup>13</sup> [Click here to read the prepared statement of Mr. Wayne L. Rogers](#)

what we can tell, so far it seems like there's an 80 percent difference between the cost of pulverized coal power in China and IGCC.

Here in the United States, that hurdle is much smaller, maybe 20 percent, the U.S. Congress overcame those with loan guarantees. But in China it's a bigger hurdle because they're using pretty old technology that's indigenous technology, that they can produce there at low cost. So that's a really big hurdle that they're going to have to overcome, and they just don't see the incentive to do it, particularly from the standpoint of climate change at this point.

But I do think that there would be other countries that might be interested in developing some kind of an investment fund. I could imagine that the United States could go to Europe and go to Japan, to create some sort of a multilateral investment fund, and I actually think you could think about asking the Chinese to also put money into that fund that would be used to help pay these incremental costs, and I would advise doing that.

HEARING COCHAIR D'AMATO: Thank you. Based on your research in terms of venture capital, how does that--

MR. ROGERS: There are a couple of things. It has issues on both sides. The venture capitalist really does have a dilemma going into China. First of all, we have not addressed the issues of intellectual property protection. So all of these new technologies that we're talking about, the venture capitalist goes in and says, my gosh, if I go in and develop this, what I am clear is that there is no real intellectual property protection.

At the same time, what's going to happen is I'm probably going to be looking at this technology coming back at me, locally manufactured, at lower cost in the world's market. If I say no, and don't do it, then do I forgo this whole Chinese market and potentially the global market? So that's kind of where they stand.

From the Chinese side, we say, "you have to do something about intellectual property." We have to make progress on this issue; it's impeding not only this but other areas as well. If we step back and look at it from the Chinese side and say who should pay for global warming, China has just released their global warming plan. I think the quote that they used is the U.S. or the Western world has an "unshirkable responsibility" to be part of the payment for this going forward.

So we are going to be a somewhat at loggerheads from the political realities of the United States versus what one might say is the fair view of the Chinese, that the U.S. has some responsibilities to solve this problem .

So I think clearly that on the U.S. we side are going to have to step up to the plate, whether it's economic incentives—and I'm not

saying necessarily the Clean Development Mechanism--but things where companies could get credit for investing in a clean energy project in China or some mechanism such as this that could deal with carbon issues going forward. This would include China as part of global solution going forward and make investments, not putting us at loggerheads of who pays, you or me, in a win-lose scenario.

HEARING COCHAIR D'AMATO: Mr. Sie.

MR. SIE: Yes. I think we should separate between demonstration R&D, and full-scale deployment, and many of the things we're talking about have again a bilateral usage and benefit. I think at least up till now the power generation in China has more local control, whereas I think if we can engage the central government to do somewhat what the United States does. We can look at it negatively as pork, but there are subsidies and there are tax credits that is hopefully for the common good and in this case not only for all of China, but for China and the United States.

So I think if we can match our subsidy with their central government subsidy as a new paradigm for these new developing technologies and maybe could have a shared IP as well. I'm saying there are things that become a win/win situation for both of us like coal sequestration.

There's no reason why we shouldn't be able to compartmentalize that and then change the paradigm of the Chinese central government to look at it the way we have looked at it.

HEARING COCHAIR D'AMATO: Thank you. Chairman Bartholomew.

CHAIRMAN BARTHOLOMEW: Thank you very much and thank you, all of you, and particularly from the private sector expertise that you're bringing to all of this. I have two ideas here. One is some sort of matching subsidies is going to be important commitment on both sides going forward. And I think we don't want to be in a position, as much as I recognize the seriousness of the problems, that we end up having the Chinese government doing cost shifting to the United States taxpayer of joint responsibilities.

And just like IPR theft is a way to get free R&D, our commitment to resolving these issues is another way that frankly you could get a lot of benefit out of it but that the taxpayer ends up bearing a burden that needs to be shared. So I think that's important. I like the idea of a multilateral investment fund. I think that's also interesting.

I'd like to ask something a little different or come at this from a slightly different angle, which is, Kelly, I was very interested also when you were talking about the role of foreign direct investment and the role of the multinationals. When 16 years ago, 17 year ago, when

this sort of growing interest in U.S. investment and multinational investment in China started really, and started picking up steam, there was concern on the part of a number of us that what was happening, one of the reasons cost of production was so cheap in China was because of a lack of environmental regulations and a lack of labor standards, and that what was happening was a race to the bottom.

I think that like so many other things to do with China's economic growth and China's rise on the global stage, it's all happened so much faster than everybody expected it to be, and now it feels like we are at the bottom. We hope that it doesn't go any lower than this. How does the U.S. government work with the Chinese government to raise what the bottom is in terms of the expectations and standards of the responsibility of the multinational companies that are there? How do we race to the top now or how do we at least lift the bottom up so that it's at a higher standard? Any suggestions?

DR. GALLAGHER: Honestly, I looked very closely at that question of whether there was a race to the bottom in terms of the decision-making on the part of the U.S. automakers and their investments in China, and I did not find any evidence of a race to the bottom. They were incurring really huge expenses by going into that market and it wasn't easy when they went into the market.

So I don't think that the cost benefit of going there in terms of the environmental dimension--I did not look at the labor dimension--was a driving decision about why they invested there. On the other hand, I take your point that their emission standards for pollution control still significantly lag U.S. emission standards. In particular, a huge hurdle now is the fuel quality issue in China. China has very high sulfur fuel and it's hindering its ability to move to more stringent pollution control standards in their automobiles.

One area where China has actually moved ahead of the United States is their fuel efficiency standards for automobiles. And my sense is that the government is very concerned about the urban air pollution that they're experiencing and because of their energy security, particularly oil security concerns, they've been quite aggressive on these fuel efficiency standards. I know planning is underway for a heavy duty truck fuel efficiency standard and the next phase of fuel efficiency standards for automobiles.

So we're actually looking at a situation where China could be moving ahead of the United States and kind of harmonizing upwards in that dimension.

I think they are quite a ways off from being able to catch up in terms of the emission control standards, however, because of this fuel quality problem.

CHAIRMAN BARTHOLOMEW: Can I just clarify one thing

which is that the standards that I was talking about were not so much standards of product but standards of production, things like water quality and air quality production, and how do we get everybody participating in these improvements?

MR. ROGERS: My impression is, and I don't have all the data on it, is that the large multinationals are not going to be our source of problems. Many of these companies, and I've worked with the European companies, are very sensitive to the issue. They're sensitive to what's happening in terms of pollution, sustainability, and what they're doing. Whether it goes as far as someone making sneakers and marketing them, having found that they were made in a sweatshop, most of the large multinationals are very sensitized to those issues.

On the other hand, the issues that are tied in with state-owned companies, when I was in India on this last trip, I met with some of the construction companies there that were saying, "we don't know what to do because in India, Chinese are quoting road projects at 30 percent lower cost than an Indian can do the project."

I was from there to Ethiopia and the Ethiopians were saying, "We can't build any roads or any infrastructure facilities; the Chinese are building everything here and these guys will work under conditions that an Ethiopian won't work under." So I think some of these issues you're going to see are even not just constrained to the country, but are global going forward. I think a lot of the focus is going to have to be in two fold: One engaging the government on this issue because many of these are tied in with government.

Two, it may be just a natural evolution as their income/GDP increases and everyone learns more and Internet is more open people aren't going to stand for a lot of these things.

When you're in Beijing or I was in Zhangzhou, you'd think you were in New York City, all the young kids running around with their cell phones, and living modern urban lifestyle. They're not going back to the farm to be in these conditions. So many of these issues I think are going to be corrected as time goes on.

MR. SIE: I think I agree generally that it is in the very Malthusian fashion a redistribution of wealth and raising the living standard over time and China will be the high labor cost and some other. So I think in the broadest sense, it's good, as long as the government has a will to improve, as well as avoidance of labor demonstrations. And I think China, as you know, wants to have stability above all, and I think eventually, like Wayne said, they watch television; they see Western values. It's just going to be amalgamated so that I think it will take care of itself by the people's desires.

CHAIRMAN BARTHOLOMEW: Let's hope they're not getting all their sense of Western values from television with all respect to the

fact that you're a leader in the television industry.

HEARING COCHAIR D'AMATO: Right.

MR. SIE: No, they censored those.

HEARING COCHAIR D'AMATO: Incidentally, before we go to the next question, just for the panel for scheduling purposes, we're running a little bit late because we had Congressman Bartlett in here, so we're going to begin our next panel in about 15 minutes.

Commissioner Fiedler.

COMMISSIONER FIEDLER: Mr. Rogers, just a comment. Your description of venture capital investments sounded more like private equity investments. In other words, it was money not acting like venture capital. Am I missing something here?

MR. ROGERS: No, that's right.

COMMISSIONER FIEDLER: And Blackstone is not known as a venture capitalist; it's known as a private equity company. So private equity is going into established ventures in China. But it's just modestly going into environmentally impacted investments; right?

MR. ROGERS: That's correct. It could be definitional as you say. If we say the definition is private equity as into a profitable company that's shipping product as opposed to a start-up.

COMMISSIONER FIEDLER: I also associated venture capital with a new idea and private equity with an older idea, established. Is that fair?

MR. ROGERS: Right.

COMMISSIONER FIEDLER: The cooperation priorities, we've heard panel, a number of panels over the last day and a half. I actually don't know the count. I think you're seven; right? And everybody is doing something, and that is intrinsically valuable. A lot of people, including our government, dealing with the central government. There is some reference made to provincial governments. Very little reference has been made to local governments; yet, everyone decries the fact that it is the local governments with the power to effect the change. They're doing, they're allowing the plants to go up and what not; right?

MR. ROGERS: Yes.

COMMISSIONER FIEDLER: If we had to decide on one of two things, not three dozen things, that we cooperated on, what would those two things be? In other words, you have to make a hard choice. What's most important to us?

By the way, I'm not sanguine about the possibilities of compartmentalizing, as you understandably wish. It's going to get in the way of politics and other things.

MR. ROGERS: I want to make a clarification on what you said. It would depend on who I was. In other words, if you're a private

sector person, a lot of focus by the private sector is going directly to those provincial governments. So if you said where is it happening, it's happening in the provincial governments and many of them have wide latitude to do things. So many of the private sector people go right to provincial government and work with provincial government.

Now, if I put on my hat and said I'm the U.S. government now, and I said what should I do there, now, the engagement of the U.S. government with the provincial governments is probably something that is not going to happen.

So you said all right, we're limiting ourselves to what can we do on this list of two things in which the U.S. government will engage the Chinese government on? I'm just taking that as the framework of your question.

COMMISSIONER FIEDLER: Okay. So, one thing for the government and one thing for the private sector, and get my two.

MR. ROGERS: Okay. I would work on the policy frameworks, and we ticked them off, for renewable energy, for venture capital, for intellectual property. I would continue to work together and find ways that we can get these policy frameworks right because if those policy frameworks are right, the private sector is going to respond and you're going to see more and more positive things going forward in the country.

COMMISSIONER FIEDLER: Dr. Gallagher.

DR. GALLAGHER: Number one, I would say getting some R&D and demonstration projects on carbon storage, carbon capture and storage. That would be number one.

Number two, I'm having a really hard time on because I think at the central government level, I do think that some sort of investment framework needs to be created. You need to get the National Development Reform Commission to a point where they approve projects that are more expensive if they have this environmental benefit.

So, but at the same time, as I said in my testimony, enforcement at the local level is a critical issue, and I do think that that's something that we could work on together with the Chinese. So three.

MR. SIE: I'll answer a different question.

COMMISSIONER FIEDLER: You've been in Washington too long. You must be the lawyer. He's been from Colorado a day.

MR. SIE: At least I tell you that beforehand. But with the same result. Not so much specific projects.

COMMISSIONER FIEDLER: Yes, I wasn't--

MR. SIE: I think when I mentioned about that we're both in the boat together, and I believe that we have to demonstrate in the United States that green--I hate to use that word "green" per se, that green is

going to be huge. Green is the color of money--green. Green is profitable. Green is going to be a huge industry. It's going to be the next generation. And you have now started with the new energy index.

So I can see we practicing that we say green is not a cost item; green is the future; green is profitable. And I think if we can demonstrate that with hard facts, I think we then leverage that into China with a new paradigm. For too long we've been saying who's paying for it? Whereas if you create a whole industry emerging in this country, I think that will translate very well in China because now you have a win/win situation of growth as well as good for societal. That was sort of my point.

COMMISSIONER FIEDLER: Thank you.

HEARING COCHAIR D'AMATO: Thank you. Commissioner Videnieks.

HEARING COCHAIR VIDENIEKS: I think Warren Buffet said something similar about green for the future.

MR. SIE: I should be so lucky.

HEARING COCHAIR VIDENIEKS: Yes. But a couple of observations. I went to a presentation by the gentleman who made the fortune in solar panels, where he actually mentioned that most of his sales were to Europe. I'd like to have your comments a little later.

And also the other observation I have is that just a reverse in the trend to reduce energy intensity, even though it didn't meet targets, is a significant event, historical actually, as GDP grows at ten, 11 percent, they were able to reduce the intensity. Any comments on that?

MR. ROGERS: With respect to Suntech.

HEARING COCHAIR VIDENIEKS: Yes.

MR. ROGERS: 90 percent of their sales are outside China. So you're right. Exactly what you said, I think this is the company you're talking about.

MR. SIE: Germany. One country.

MR. ROGERS: Yes, so clearly that's the case although one could argue from a global perspective, that's a win/win thing because we've turned around and reduced the cost of solar panels by 20 or 30 percent. What they would say probably is that they combine first world technology, developing world prices, venture capital access and open markets. So on a global basis. If you did that, they went to \$600 million in five years, and 90 percent global sales. HEARING

COCHAIR VIDENIEKS: Now, the other question about the significance of improving energy intensity. Even though they didn't meet targets and look bad and the president--

DR. GALLAGHER: No, I think that one of China's great accomplishments has been their rapid improvement in energy intensity

in the last 20 years. China is still relatively inefficient compared with most industrialized countries, but the rate at which they improve their energy intensity from 1980 to 2000 was unprecedented in terms of their--

HEARING COCHAIR VIDENIEKS: The GDP quadrupled and energy use only doubled.

DR. GALLAGHER: That's right. That's right.

HEARING COCHAIR VIDENIEKS: Then something happened. I guess they went to heavy industry. I think we had testimony earlier today.

DR. GALLAGHER: Yes.

MR. ROGERS: But in the macro picture, everyone else is here on the chart and they're over here on the chart. So even as we reduce that energy intensity, the demand growth, if 11.1 percent is the right number, which we don't know, for the first quarter in growth, even if you've reduced it down to eight percent, it's four times or five times still what is it in other parts of the world. So that's the problem we're facing is that. It doesn't say you don't reduce your energy intensity, but in a macro picture, we have to recognize even doing that, it's still going to be multiples of what the rest of the world is going to need to go forward. So reducing energy intensity is not going to cut it in and by itself is my point.

DR. GALLAGHER: But they have set this target to do the same thing again, to quadruple their economy and only double their energy consumption by 2020, but let's just be clear that doubling their energy consumption, based on coal, is not tenable from a climate change point of view.

HEARING COCHAIR VIDENIEKS: But also as they go into heavy industry, aluminum, steel and what not.

DR. GALLAGHER: Yes, that's right.

HEARING COCHAIR VIDENIEKS: But anyway I'm done with my comments.

HEARING COCHAIR D'AMATO: Anybody? I have one quick last question. Sorry.

CHAIRMAN BARTHOLOMEW: I don't want to keep our next panel waiting.

HEARING COCHAIR D'AMATO: We have one-and-a-half minutes so it's a quickie. So for Mr. Sie, as an engineer, my question is in terms of science and technology, engineering solutions to the generation of renewable energy. What would you say, what in your mind is the most promising technology that you've been looking at?

MR. SIE: Besides an engineer, I'm also an eternal optimist. So I believe that science and technology will get us out of all of our troubles. With the government will and subsidy.

HEARING COCHAIR D'AMATO: With the government subsidy.

MR. SIE: I think the most encouraging thing that's on the horizon is almost one of those too good to be true patent. In 1967, a gentleman, professor now, professor at Purdue, Jeff Woodall, he has patented and reduced the practice of taking aluminum and water and create hydrogen and aluminum oxide. And the water is plenty. And we have a lot of aluminum, and both of them are recyclable. So that was a fantastic demonstration, those of you who haven't seen it, is that what he's discovered that when he puts aluminum and gallium, melt the aluminum into gallium--gallium is like a third column compound, inert, but what the gallium does is it inhibits the formation of aluminum oxide on the surface.

So aluminum likes water, and as soon as they get together, you get hydrogen comes out, you get deposits of aluminum oxide and the gallium stays inert. So you can have an almost without transportation, you can create a vehicle where you just add water, and add water, it will just convert it to hydrogen and hydrogen can fuel the engine. So that's sort of a too good to be true technology, but it requires a lot more work. It requires a whole infrastructure.

You go drop off your aluminum oxide and get aluminum back. It's a very interesting and I've discussed it with Professor Woodall, who is a distinguished professor of electrical and computer engineering at Purdue, and if you go on the Web site, you'll get a sense. It solves everything if we can make it work because you got forever water and you use aluminum that's recyclable and it just sounded too good to be true.

HEARING COCHAIR D'AMATO: So you're announcing today that in your institution, you're making hydrogen-powered cars in Denver.

MR. SIE: No, but we want to encourage that kind of development to see--that's truly venture capital, but it's more than venture capital. You really have to say the large companies are willing to say test the reduction to practice, and then see if it can be possible. If it is, then it really will change the whole paradigm. I don't give much chance because of all of the existing stakeholders, but I think from a technical point of view, it really solves all of the things we discussed about today, very simple, renewable, recyclable, just with water and aluminum.

HEARING COCHAIR D'AMATO: Thank you. Thank you very much for that, and thank the panel for a very interesting panel and all your research. We will conclude this panel, and we'll move on to our last panel of the day.

Thank you.

[Whereupon, a short recess was taken.]

**PANEL X: U.S.-CHINA GOVERNMENTAL AND  
NONGOVERNMENTAL COOPERATIVE PROGRAMS IN ENERGY  
AND THE ENVIRONMENT**

HEARING COCHAIR SHEA: thank you for your patience in starting late. I really appreciate it. This is the fifth and final panel of the day and I guess it might be the tenth or 11th panel of the two-day hearing. We will examine governmental and nongovernmental cooperative energy programs between the United States and China that are currently in progress.

Our first speaker, Dr. S. T. Hsieh, is the Director of the U.S.-China Energy and Environmental Technology Center under the Payson Center of Tulane University since it was officially established in 1997.

He earned a Doctor of Engineering and Master of Science from Tulane University and a Bachelor of Science from the National Chiao Tung University, Taiwan.

Next, Dr. Wei-Ping Pan, Director of the Institute for Combustion Science and Environmental Technology, received his B.S. degree in Chemical Engineering from Chung Yuan University, Taiwan, and his Ph.D. in Physical Chemistry from Michigan Technological University in 1986. He has pioneered work in the area of clean coal technology, emission control and thermal analysis.

Finally, Mr. Michael J. Mudd is the Chief Executive Officer of FutureGen Alliance. Prior to being named the CEO of the FutureGen Alliance, Mr. Mudd spent his professional career with the American Electric Power, mostly focused on coal-fired generation. During his over 30 years with AEP, he was involved in the design, construction, start-up and operation of large coal-fired power plants in several Clean Coal Technology Demonstration Projects.

On behalf of the Commission, I want to thank off of the panelists today for joining us, and we'll begin with Dr. Hsieh.

**STATEMENT OF DR. S.T. HSIEH  
DIRECTOR, U.S./CHINA ENERGY AND ENVIRONMENTAL  
TECHNOLOGY CENTER, TULANE UNIVERSITY,  
NEW ORLEANS, LOUISIANA**

DR. HSIEH: Thank you for the nice introduction. Mr. Chairman, Madam Chairman, and members of the Commission, I'm very pleased to appear in front of you and very honored, but more importantly, from yesterday and today--

CHAIRMAN BARTHOLOMEW: You must be very tired.

DR. HSIEH: No, no. I could sit through another session. I do

learn so much from your exchange with the distinguished panel and they inspired me, enlightened me and broadened my perspective.

HEARING COCHAIR SHEA: Thank you.

DR. HSIEH: It made me believe what I'm doing now is valuable for both the USA and China to enhance the energy collaborations. So from my perspective, instead of reciting effort I reported in writing, I'm just going to summarize for you, and in view of just the discussions about investment or funding, I'd like to share with you my experience of promoting FGD technology in China.

We started to promote U.S. flue gas desulfurization (FGD) technology in the early '90s and for awhile nothing happened. You know just meetings, more meetings. Then by 2001, Babcock Wilcox started to have a chance to bid for a relatively small project, 125 megawatts in Zhejiang, and they called upon us, said EETC, can you help us to structure a tour for this potential project in the U.S. look at our equipment installation in the U.S. and to look at operation record? We didn't have much money because we didn't know whether this market is real or not.

This made me think if by the time we had the so-called bilateral investment fund available, that would be very easy because it didn't cost that much. But that would move the technology penetration much earlier. Fortunately, the French bid for that project eventually pulled out and Babcock Wilcox got a second chance. By 2003, November, the equipment worked without any problem.

Since then, Babcock Wilcox with FGD technology has prevailed in China, and has become an industry standard. And so very recently, maybe a week ago, China realizes the value and the cost effectiveness of the U.S. technology. China has issued very stringent SOx requirements. If you do not have the FGD, you will double the penalty. If you do have FGD installed, you will get .15 cent RMB in addition to the cost, whatever the regular power plant gets on line.

So I think this is a very good example speaking if we can do something to facilitate early technology penetration with a joint bilateral investment fund.

On the other hand, I'd like to speak a little bit on the carbon sequestration capture issue because I sense the Commission has a strong interest to see the early deployment, early development of carbon sequestration in China, and I would like to highlight for you a little bit on what we do now.

We have a project called the Regional Storage Opportunities in China, which has been working for one year, and we have Battelle Pacific North Laboratory. We have Montana State University as the U.S. team. We have China's Tsinghua University as a team. The project is to do economic modeling on the sources and sinks in China,

to try to estimate the economic value of the storage capacity. China fully supports that, and I think the project will be finished by July 20, 2008.

By that time, I think a report will come out and that will enhance Chinese acceptance of carbon sequestration technology.

On the other hand, we also understand China really likes our regional partnership, Carbon Sequestration Partnership approach. So there will be two Chinese scientists coming to Montana State for the RECS 2007. That's Research Experience in Carbon Sequestration--from July 30 to August 10. After that, we will pass by Richland to visit PNL to continue the work on that modeling project.

We also will support, based on China's request, the roadmap to share with them our experience. How do you develop a roadmap for carbon sequestration? Hopefully this will give Chinese decision-makers really a roadmap how to pursue that. We understand one of the major challenges in carbon sequestration is the capture costs. So we are developing a U.S.-China joint research agenda to put the U.S. scientists who are working on reducing the cost of capture with the Chinese scientists from Tsinghua University, and from the Chinese Academy of Sciences.

Hopefully, this joint effort will reduce duplication, enhance the communication, and achieve the cost reduction in a much earlier phase. As we know, Chinese have lots of capable scientists working at a much lower rate than our scientists. If we can put a U.S.-China team together like that, I think we can really enhance the intellectual property issue and move the carbon capture and sequestration project ahead.

Again, this is my brief summary. I look forward to the future guidance from this Commission, and support from this important Commission to help us to be more effect to promote U.S.-China energy collaborations.

Thank you very much.  
[The statement follows:]<sup>14</sup>

HEARING COCHAIR SHEA: Thank you very much, Dr. Hsieh. Dr. Pan.

#### **STATEMENT OF DR. WEI-PING PAN**

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<sup>14</sup> [Click here to read the prepared statement of Dr. S.T. Hsieh](#)

**DIRECTOR AND SUMPTER PROFESSOR  
INSTITUTE FOR COMBUSTION SCIENCE AND  
ENVIRONMENTAL TECHNOLOGY, WESTERN KENTUCKY  
UNIVERSITY, BOWLING GREEN, KENTUCKY**

DR. PAN: Thank you to the Commission for giving me this opportunity to provide my testimony before the U.S.-China Economic and Security Review Commission. In my seven minutes, I would like to highlight the activities and potential impact of my clean coal technology work with the Western Kentucky University China Environmental Health Project, an initiative that received major support from the United States Agency for International Development.

The project's goal is to improve public health in China through activities promoting access to clean coal and potable water through applied scientific research with Chinese university partners.

The China Environmental Health Project has three components: clean coal technology, karst water and the community outreach information dissemination. I work with Anhui University of Science and Technology on the clean coal technology components and Dr. Chris Groves at Western Kentucky University leads the CEHP karst water activities in partnership with Southwest University of China.

Dr. Jennifer Turner of the China Environmental Forum at the Woodrow Wilson International Center for Scholars in Washington, D.C. and Ms. Amelia Chung from the International Institute of the Rural Reconstruction, head of the community outreach information dissemination activities.

Western Kentucky University gratefully acknowledges the considerable support United States Senator Mitch McConnell of Kentucky has given to our CEHP work.

My talk will focus on the following four points that are detailed in my written testimony. Western Kentucky University China Environmental Health Project is filling an urgent need in China to enhance scientific capacity to accurately measure coal emissions. That's mentioned in the panel in the morning.

We speculate the mercury may be from China, but remember, Chinese government has never released any mercury data and the CO2 data since 2001.

So our project will enhance the scientific capacity to accurately measure coal emissions which are the leading cause of respiratory illnesses and recurring source of ecological harm within China and beyond.

Second, the coal component of China Environmental Health Project aims to obtain accurate data on coal-fired pollution emissions in Huainan city in Anhui Province. The key to success of this data

collection is the strong collaborative partnership we have formed with both provincial and the local government agencies.

The collection of this information could not only help promote transparency on pollution emission in China and supporting new laws on environmental information disseminations, but also could generate awareness among policymakers on the health problems of coal.

The third, while the data collection work could have an immediate impact on informing policymakers to take action on the air problems, one other key contribution to the China Environmental Health Project is the training of Chinese researchers and students in air quality monitoring, environmental health surveys and sampling and modeling techniques.

U.S. students at Western Kentucky University are also benefiting in conducting research on real work emission factors in China.

Number four, beyond data collection and training, the China Environmental Health Project is also exploring carbon sequestrations as a way to help the Huainan power plant decrease emissions by turning them into potentially profitable and environmentally safe nitrogen fertilizer.

I just returned from China yesterday morning.

HEARING COCHAIR SHEA: Thank you for being here.

DR. PAN: I did 17 travel days to Shanghai, Huainan, Beijing, and Harbin, but I did not see any blue sky days within Shanghai, Huainan and Beijing. I only saw blue sky days three days when I was in Harbin City, which is northeast of China.

However, the good news is I have been told by Huainan residents they very much enjoy seeing the white color snow during wintertime instead of black color snow for the past 10- 15 years. So in other words, the city government of Huainan is trying to improve the air quality and during my trip, the city government, the deputy mayor of the city with three directors, one from the local EPA, one from the health department, one from the technology department, with three power plant managers, and the research from the Anhui University of Science and Technology and myself. We laid out the work, how to do the collaboration to further improve the air quality in Huainan City.

I strongly believe through this collaborative project, we should be able to improve the air quality in Huainan City. That concludes my talk.

[The statement follows:]<sup>15</sup>

HEARING COCHAIR SHEA: Thank you, Dr. Pan, appreciate that. And last, but not least, Mr. Mudd.

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<sup>15</sup> [Click here to read the prepared statement of Dr. Wei-ping Pan](#)

**STATEMENT OF MR. MICHAEL J. MUDD  
CHIEF EXECUTIVE OFFICER, FUTUREGEN ALLIANCE, INC.  
WASHINGTON, D.C.**

MR. MUDD: The anchor man. Thank you very much, and it's an honor for me to be here before you to share with you about the FutureGen Project, the foremost international project in the world to advance technology that will enable coal to be used with virtually no emissions including the emissions of CO<sub>2</sub>.

I have heard three recurring themes in hearing several of the talks today. The first one is the need to advance technology solutions to ensure that we can serve the population of China and the world with cleaner and cleaner and more efficient energy.

A second theme I heard is the need for international cooperation to solve that problem, and the third one is the sense of urgency in light of the need to reduce CO<sub>2</sub> emissions and to serve the ever-growing demand for power in China, in fact, throughout the world.

The FutureGen Project is a global public/private partnership formed to determine the technical and economic feasibility of generating electricity from coal with near zero emissions including CO<sub>2</sub>.

The FutureGen plant will cost \$1.5 billion to develop. It will use cutting-edge technologies to generate electricity while capturing and firmly storing carbon dioxide deep beneath the earth. The Department of Energy leads the public side of this private/public partnership and provides project oversight. They chair an international government steering group and with foreign governments to help to co-fund the project.

The Department of Energy is co-funding 74 percent of the project's \$1.5 billion cost. Currently, the U.S. government is in discussions with the government of China, India, Korea and Japan about joining the government side of FutureGen. Other governments are likely to join that effort soon.

The nonprofit FutureGen Alliance leads the private side of the partnership. It is responsible for project management, development and co-funding of 26 percent of the project costs.

Currently, there are 12 industrial companies who are members of FutureGen representing some of the world's largest coal companies and electric utilities including American Electric Power, Anglo American, BHP Billiton, CHNG, the China Huaneng Group, CONSOL Energy, E.ON U.S., Foundation Coal, PPL Corporation, Rio Tinto Energy America, Peabody Energy, Southern Company and Xstrada Coal.

As a group, these companies provide coal and produce power to tens of millions of residential, business and industrial people on six

continents including Asia, Australia, North America, South America, Europe and Africa. U.S. member companies alone representatives, are responsible for more than 40 percent of the U.S. coal production and more than 20 percent of the U.S. coal power generation here in the U.S.

The Alliance is structured as a nonprofit 501(c)(3) entity in order to focus on technology advancement rather than profits. As a result, the Alliance members cannot receive any direct financial return from participation in FutureGen. Furthermore, the members cannot receive an IP associated with FutureGen.

This is important because we want to make sure that the Alliance focuses on advancing technology, not making money, not making megawatts, but advancing technology.

The FutureGen, an important goal of FutureGen is to demonstrate and prove successful and permanent sequestration of carbon dioxide through an aggressive R&D program. That's very important because we talk often about the capture of CO<sub>2</sub>. When it comes to the injection of CO<sub>2</sub> in deep geological formation, it is a real challenge and it needs to be proven.

FutureGen will integrate that together. It will also use Integrated Coal Gasification Combined Cycle to generate approximately 275 megawatts of power. This is a full-size plant which is once again very important. If we want to accelerate the advancement of technology by proving it at a full scale, we avoid steps of having to scale it up and hence the risk of advanced plants in the future.

Also, the R&D conducted at FutureGen will provide a unique platform for testing new technologies in the environment. The ultimate goal of the Alliance is to make these technologies available so that clean coal, clean power can be generated and CO<sub>2</sub> can be captured in a cost-effective way for future coal plants in the U.S., in China, India, and other places throughout the world.

The Alliance is operating under a very aggressive time line in order to break ground in 2009 and be in service by 2012. We've made substantial progress in this area since we formed a partnership in December 2005 through signing of a cooperative agreement with the U.S. Department of Energy. We've completed the conceptual design and cost estimate for the project and now we are developing the design and specification for the major equipment.

We will begin buying that long lead items later this year. The Alliance has also made great progress in selecting a site for FutureGen. In 2006, we issued a request for proposals for parties interested in hosting the site. Seven states responded with 12 bids for the site. It's interesting. We often hear of "not-in-my-backyard." This proved a

new concept, "build-in-my-backyard." Twelve communities rose up and said I want this R&D project, a coal plant in my state, willing to inject for the first time over one million tons per year CO2. I think that's very exciting.

We went through a very extensive process with peer review to narrow that down to four sites in two states, two in Texas and two in Illinois. We expect to make a final decision on the site by the end of this year. In fact, next week, the Department of Energy will be holding its NEPA process with the public hearings for the environmental impact statement.

With that as background, let me focus on some aspects of our relationship with the CHNG. They are one of the members of FutureGen. China Huaneng Group is one of the top ten power companies in the world, the largest coal-based power generation company in the People's Republic of China, representing about nine percent of China's generating capacity.

Their involvement in FutureGen signals an exciting step towards international cooperation towards global energy challenges. I think it's very exciting. They have a seat at the board of directors; therefore, they participate in all of our board meetings, provide guidance on the technical and business direction of the Alliance, and vote on critical matters of the bylaw.

As I mentioned, because we are a 501(c)(3) nonprofit entity, they are not receiving financial return. They're not receiving IP. But the indirect benefits to CHNG and other participating companies are significant. Some of them are first-hand knowledge in how to develop the world's first near zero emission coal-fired power plant; opportunities to develop relationships with experts in the industry, including the other members of the other companies in the Alliance, equipment suppliers and DOE. We've seen that manifest several times. A better understanding about the operation of the plant including what equipment and systems work well and do not work well, and improved public perception and goodwill by being a member.

I'd like to conclude by sharing with you some of my personal observations about our relationship with the partners from CHNG. First of all, we had a board meeting in China in early last year. What a fantastic experience for the executives of several of the major power companies to visit them. It really opened our eyes to the needs of China and the dedication of the Chinese entities to solve many of the problems that they have.

And as I mentioned, the CHNG representative on the board has been an equal member. There have been cultural differences, but nevertheless when we have the meetings, they have taken an active part just like any other member.

In closing, I'd like to say that developing technology-based solutions to global climate change is an issue that transcends all international borders. The FutureGen Project has been successful in creating an alliance of international companies and governments who are taking tangible steps to ensure that coal, the most abundant fossil fuel in the world can be used cleanly and without emissions.

Projects such as FutureGen are expensive. There is no one company, no one government should be expected to develop such a project in a vacuum. As the FutureGen Project continues down this pathway towards proving that zero emission coal plants can be built and operated safely and economically, private companies and governments through the world will be in a better position to replicate the technologies behind FutureGen because the U.S. and foreign governments and the members of FutureGen are working together to support this important project. I thank you for this opportunity to speak before you.

[The statement follows:]

**Prepared Statement of Mr. Michael J. Mudd  
Chief Executive Officer, FutureGen Alliance, Inc.  
Washington, D.C.**

I thank the Commission for the opportunity to share with you an example of excellent collaboration with a Chinese company, the China Huaneng Group, in the FutureGen project – the foremost project in the world to advance technology that will enable coal to be used with virtually no emissions, including the emission of carbon dioxide.

The FutureGen Project is a global public-private partnership formed to determine the technical and economic feasibility of generating electricity from coal with near-zero emissions, including carbon dioxide [CO<sub>2</sub>]. The FutureGen plant will cost US \$1.5 billion to develop. It will use cutting-edge technologies to generate electricity while capturing and permanently storing carbon dioxide deep beneath the earth. The plant will also produce hydrogen and byproducts for possible use by other industries.

**Private-Public Partnership**

The global scale of the energy system and the impact of CO<sub>2</sub> emissions make participation by a broad cross-section of international industrial, government, and other stakeholders a key requirement in developing strategies to reduce CO<sub>2</sub> emissions from the energy sector. For this reason FutureGen is being conducted through an international public-private partnership. The DOE leads the public side of the partnership and provides project oversight, chairs the intergovernmental steering committee, and with foreign governments, co-funds the project. The DOE is co-funding 74% of the project's \$1.5-billion cost. Currently, the governments of China, India and South Korea participate and co-fund the project with DOE. Other governments are likely to join the effort soon. The non-profit FutureGen Alliance (the Alliance) leads the private side of the partnership and is responsible for project management, implementation and co-funding 26% of the project cost.

Currently, there are 12 industrial companies who are members of the Alliance, representing some of the world's largest coal companies and electric utilities including: American Electric Power, Anglo American,

BHP Billiton, the China Huaneng Group, CONSOL Energy Inc., E.ON U.S., Foundation Coal, PPL Corporation, Rio Tinto Energy America, Peabody Energy, Southern Company, and Xstrata Coal. As a group, these companies provide coal and produce electricity provide energy to tens of millions of residential, business, and industrial customers on six continents including Asia, Australia, North America, South America, Europe, and Africa. U.S. member companies are responsible for more than 40% of the U.S. coal production and more than 20% of U.S. coal-fueled power generation capacity.

The Alliance is structured as a non-profit (501(c)(3)) organization in order to focus on technology advancement rather than profits. Alliance members contributing to the project do not receive any direct financial returns from participation in FutureGen. All revenue from the sale of power or any marketable byproducts will be returned to the non-profit entity, not the individual members, to support continued operations, research and development. This arrangement enables the Alliance members to focus on developing innovative approaches to generating electricity from coal in a cleaner way than ever envisioned. The non-profit structure will enable the Alliance to take more risk in experimenting with advanced technologies than would be the case if traditional measures of financial return were considered.

### **The strategic importance of coal**

Coal is currently the world's leading fuel for electricity generation, and its use is projected to double by 2030. Within the United States, coal now fuels more than half of electricity generation. Coal is the major fuel for fast-growing economies such as China. Climate change and other energy concerns have created a pressing need to move coal-to-energy technologies onto a development pathway toward near-zero emissions. FutureGen, with its goal of demonstrating proving successful, permanent sequestration of CO<sub>2</sub> through its aggressive R&D program, is a linchpin of that pathway. The FutureGen plant and its operational performance will provide the basis for a new generation of reliable, near-emissions free, coal-fueled power plants that can compete economically with other generation technologies in a carbon-constrained world.

### **The FutureGen Project**

FutureGen will be the first plant in the world to integrate coal gasification, electricity generation, emissions control, carbon dioxide capture and storage, and hydrogen production technologies. The 257-MW (nominal) FutureGen plant will use Integrated Gasification Combined Cycle (IGCC) technology, which will convert the solid energy in the coal into synthesis gas comprised of mostly hydrogen and carbon monoxide. The synthesis gas will react with steam to produce additional hydrogen and a concentrated stream of CO<sub>2</sub>. Hydrogen captured at the end of the gasification process will be used primarily to power turbines that will generate electricity. Additionally, hydrogen could be used in fuel cells, a combustion turbine and other hydrogen-based technologies. An important goal for the FutureGen plant is to capture 90 percent of the CO<sub>2</sub> and sequester over one-million tons of CO<sub>2</sub> annually. Deep saline formations, at depths greater than 3000 feet, are the target formation for CO<sub>2</sub> storage. DOE and the Alliance are interested in these formations because of the abundance of such formations throughout the world, making them a long-term viable solution for the wide-scale deployment of carbon sequestration.

While CO<sub>2</sub> storage in depleted oil wells has been widely used for enhanced oil recovery (EOR) since the 1970s – and is well understood – EOR opportunities are much less prevalent than deep saline formations. Because the Alliance wants to ensure that FutureGen is broadly replicable around the U.S. and the world, it is important to demonstrate CO<sub>2</sub> in this more widely occurring type of formation.

The R&D conducted at the FutureGen facility will provide a unique platform for testing new technologies in a commercial-scale environment. The Alliance's ultimate goal is to make these technologies commercially available so that clean power can be generated and CO<sub>2</sub> can be captured and permanently stored in a cost-effective way for future coal plants throughout the world.

Siting and building any power plant is a major undertaking that requires design, permitting and construction. The Alliance is operating under an aggressive timeline in order to break ground in 2009 and be operational in 2012. Substantial progress has been made since the public-private partnership was formalized on December 3, 2005 through the signing of a Cooperative Agreement by DOE and the Alliance. The FutureGen Alliance has completed the conceptual design and cost estimate for the project and is currently developing the design and specification for the major equipment. We will begin the procurement of long-lead items this summer. The Alliance has also made great progress in selecting the site for FutureGen. In 2006, the Alliance issued a Request for Proposals for parties interested in hosting the FutureGen plant, which seven states responded to with 12 proposals. A team of renowned U.S. and international scientists and engineers reviewed the proposals against a set of nearly 100 peer-reviewed, publicly-vetted criteria. These criteria reflected the environmental, technical, regulatory, and financial goals of the project. Based on a thorough evaluation, the FutureGen Alliance selected four candidate sites for further review, two in Illinois and two in Texas. The Alliance is supporting the Department of Energy in the Environmental Impact Statement as part of the National Energy Policy Act (NEPA) process, and will select the site for project deployment in late 2007.

### **The China Huaneng Group**

The China Huaneng Group (CHNG) is one of the charter members of the Alliance. China Huaneng Group is one of the top ten power companies in the world and is the largest coal-based power generator in the People's Republic of China, representing about nine percent of China's generating capacity. The Huaneng Group's involvement in FutureGen signals an exciting step forward in international cooperation to meet long-term global energy challenges, promote a cleaner environment, and create solutions to address concerns about climate change. The involvement of China's largest coal-based generator is significant considering that China has the world's third-largest coal reserve base and uses coal to generate about 70 percent of its electricity.

As a member of the Alliance, the CHNG has a seat at the Board of Directors. This enables CHNG to participate in all Board meetings, provide guidance on the technical and business direction of the Alliance, and vote on critical matters in accordance with the Alliance by-laws.

Because the Alliance is a non-profit (501(c)(3)) organization, Alliance members are not entitled to receive financial return or intellectual property associated with the project. However, the benefits of membership to CHNG and other participating companies are significant. Some of those benefits include:

- First-hand knowledge in the development of the world's first near-zero coal plant
- Opportunities to develop relationships with experts in the industry, including other Alliance members and equipment suppliers, and DOE officials
- Better understanding about the operation of the facility, including what equipment and systems work well and do not work well
- Improved public perception / good will from providing financial support to technology solutions towards reducing emission of CO<sub>2</sub> into the atmosphere while continuing to use low-cost and abundant coal.

I would like to conclude by sharing with you some personal observations about our relationship with our partners from CHNG:

- CHNG invited the Alliance members to conduct a Board meeting in China, and we took advantage of that offer in February 2006. The visit, which also included the opportunity to meet with several Government officials and Chinese R&D firms and to visit a Chinese gasifier, provided significant insight to Alliance Directors about the immense growth in China and the desire and important need for the Chinese energy industry to find ways to use coal more cleanly and economically.

- The CHNG representative on the Board has contributed as an equal Board member despite cultural differences, and his contributions to our deliberations have been meaningful.

In closing, I would like to say that developing technology-based solutions to global climate change is an issue that transcends all international borders. The FutureGen project has been successful in creating an Alliance of international companies and governments who are taking tangible steps to ensure that coal, the most abundant and secure fossil fuel in the world, can be used cleanly and efficiently. Projects such as FutureGen are expensive. No one company, or government, should be expected to develop such a project in a vacuum. As the FutureGen project continues down its pathway towards proving that near-zero emission coal plants can be built and operated safely, economically, and in an environmental compatible manner, private companies and governments throughout the world will be in a better position to replicate the technologies behind FutureGen because U.S. and foreign governments and the Alliance members collaborated in supporting this important project.

I thank you for this opportunity to speak before you, and I welcome the opportunity to respond to any questions.

### **PANEL X: Discussion, Questions and Answers**

HEARING COCHAIR SHEA: Thank you very much, Mr. Mudd. I'll start off with a question or two. Dr. Pan, I want to make sure I understood you correctly. Do the Chinese officials not collect environmental impact information or do they collect it and not make it publicly available or transparent?

DR. PAN: The Chinese government did collect some of the information, but did not release the information. For example, in the mercury and CO<sub>2</sub>, we have not read any data on the mercury and CO<sub>2</sub> from China after 2001.

HEARING COCHAIR SHEA: So when you're involved in collaborative efforts to assist them, how do you help them when you don't know what the baseline is, in the sort of void of information?

DR. PAN: That has several answers on that. First, regarding the baseline, when we see the air pollution, like Dr. Hsieh mentioned the FGD system, like we went to this trip and one company had an old unit without FGD, but they are now planning to set up new FGD next year. (The new FGD is under construction.)

We are collecting data without FGD so we know the baseline, and then after the new FGD is installed, next year, then we can measure again for the SO<sub>2</sub> emissions. That's on the aspect of SO<sub>2</sub>. But on the aspect of mercury, like you mentioned in your question in the morning, actually China there is no mercury data available in China. CO<sub>2</sub>, yes. They have measured CO<sub>2</sub>.

HEARING COCHAIR SHEA: No mercury publicly available or no mercury information collected?

DR. PAN: Actually no accurate mercury measurement has been done in China. The United States just set up the clean air regulation on mercury last year, and we start to regulate mercury by 2009. China

still used the wet method and we don't know how accurate it is, and the information we have on all this mercury coming from China is just based on the calculation of how much mercury in the coal times how much mercury consumption in China. That's so you can see the data (Chinese mercury range between 200 tons to 14,000 tons.

In the United States, coal-fired power plant only generated 48 tons in the year of 1999, and then based on new regulations, United States should reduce down to 70 percent which by the year 2018 would be reached at around 13 tons. So that's what we're trying to help the Chinese local government do to set up the mercury measurement system, and then to obtain accurate data as to how much mercury is actually emitted.

HEARING COCHAIR SHEA: I see. Dr. Hsieh.

DR. HSIEH: Yes. In terms of mercury data, I just wish to add a little bit. Under the DOE and the MOST Clean Fossil Energy Protocol, about two years ago we start to help Zhejiang University for the first time to do some measurements within one power plant. So that's the enhancing their capacity, and we are going to have a workshop later this year. Hopefully Zhejiang will present its methodology to other Chinese power plants. Hopefully, this way, we can start to get more accurate data.

HEARING COCHAIR SHEA: I see. Both of you, and I have a quick question for Mr. Mudd, but both of you have a tremendous amount of experience working with regional, local, provincial officials, scientists in China. You just came back from a 17-day trip, God bless you for being here. What regions of China do you consider to be most environmentally progressive? And what causes people at the regional and provincial level in China to take a leadership role in addressing environmental issues? What is the mix of factors that leads them to take a lead in the problem?

DR. HSIEH: Okay. My sense is in the coastal region because of the economic development, most of the local governors, mayors, even county officials are very sensitive or more sensitive to environment issues. For example, Beijing's air quality requirement, as far as I know, is more stringent than Philadelphia, but look at Dr. Pan's trip and my trip, I just came back from China on June 6, and not much--

HEARING COCHAIR SHEA: Difference between a standard and enforcement.

DR. HSIEH: Enforcement.

HEARING COCHAIR SHEA: Right. Right. Dr. Pan?

DR. PAN: I just want to follow up Dr. Hsieh, he mentioned the regulation and the enforcement, and although China indicates it has set up a regulation, all the new power plants require a FGD system, but some power plants have an FGD, but they never buy the limestone. In

other words, they never use it. So that depends on the local enforcement. Also this the morning it was indicated the Chinese SEPA just set out the six regional EPA monitoring offices. I think that will be a help in monitoring actual SO2 emissions and also other emissions stuff.

And I believe based on our collaboration, we need to involve the city government, local government, all the people. The most important is, like mercury, they don't have an idea how to make accurate measurement, and then we introduced the measurement system which we have in the United States. They (Huainan) are happy to put it in the budget for the year 2009 to buy a continuous monitoring system, to actually measure the mercury.

HEARING COCHAIR SHEA: Thank you. My question period is over. Madam Chair.

CHAIRMAN BARTHOLOMEW: Thank you very much, and thank you, gentlemen, for your testimony today. Dr. Hsieh, I was going to note that I understand that you had just come back from China, too, so we are particularly pleased that you're both here. I want to thank the members of our audience for sitting here. This has been a marathon hearing. We don't usually for two full days with our hearings, but it is, I think, a testament to the importance of this issue that we have done that.

As a nonscientist, it's been a rather intensive seminar for me, and I'm beginning to think I should get some sort of scientific continuing education credit for all of this, but nonetheless, we're very appreciative of everything that you have all done for us.

In some ways, the levels of collaboration that you all work on are quite different. Mr. Mudd, you're at a rather high level. Dr. Hsieh, high level of university contacts, and Dr. Pan, a more local-to-local. How can these three different types of cooperation help to determine best practices, and how can we use the lessons that you are learning in all of this to address what Mr. Sie talked about in the panel before yours, which is now do we take demonstration projects, and take them to scale? I'll add one more point on that. How do we weave the different kinds of efforts that you all are doing into some sort of net, so that we're not duplicating projects, redoing the same things, but start putting together comprehensive work from which we benefit and from which the Chinese government benefits, the Chinese people and the people of the U.S.?

MR. MUDD: We need a portfolio of all three. The concept from the lab to the commercial plant is like a big funnel. Okay. A big funnel at the beginning from the lab, small hole at the bottom with those projects that make it, and one must always recognize the need to keep fundamental R&D, pilot plant, demonstration, commercial plants,

one needs a robust portfolio of all of them.

So I think the first lesson is look for opportunities to collaborate on all levels. Another question about how to avoid duplication is not necessarily--sometimes duplication is good rather than bad. For example, in China, since FutureGen was formed, a similar project called "GreenGen" has been announced. There have been many other projects that have been announced throughout the world. Australia has some. Europe has some. GreenGen, some say, it's in competition with FutureGen, but the opposite is it complements FutureGen. We really need many large demonstration projects and R&D projects to advance carbon capture, carbon sequestration, and IGCC in order to get more varied experience, differences here and there and also replication to bring the cost down.

The cost hurdle for the first couple of plants is high. The more you build, in general, the more it comes down. I think what we want to look for is appropriate duplication in order to find ways to cooperate in all three and ensure that you don't have competition between the lab demonstration and commercialization nor competition between the countries and the projects, but ways to fund all of them.

DR. HSIEH: In terms of coordination, maybe I can share with you a little bit more on the operational side of the Clean Fossil Energy Protocol, which I am most familiar with. I think the structure may provide some good example.

For example, the protocol was signed by the Vice Minister of Ministry of Science and Technology with Assistant Secretary of Fossil Energy, DOE, and they are two very busy people. But we set up a permanent working group which has a secretariat which is a little below and are communicating constantly. That's on the department level in the Office of Clean Energy Collaboration. That's the Fossil Energy Office and the Department of Industry High Tech industrialization is the office for communication.

Then under that protocol with this leading group or permanent working group, we have annexes; different projects have different annexes. Annex 1 for clean power generation, IGCC and advanced generation. Annex 2, that's clean transportation fuel, the coal to liquids. Annex 3, oil and gas. Annex 4, environmental control technology, post-combustion, FGD. Annex 5, climate change.

I think with that kind of structure, at least within fossil fuels, it's clearly laid out. Each annex has annex coordinator. Each project in the annex will report to the annex coordinator. The annex coordinator corresponds with the Secretariat, then reports to the Vice Minister Assistant of Fossil Energy.

Every year, there's a large group meeting. Every two years, there's an expanded conference/workshop, just put all the annex

coordinators reporting all the projects. I think maybe the federal government should take leadership in looking at each of the components for renewable energy efficiency, for nuclear. Each has a kind of category, somebody to oversee that. That could avoid lots of complication.

DR. PAN: I only can speak on our project. I believe the United States Agency for International Development Office has a very good idea. At the beginning, we proposed five sites including Beijing, Shanghai, including all the famous universities like Tsinghua, Zhejiang University, all this. But in the end, the USAID decided we have to pick up Huainan City, and the reason why Huainan City was because Huainan produced ten percent of the coal in China and then used ten million tons of coal per year, and in the next ten years will use 20 million tons of coal for electricity generation.

I only can speak for the project. I believe USAID has a very good background in China of what's going on, so that is why, I know we proposed the five new sites at the beginning, but then USAID only picked up the one site which is Huainan City. So that's from our experience.

HEARING COCHAIR SHEA: Thank you. Commissioner Videnieks, question?

HEARING COCHAIR VIDENIEKS: Mr. Mudd, a question. I think you mentioned that the FutureGen plant will be, construction will begin in '09 and maybe completion will be in 2012.

Along those lines, my question of continuity comes up. Are we convincing other governments that our government will stand continuously behind the project through its construction and possibly even data generation, and get a cooperative effort out of it.

My question is also if DOE is issuing the contract, and I guess American money is funding this thing partially, what about data rights? Unlimited? Will U.S. government fund the contracts? Usually we have unlimited data rights clauses in there, which enable us to give the data to whomever for free.

I'm just questioning whether this will be the case here. The other thing is I looked at an MIT study just recently where the number of sites, the size was mentioned to be commercial in size, had to be commercially--that was to take care of certain stresses underground and so forth, sequestration, and also they mentioned like ten to 13 sites. So my question is then will FutureGen being one experiment, one technology? How does that relate to the MIT recommendations of having ten to 13 and not to make the choice on technology now, but maybe to look at several technologies to see which one will be the best?

So that's kind of a general question. The first question is

regarding the continuity assurances that we can give to other governments; then maybe the question of one plan versus 13; and then data rights.

MR. MUDD: Thank you, Commissioner. It is an issue with respect to the funding of the U.S. government. As I'm sure you know, the government appropriates money on a year-by-year basis, and we have our board meetings. A common theme that comes up from many of the foreign governments and especially the Chinese is their biggest worry is will the U.S. government stand behind its commitment to continue to fund?

As you know probably better than me in this city, it's always an issue when you have a large project, you become a target. And there are some in the government that understand the importance of coal. Others would see limited R&D funds spent elsewhere.

We also have to confront once again the year to year appropriation, and then we also are getting signals from the U.S. Department of Energy wanting to renegotiate the project. The cost has gone up, but the cost has gone up for all plants.

And that has caused angst amongst many of our foreign partners, especially the Chinese, who believe once you sign an amount, you're expected to have to commit that amount. And if you have a deal with the government you're expected to commit to that.

So we are concerned about the signals from the government that the original deal may be need to be renegotiated, as you heard from some people in the Department of Energy. This uncertainty could cause some of our foreign partners--they said they would have to reconsider their involvement in FutureGen if the government cannot stand behind its original commitment.

So that is something that I think with these type of cooperative programs needs to be looked at.

With respect to data rights, as I mentioned, the Alliance itself cannot provide any data rights to member companies. So therefore we've addressed concerns about issues associated with providing IP to the member companies. It's one of the reasons we set up as a 501(c)(3) to make it easier. Therefore, I think we want to look at the data rights on the same line as the Department of Energy sponsors the Clean Coal Technology Program or the Clean Coal Power Initiative Program.

In a nutshell, the concept is if we let the IP reside within the equipment suppliers, they're in the best position to commercialize the technology. If the user who will build the plant can learn how to specify a better plant through a project like FutureGen, the user specifies a better plant, the suppliers builds a better plant, the customers get lower cost electricity and cleaner power out of that.

So in a nutshell, that's it, but I'll be glad to go into more depth

with you in the future. With respect to the MIT study, and it's interesting, the MIT study has some excellent points, but I think they have missed the point with some of the comments they've made about FutureGen, but specific to your question about the need for ten to 13 sites, I was at national coal--

HEARING COCHAIR VIDENIEKS: And large commercially--

MR. MUDD: Large sites. I was at a National Coal Council meeting last week when John Deutsch, one of the authors, talked, and someone asked him, how much do you think it's going to cost for each of these ten to 13 sites, just to buy the CO2 and inject it if you just buy it? He says about \$800 million per site. So we can spend \$800 million to buy CO2 on the market for ten to 13 sites or we can spend the \$1.5 billion in FutureGen to at least provide the Integrated Injection of CO2. We need more than one FutureGen clearly, but with budget constraints, at least FutureGen is tying it all together and doing it in an integrated fashion.

HEARING COCHAIR VIDENIEKS: Thank you. Maybe the other gentlemen want to comment on the question of choosing a technology up front.

DR. HSIEH: I think from my experience working with Chinese, whether the central government is efficient or not as we heard from the other testimony, I think their mind-set is pretty much still in centralized planning. So they will go through their cycle of internal discussion. Once they make their plan like the action plan in the just released on June 4, they outline within the next five to ten years what they are going to do.

As Mr. Mudd just said, from Chinese point of view, that's their decision. They won't sway from that very much. So they probably operate quite different from ours.

HEARING COCHAIR VIDENIEKS: Dr. Pan.

DR. PAN: As I mentioned in my testimony, we provide the second choice of how to capture the CO2, and then all the panels today mentioned the storage, the CO2 in the deep ocean or the opened mine. That's one of the methods. And we provide another method which the method already sponsored by the Department of Energy to change the CO2 to nitrogen fertilizer, but we cannot, since China has 340,000 megawatts of existing electricity power plant already. They cannot change all this to IGCC. Then what happens to the CO2 emissions from all the power plants. Therefore we provide a second method to use the CO2 converted to the ammonia bicarbonate as nitrogen fertilizer, which at least provides a second choice for the user.

We are also trying to explore the possibility for additional funding to do this. The original funding was supported by the Department of Energy to Western Kentucky University.

HEARING COCHAIR SHEA: Thank you.

HEARING COCHAIR VIDENIEKS: Mr. Mudd, I didn't quite understand--

HEARING COCHAIR SHEA: Pete, we have to move--

HEARING COCHAIR VIDENIEKS: Okay. Fine. The data rights issue I didn't quite understand it, who has the ultimate data rights?

HEARING COCHAIR SHEA: Okay. We'll answer that--

COMMISSIONER FIEDLER: I actually was going to ask a similar question. I don't phrase it as data rights in the following sense. Let me just ask a question whether or not the FutureGen plant will either develop or refine existing technology, new technology and/or refined further existing technology.

MR. MUDD: The answer is yes and yes.

COMMISSIONER FIEDLER: Okay. So there's something new coming out of it in any event. Who's going to own it?

MR. MUDD: The Alliance itself does not have the inventors to invent new technology. We are a platform for equipment suppliers and researchers to apply their technology to the FutureGen plant.

So I buy a turbine from you, a gasifier from you, a new widget from you, FutureGen is the opportunity to be able to test all of your new components, technologies and widgets.

COMMISSIONER FIEDLER: Okay.

MR. MUDD: In the plant. You still own the IP. And you can go and sell it.

COMMISSIONER FIEDLER: All of your suppliers and all the input into the plant, the IP remains with whoever put it in there.

MR. MUDD: Exactly.

COMMISSIONER FIEDLER: And the value added to that technology by this process remains with them?

MR. MUDD: That's correct. Now, the FutureGen Alliance now understands how this component interfaces with that component, all the time constants and the interrelationships. We will take that and share that with the world.

COMMISSIONER FIEDLER: Right.

MR. MUDD: Because that is so invaluable.

COMMISSIONER FIEDLER: And then I as a customer who want to build a plant, I now understand that this way is, well, if Pete's second, third and fourth plants get built, then I'll be able to compare the first, second, third and fourth's experience to see which one is the most efficient. Is that right?

MR. MUDD: That's right.

COMMISSIONER FIEDLER: I just want to make sure that I clearly understand what the project does, and I do understand the incentive for--therefore why all these other companies are participating

in it because they don't want to spend that money up front each on their own to do that. Smart.

MR. MUDD: Yes.

COMMISSIONER FIEDLER: Thank you.

HEARING COCHAIR SHEA: Will the plant be operational once it reaches a demonstration phase, proves that it can work, it will be an operating facility over a period of time; right? So I have trouble with the ownership. Someone has got to own a platform that's operating over time.

MR. MUDD: The FutureGen Alliance owns the facility. Title vests in the FutureGen Alliance, but when you contract with the Department of Energy, the lawyers can explain it, I can't. It's a complicated title arrangement.

At the end of the test period, some options can happen. One is the Department of Energy could take it over and fund it and run it, but they can't decide that now because that takes advance appropriations. The Alliance could take it and run it, but even if the Alliance were to take it over and run it, the Alliance can never return that money back to the Alliance members.

My vision, I don't know if it will happen, but I'm telling my directors is my vision is as it continues. As it finishes its demonstration period, becomes a viable commercial plant some day, back the late teens, late '20s, teens, that if it becomes a source of revenue, the Alliance now can be a platform to do good.

Because it will be a 501(c)(3). Maybe we can replicate FutureGen type of plants throughout the rest of the world.

COMMISSIONER FIEDLER: Are you prohibited from selling at some point in the future?

MR. MUDD: We could sell it, but then what are we going to do with the money?

COMMISSIONER FIEDLER: Do another plant?

MR. MUDD: Yes.

COMMISSIONER FIEDLER: Excuse me. You just got done saying what you would do with the money. You said you wanted to operate as a platform.

MR. MUDD: Yes.

COMMISSIONER FIEDLER: It's a normal cooperative leverage venture to do more work. Yes.

MR. MUDD: But I think you're saying the beauty is hopefully we will become a viable entity in the future to do goodness.

COMMISSIONER FIEDLER: Yes, right.

HEARING COCHAIR SHEA: Do we have any more questions from anyone? Gentlemen, I want to thank you very much for your time, appreciate your patience, and this hearing is officially over.

[Whereupon, at 4:25 p.m., the hearing was adjourned.]

**ADDITIONAL MATERIAL FOR THE RECORD**

**Statement of Dr. Elizabeth Economy, C.V. Starr Senior Fellow,  
Director of Asia Studies, Council on Foreign Relations, New York,  
New York<sup>16</sup>**

**Statement of Dr. Mark D. Levine, Environmental Energy  
Technologies Division, Lawrence Berkeley National Laboratory,  
Berkeley, California<sup>17</sup>**

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<sup>16</sup> [Click here to read the statement submitted for the record by Dr. Elizabeth Economy](#)

<sup>17</sup> [Click here to read the statement submitted for the record by Dr. Mark Levine](#)

