

**CHALLENGES AND OPPORTUNITIES FOR U.S.-
CHINA COOPERATION ON CLIMATE CHANGE**

HEARING

BEFORE THE

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UNITED STATES SENATE

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CHALLENGES AND OPPORTUNITIES FOR U.S.- CHINA COOPERATION ON CLIMATE CHANGE

THURSDAY, JUNE 4, 2009

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

The committee met, pursuant to notice, at 10:01 a.m., in room SD-419, Dirksen Senate Office Building, Hon. John F. Kerry (chairman of the committee) presiding.

Present: Senators Kerry, Cardin, Casey, and Lugar.

OPENING STATEMENT OF HON. JOHN F. KERRY, U.S. SENATOR FROM MASSACHUSETTS

The CHAIRMAN. The hearing will come to order. Thank you for joining us today.

Delegates from 192 nations are going to be spending the rest of this year doing the vital work of crafting a global climate change treaty to be negotiated in Copenhagen this December. But, make no mistake, those 190-plus nations are inevitably going to be taking their queues from just two nations.

The reality is that a robust American partnership with China will do more than anything else to ensure a successful global response to the urgent threat of climate change. America is the world's largest historical emitter of greenhouse gases that cause climate change. And China recently passed us to become the world's No. 1 current emitter. So, together we are, today, responsible for nearly half of all global climate greenhouse gas emissions.

Obviously, the full extent of our responsibility goes well beyond the numbers. Our words and our actions will set the tone. And Washington and Beijing have a unique opportunity here to be able to lead. Either we're going to create the necessary momentum right now—June, July, August, September—leading into Copenhagen to galvanize a legitimate global response or we truly risk a global catastrophe.

Last week, I visited China to assess where that country currently stands on climate change and what the realities of their position are. And it's interesting, because I've been engaged with the Chinese on this topic for almost 20 years now, going back to Rio, the original Earth Summit in 1992, and really it was a kind of one-way discussion for about 15 of those 20 years, where you could sit with Chinese delegations, but there wasn't much feedback, there wasn't much engagement, there wasn't much discussion, and frankly, there wasn't much happening on the positive side in China itself. That has changed dramatically, I might say, over the course of the

last years. And both in Bali as well as in Poznan, I met with Minister Xie, their lead negotiator on climate change, as I did meet with him last week in Beijing, and it is striking the degree to which they are energized, enthusiastic, embracing new technologies, setting goals and standards, and moving aggressively in a new direction.

Last week, I met with top Chinese political leaders, energy executives, scientists, students, and environmentalists, and what I heard was, in fact, very encouraging. Now, words are words; I understand that. And I'm meeting today with Todd Stern and John Holdren and others to discuss how we translate the words into specific actions. But the fact is that the Chinese decisionmakers insisted to me, repeatedly, that China grasps the urgency of this problem. People who, a few short years ago, were not even willing to entertain this discussion are now unequivocal. China is eager to embrace low-carbon development pathways and is ready to be, in their words, a positive, constructive force in Copenhagen and in the negotiations, going forward.

My message to the Chinese was very direct, simply that America understands that we have an obligation to lead, as the historical largest emitter, but that China needs to understand, point blank, that if America went to zero tomorrow, China has the ability to obliterate every gain we make unless it is also part of the solution, as well as other developing countries. And so, the message is clear. America is no more likely to enter into a legally binding global solution in 2009 than it was back in the 1990s, when we debated Kyoto, unless China is part of the solution and unless there is a global solution in the making through the Copenhagen process. I might add, that this can be achieved by filling out the already-adopted language of U.N. process, which refers to "common, but differentiated, responsibilities," and, most importantly, filling out the three words that came out of the Bali and Poznan process, that emissions reductions must be "measurable, reportable, and verifiable," MRV, as it is referred to in the negotiating process.

The Chinese are beginning to realize that addressing climate change and pursuing sustainable energy policies is very much in their own national interest. China's ballooning growth has resulted in a resource dependency that comes with very real strategic costs. In a sense, China and the United States find themselves in a similar kind of strategic box. Both of us have increasing economic demand, increasing power-production demand, and both of us are predominantly dependent on foreign sources of fuel. So, to the degree that we both move aggressively to create bioalternative, renewable, wind, solar, clean coal, et cetera, we are significantly advantaged, because we both have significant supplies of coal and an ability to burn it, providing that it is clean.

Of course, the costs of environmental devastation are also being felt in more than strategic terms for China. Air pollution causes the premature deaths of 750,000 Chinese people every year. Farmers are experiencing declining crop yields right now. And scientists are now warning that the Himalayan glaciers, which supply water to almost a billion people, could disappear completely by 2035. Everyone I spoke to recognized these risks.

So, it's time to retire, once and for all, the old outdated stereotype and myth that China doesn't care at all and China won't act. They do care, and they are acting. They may not embrace exactly the same schedule immediately that we do, but I believe that if you give those concepts of "verifiable, measurable, reportable" the life that they can be given, we are going to see very significant emissions reductions from China. And I'm willing to bet any of my colleagues in the United States Senate that if we don't get our act together significantly over the course of the next few years, we're going to be chasing China, 4 or 5 years from now, because that's the rate that they are moving at.

I had the pleasure of riding on a 200-mile-an-hour bullet train from Beijing to Tianjin, steel on steel. Nancy Pelosi was also there. We met one evening and chatted, and she had the pleasure of riding on a 300-mile-an-hour Shanghai maglev train from the airport to downtown. Folks, those are cars that are off the road and people who move in a low carbon footprint lifestyle, and our Acela train has yet to be able to go more than 18 miles of the entire way to New York at 150 miles an hour.

So, the challenge is pretty clear to me. The old train in Beijing took 8 hours, and it ran on diesel. The new one takes 29 minutes. And in the next 4 years, China will extend its high-speed rail system by 38 percent.

Earlier this year, while America spent \$80 billion in green stimulus measures, the largest such investment in our history, China invested \$200 billion. In the past few years, China has tripled its wind energy-usage targets and quintupled its solar energy-use targets for 2020. They set an energy intensity reduction target of 20 percent by 2020, and they are already moving ahead of that in certain sectors of their economy, and they've surprised themselves at the ease and rapidity with which they were able to do it.

China has actually begun dynamiting—blowing up—some of its small dirty coal plants, because they're so inefficient, and replacing them with new technology and newer plants. But, as China builds and expands its industrial base, we obviously can't expect them to simply dynamite dirty sources of energy; we need to ensure that China starts building clean. Both countries have a great deal to gain from bilateral cooperation to develop and deploy clean energy sources. We have the chance to commercialize some of the most promising technologies and make clean energy advances that can literally be transformational.

I raised these issues with Chinese Vice Premier Li Keqiang, and he was enthusiastic, literally saying, "Let's do it. Why don't you get the names of those businesses to our people and we'll work together and see if we can start to joint venture and specifically describe how we could proceed forward."

So, the opportunity for Mr. Stern and the State Department team is immense, and we should collaborate on multiple demonstration projects of near-to-market clean-energy technology, from solar to thermal to carbon capture and storage. We should combine forces in driving toward next-generation battery and electric-vehicle technology. I might add, China has already set a daunting goal; daunting both with respect to the challenge of doing it, but also with respect to us, because they are setting out to be the world's

No. 1 electric-car manufacturer. And at a time when we see the woes of Detroit, we ought to take a message from that and, likewise, get our act together.

Most importantly, we need to inspire the 1.6 billion Americans and Chinese to take ownership of this challenge and prove to the world that we can rise and meet it together.

Now, make no mistake, bilateral cooperation with China is not an alternative to the global treaty process. On the contrary, it is an essential component of the larger effort. Our two countries, representing more than 40 percent of the emissions globally, have stood aside from this effort for too long, and now it falls to us to take the helm. And if we lead, if we prove our ability to be able to reach agreement on many of these issues in these next few weeks, that will have a profound impact on the negotiating positions and the capacity to move much more easily in Copenhagen.

We're very fortunate to have with us today a respected panel of experts. Ken Lieberthal served as senior director for Asia on the National Security Council under President Clinton and is a visiting fellow at the Brookings Institution. Elizabeth Economy is a senior fellow and director for Asia studies at the Council of Foreign Relations. And Bill Chandler is director of the Energy and Climate Program at the Carnegie Endowment for International Peace.

Let me just comment on one other thing we mark today also. Today is also the 20th anniversary marking the violent crackdown against democracy advocates in Beijing's Tiananmen Square and in dozens of other cities over China, and it would be inappropriate to simply gather here today and talk about the relationship with China without mentioning that and remembering the sacrifice of those who lost their lives in pursuit of greater freedom.

Obviously, much remains to be done in that regard, and, as we continue to build a closer relationship with China, it's important for us to continue to urge the Chinese to unleash the dynamism of the Chinese people through further political liberalization and strengthening the rule of law and making government fully accountable to the people. And I think that China's success in that endeavor is also of profound interest to our relationship and to the United States.

My visit last week confirmed for me China's indispensable role in tackling a host of international problems, from the global financial crisis to the subject of today's hearing. And I look forward to growing this relationship. It is perhaps the most important bilateral relationship on the planet today, and there's much that we need to do with respect to nuclear proliferation, North Korea, as well as the other issues I've mentioned.

Senator Lugar.

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

Senator LUGAR. Well, thank you very much, Mr. Chairman. I congratulate you on your trip to China, your diplomacy; likewise, your survival at 200 miles an hour—

[Laughter.]

Senator LUGAR [continuing]. In addition to the Speaker of the House's feat.

Let me just say, I join you also in welcoming our distinguished panel, and we look forward to discussing the subject with you.

As the chairman has pointed out, China's actions are critical to the success of any global effort to meaningfully reduce carbon emissions. Not only is China the largest source of greenhouse gases, its negotiating position is influential on the G77 developing nations and others. Chinese responses to climate change and to global negotiations on the subject have already been complex and sometimes contradictory. The words and actions of Chinese leaders indicate that they see climate change as a risk to the stability and development of their country.

And yet, this focus on stability also reduces China's willingness to limit carbon usage in ways that might impede economic growth. China has demonstrated a strong appetite for developing and deploying cleaner energy technologies, including solar and wind energy systems, yet it continues to build coal-fired powerplants at a rapid rate. It has issued forward-looking regulations and mileage standards designed to produce a greener economy, yet it remains unclear whether China will develop the capacity to effectively implement its new regulations, or even whether it can accurately measure their impact.

China has productively discussed some climate change issues in bilateral negotiations, yet it is association with the G77 that routinely engages in strident rhetoric that blames the West for climate change and supports counterproductive policy demands, such as having consumers in the West pay for the carbon content of products they buy from China.

China's position on climate change is more than a diplomatic problem for the United States. The American domestic debate on this issue will be profoundly influenced by perceptions of China's willingness to set aside doctrinaire positions and to agree on steps to limit greenhouse gas emissions.

China's status as a nondemocratic nation which lacks the checks and balances provided by a free press and other democratic institutions will complicate the verification of any climate change agreement. Moreover, the fundamental trends in China toward industrialization, urbanization, higher standards of living will have far more impact on the growth of emissions than government policy.

Now, a starting point for our discussion is what can realistically be achieved through bilateral talks with the Chinese Government. In my judgment, there is no doubt that such talks should be pursued, probably in a format that can include, not just energy and climate, but also economic, security, and other issues.

Even apart from climate change concerns, our Nation has a strong interest in improving our communications with Beijing and making progress on common interests. I appreciate the diplomatic efforts already undertaken by the Obama administration, and especially the efforts of our chairman, John Kerry. As I have mentioned in past hearings, it is critical that the American people have a much clearer picture of the overall elements of the climate change problem and the administration's strategy in structuring a potential agreement. American participation in any global climate agreement is likely to bring profound changes to the American economy and culture that require the achievement of much greater con-

sensus than we now have. Absent a reasonable consensus on how we structure our response and what sacrifices we have to make, implementations of a climate change policy is far more likely to be ineffective, economically damaging, and divisive if we do not have a common consensus.

Part of this understanding involves how American efforts on climate change fit into global efforts. And the overall volume of greenhouse gases released by China, India, other rapidly developing countries, is expected to continue to grow, under almost any scenario. If this is the case, the American people will require much greater confidence than mitigation steps taken by the United States and other developed nations, combined with commitments by China and other developing nations to slow the growth of their greenhouse gases, will finally produce a meaningful result.

I thank the chairman again for calling the hearing, and we look forward to the insights of our witnesses.

The CHAIRMAN. Thank you very much, Senator Lugar. And thank you for your personal comments. And I appreciate the questions you've raised, and, needless to say, they've got to be answered as we go forward.

Mr. Lieberthal, if you would lead off, and then Elizabeth, and we'll just go down the line.

Thanks.

STATEMENT OF KENNETH LIEBERTHAL, VISITING FELLOW IN FOREIGN POLICY, BROOKINGS INSTITUTION, WASHINGTON, DC

Mr. LIEBERTHAL. Thank you, Mr. Chairman, Senator Lugar. I appreciate the opportunity to comment on the critical issues of challenges and opportunities for United States-China cooperation on climate change.

China's rate of growth of carbon emissions, especially since 2002, has been extremely steep, and pollution problems in China, I think, are rightly viewed as severe. Most Americans seem to believe that China is, therefore, ignoring its carbon emissions while pursuing all-out economic growth.

But, as you just explained, Mr. Chairman, the reality is that the leaders in Beijing have adopted serious measures to bring growth in carbon emissions under control, even as they have tried to maintain rapid overall expansion of GDP.

To engage effectively with the Chinese and achieve the best outcomes on carbon emissions with them, it is important to have a realistic understanding both of the reasons their emissions are growing so rapidly and of the types of efforts they're making. It is critical for the United States and China to find ways to work as effectively as possible to reduce overall greenhouse gas emissions, and this requires reality-based approaches by each side toward the other.

Why are China's greenhouse gas emissions increasing so rapidly? Fundamental to the answer is that, first, China's economy is based overwhelmingly on coal. And second, China retains many of the problems of a developing country.

Coal currently provides about 70 percent of China's energy, and there is no serious alternative to coal for many years to come.

Without development and deployment of technology to reduce coal's carbon footprint, the future looks grim for China's carbon emissions, and this, I believe, provides a major area for potential United States-China cooperation.

China describes itself as a developing country, and it's more than half right. It makes sense to envision China as a group of relatively developed islands with a cumulative population of over 400 million people that are scattered around in a sea of over 800 million people who live very much in developing-country conditions. The interaction between the developed areas and the developing regions is pervasive, and it affects every dimension of economic, social, and political life in China. Every Chinese leader views the developing part of the country as a constant and pressing reality.

One of the results of this developing-country context is that China encounters more fundamental problems regarding human capital, infrastructure, social malaise, and technical capabilities than most of us appreciate. Put simply, China's leaders lack the institutional and technical capabilities to achieve many of the improved energy outcomes that they seek. Indeed, the issue of capacity-building is critically important for China's future outcomes in the clean energy and climate change arenas and provides a major area of potential United States-China cooperation.

Another reality of China's developing-country context is that Beijing is also focused on managing perhaps the greatest migratory flow in human history as urbanization proceeds on an almost unimaginable scale. Since 1992, nearly 200 million Chinese have shifted from rural to urban life, and the current pace of migration of about 15 million people per year moving into the cities is likely to continue for another 15 to 20 years. The resulting requirements for new power generation, building construction, transportation, education, health services, and so forth means that, effectively, China has to build urban infrastructure and create urban jobs for a new, relatively poor city of 1.25 million people every month, and that will likely continue for the better part of the next two decades.

The key industries that support the related infrastructure development—cement, steel, petrochemicals, power, and aluminum—have been among the fastest growing industries in China over the past half decade and are also the most important sources of greenhouse gas emissions.

In addition, as more Chinese achieve higher incomes, they want comfortable transportation, including private cars. Many are also upgrading their homes, making them larger, and filling them with appliances. Carbon emissions growth reflects, therefore, extremely fundamental forces in China's development.

China's leaders also have competing environmental concerns, especially focused on water distribution and quality, and on extremely severe air pollution, and those divert serious resources from attacking the issue of carbon emissions.

In sum, while visits to Beijing or other major coastal cities may create the impression that China's a relatively developed country, the reality is far different. The underdeveloped parts of China have a population nearly three times the size of our own population, and that population's needs and capabilities inevitably shape major outcomes in China.

None of the above should be interpreted as indicating that controlling greenhouse gas emissions is not on Beijing's priority list. That would be very far from the truth, as China sees itself as one of the countries most vulnerable to damage from climate change. In fact, when you look at the policies and programs already in place, they are very impressive, and they are constantly growing. Even the following short list of key official targets, every one of them backed up by substantial commitments of resources, suggests the reality that China's taking these issues very seriously.

The targets include seeking a 20-percent reduction in energy intensity for all of GDP during the 11th 5-year plan, from 2006 to 2010. According to Chinese authorities, meeting this target will reduce total carbon emissions by roughly 1 billion tons of CO₂ over the course of the plan, as against a business-as-usual model.

Adopting the target of having renewable fuels account for 10 percent of China's total energy consumption by 2010, and 15 percent by 2020. As part of this, there are major programs and mandates in solar, wind, nuclear, and hydro, and there is much work being done on biofuels.

Taking serious measures to reduce the emissions from coal-fired power generation facilities, including shutting down small-scale plants and deploying, on a large scale, the most advanced technologies on all new coal-fired plants.

Investing over \$88 billion in ultra-high-voltage transmission-smart grid projects by 2020. And there are other targets on various additional measures in electric vehicles, mass transit, electrified trains for freight-hauling, and so forth.

The bottom line is that China faces enormous pressures via urbanization and other aspects of development to continue massive creation of infrastructure. It takes reduction of greenhouse gas emissions, as against a business-as-usual model, extremely seriously. And it has more problems, in terms of lack of capacity, than is true for developed countries.

There are serious implications for the United States and China, and for Copenhagen, in the above remarks. These include, first, United States-China cooperation on clean energy can be in both of our interests. We have many complementary capabilities, but such cooperation has to be based on the trust that grows out of realistic understandings of each other's actions, problems, worries, capabilities, and goals. That trust, I believe, is not yet there.

Second, at Copenhagen, China should be pushed hard to accept targets for greenhouse gas emissions that require major efforts for them to achieve, with full verification requirements. But China will, in my judgment, not accept caps at this point, as it does not see how it can actually cap emissions growth in the face of ongoing urbanization and other demands. Beijing does not accept international obligations that it does not think it is capable of meeting.

And finally, the United States and China should work to develop a major clean energy partnership. Achieving such a partnership will provide new momentum for the Copenhagen effort.

I hope these comments are helpful. I look forward to your questions.

Thank you, sir.

[The prepared statement of Mr. Lieberthal follows:]

PREPARED STATEMENT OF KENNETH LIEBERTHAL, VISITING FELLOW, THE BROOKINGS INSTITUTION, PROFESSOR OF POLITICAL SCIENCE AND PROFESSOR OF BUSINESS ADMINISTRATION, THE UNIVERSITY OF MICHIGAN

Mr. Chairman and members of the Foreign Relations Committee. Thank you for giving me the opportunity to comment on the critical issue of "Challenges and Opportunities for United States-China Cooperation on Climate Change."

China's rate of growth of carbon emissions, especially since 2002, has been extremely steep, and pollution problems in China are rightly viewed as very sobering. Most Americans seem to believe that China is therefore ignoring its carbon emissions while pursuing all-out economic growth.

But the reality is that the leaders in Beijing have adopted serious measures to bring growth in carbon emissions under control, even as they try to maintain rapid overall expansion of GDP. To engage effectively with the Chinese and achieve the best outcomes on carbon emissions with them, it is important to have a realistic understanding both of the reasons their emissions are growing so rapidly and of the types of efforts they are making. It is critical that the United States and China find ways to work as effectively as possible to reduce overall greenhouse gas emissions, and this requires reality-based approaches by each side toward the other.

First, why are China's greenhouse gas emissions increasing so rapidly? Fundamental to the answer is that: One, China's economy is based overwhelmingly on coal; and two, China retains many of the problems of a developing country.

Coal currently provides about 70 percent of China's energy, and there is no serious alternative to coal for many decades to come. Without development and deployment of technology to reduce coal's carbon footprint, the future looks grim for China's carbon emissions. This provides a major area for potential United States-China cooperation.

China always describes itself as a developing country, and it is more than half right. It makes sense to envision China as a group of relatively developed islands with a cumulative population of over 400 million people that are scattered around in a sea of over 800 million people who live very much in developing country conditions. The interaction between the developed areas and the developing regions is pervasive and affects every dimension of economic, social, and political life. Every Chinese leader views the developing part of the country as a constant and pressing reality.

One of the results of this developing country context is that China encounters more fundamental problems regarding human capital, infrastructure, social malaise, and technical capabilities than most of us appreciate. Put simply, China's leaders lack the institutional and technical capabilities to achieve many of the improved energy outcomes that they seek. Indeed, the issue of capacity-building is critically important for China's future outcomes in the clean energy and climate change arenas and provides a major area of potential United States-China cooperation.

Another reality of China's developing country context is that Beijing is also focused on managing perhaps the greatest migratory flow in human history as urbanization proceeds on an almost unimaginable scale. Since 1992, nearly 200 million Chinese have shifted from rural to urban life, and the current pace of migration of about 15 million people per year moving into cities is likely to continue for another 15–20 years.

The resulting requirements for new power generation, building construction, transportation, education, health services, etc., means that, effectively, China has to build urban infrastructure and create urban jobs for a new, relatively poor city of 1.25 million people every month, and that will likely continue for the better part of the next two decades. The key industries that support the related infrastructure development—cement, steel, petrochemicals, power, and aluminum—have been among the fastest-growing industries in China over the past half decade and are also the most important sources of greenhouse gas emissions. In addition, as more Chinese achieve higher incomes, they want comfortable transportation, including private cars. Many also are upgrading their homes—making them larger and filling them with appliances. Carbon emissions growth reflects, therefore, extremely fundamental forces in China's development.

China's leaders also have competing environmental concerns, especially focused on water distribution and quality and on extremely severe air pollution, that divert serious resources from attacking the issue of carbon emissions.

In sum, while visits to Beijing or other major coastal areas may create the impression that China is a relatively developed country, the reality is far different. The underdeveloped parts of China have a population nearly three times the size of ours, and that population's needs and capabilities inevitably shape major outcomes in China.

None of the above should be interpreted as indicating that controlling greenhouse gas emissions is not on Beijing's priority list. That would be very far from the truth, as China sees itself as one of the countries most vulnerable to damage from climate change. In fact, when you look at the policies and programs already in place, they are very impressive—and they are constantly growing. Even the following short list of key official targets—every one backed up by substantial commitments of resources—suggests the reality that China is taking these issues very seriously. China is:

- Seeking a 20-percent reduction in energy intensity for all GDP during the 11th 5-year plan, which covers 2006–2010.¹ According to Chinese authorities, total carbon emissions would decline by roughly a billion tons of CO₂ over the course of the plan as against a “business as usual” (BAU) model, if this target were fully met. At present, progress toward the target is behind schedule, but the gap between targets and performance is closing.
- Adopting the target of having renewable fuels account for 10 percent of China's total energy consumption by 2010 and 15 percent by 2020.² As part of this:
 - Establishing major programs to improve technology in solar and wind power. China has rapidly become the world's leading producer of solar panels, although solar power's installed generating capacity is to increase to only 300,000 kW in 2010. For wind power, tax breaks and other forms of government support are already in place as of 2008. The installed generating capacity of wind power is to increase from 1.26 million kW in 2005 to 10 million kW in the year 2010.³
 - Enhancing China's hydropower generation (despite the fact that the country already has the greatest concentration of hydropower facilities in the world). The installed hydropower generating capacity is to increase from 117 million kW in 2005 to 190 million kW in 2010⁴ and will provide 6.8 percent⁵ of the country's anticipated energy consumption in the latter year.
- Taking serious measures to reduce the emissions from highly polluting power-generation facilities. Coal remains king in China, and about 70 percent of power still comes from coal-fired plants. Over the past 5 years China has built the equivalent of America's entire coal power generation system. These plants will stay on line for another 30–50 years while 60 percent of U.S. coal-fired powerplants will be over 50 years old by 2025. The technologies involved in generating power in these new plants are thus very important. Fortunately, China is building many of these plants to be relatively clean⁶ and is investing in development and deployment of clean coal technologies.⁷ Despite these measures, specific problems often result in emissions far above the level that would be anticipated from plant technology alone. This is the unintended result of economic pressures at the powerplant level that lead many operators to purchase and burn low-quality coal that undermines the efficiency capabilities of the advanced technologies in their plants.⁸

¹“The Energy Development Plan for the 11th Five-Year Period,” the National Development and Reform Council (NDRC), Government of the People's Republic of China, April 2007. Available at: <http://www.ccchina.gov.cn/WebSite/CCChina/UpFile/File186.pdf>.

²“The Medium and Long-Term Development Plan for Renewable Energy,” the National Development and Reform Council (NDRC), Government of the People's Republic of China, August 2007. Available at: <http://www.ccchina.gov.cn/WebSite/CCChina/UpFile/2007/20079583745145.pdf>. China passed a renewable energy law in 2006. In 2007 renewables accounted for 8.5% of China's energy production.

³“The Renewable Energy Development Plan for the 11th Five-Year Period,” NDRC, PRC. March 2008. Available at: www.ccchina.gov.cn/WebSite/CCChina/UpFile/File186.pdf.

⁴“The Renewable Energy Development Plan for the 11th Five-year Period,” *ibid*.

⁵“The Energy Development Plan for the 11th Five-Year Period.”

⁶Government regulations now require that: New plants be synchronously equipped with flue gas desulfurization (FGD) technology before 2010; existing plants begin to be retrofitted with FGD technology before 2010; all plants meet SO₂ requirements before 2015; and new plants set aside space for future flue gas denitrification equipment installations. New power-generation units are equipped with low-NO_x burners, and many existing units have been retrofitted with this technology: Zhao, Lifeng and Gallagher, Kelly Sims, “Research, Development, Demonstration, and Early Development Policies for Advanced-Coal Technology in China,” *Energy Policy*, Vol. 35, 2007, 6467–6477.

⁷This includes, for example, substantial work on direct hydrogenation of coal, with production starting up in the Inner Mongolian Autonomous Region in 2008. Beijing is also focusing on coal gasification and is constructing 35 plants using this technique.

⁸Edward S. Steinfeld, Richard K. Lester, and Edward A. Cunningham, “Greener Plants, Grayer Skies? A Report from the Front Lines of China's Energy Sector” (Cambridge, Mass.: China Energy Group, MIT Industrial Performance Center, August 2008).

- Aggressively expanding nuclear power capabilities, with a target of building nine new generators in the next 2 years and at least 30 over the coming decade. Nuclear is slated to provide 5 percent of China's total installed power-generating capacity by 2020.⁹ There have been recent suggestions that the nuclear output target has been raised from 40 GW to 70 GW by 2020.¹⁰
- Investing over 600 billion RMB (\$88 billion) on ultra-high voltage transmission projects by 2020. The installed capacity of China's clean energy will be increased to 579 billion kW when the smart grid is completed by 2020.¹¹

The bottom line is that China faces enormous pressures via urbanization and other aspects of development to continue massive creation of infrastructure, it takes reduction of greenhouse gas emissions as against a BAU model extremely seriously, and it has more problems in terms of lack of capacity monitoring and other needs for high quality efforts than is true for developed countries.

There are serious implications for the United States and for Copenhagen in the above comments. These include¹²:

- There are numerous areas in which United States-China cooperation on clean energy can be in both our interests. We have many complementary capabilities. But such cooperation has to be based on the trust that grows out of realistic understanding of each other's actions, problems, worries, capabilities, and goals. That trust is not yet there.
- At Copenhagen, China should be pushed hard to accept targets for greenhouse gas emissions that require major efforts to achieve. Beijing should also accept full verification requirements, which include transparency, clear metrics, etc. But China will, in my judgment, not accept caps at this point. It does not see how it can possibly actually cap emissions growth, given the ongoing urbanization and other developments noted above, and Beijing does not accept international obligations that it does not think it is capable of meeting. Chinese quantitative obligations are, therefore, likely to focus on improvements in energy intensity per unit of GDP, perhaps bolstered by some sectoral requirements, along with targets on use of renewables. China cannot avoid an overall cap on carbon emissions indefinitely, but it is not in a position realistically to accept a cap at Copenhagen.
- The United States and China should work to develop a major clean energy partnership. Achieving such a partnership will provide new momentum to the Copenhagen effort. It will demonstrate that the United States and China are serious about improving their records on clean energy. It inherently will also highlight that, despite the differences in principle that separate the industrialized from the developing countries over responsibilities for greenhouse gas emissions, the most important developed and most important developing country can find significant ways to work together. But a United States-China clean energy partnership and the Copenhagen effort should be developed separately, as the negotiating framework for the latter is far more complicated than that for the former. Close linkage, therefore, may complicate both issues.

The CHAIRMAN. They are, indeed, very helpful, thank you.
Ms. Economy.

**STATEMENT OF ELIZABETH ECONOMY, C.V. STARR SENIOR
FELLOW AND DIRECTOR FOR ASIA STUDIES, COUNCIL ON
FOREIGN RELATIONS, NEW YORK, NY**

Ms. ECONOMY. Thank you very much, Mr. Chairman and Senator Lugar. It is a pleasure to be here to have the opportunity to discuss

⁹"The Nuclear Industry Development Plan for the 11th Five-Year Period," the Commission of Science, Technology, and Industry for National Defense (COSTIND), the Peoples' Republic of China, August 2006. Available at: <http://www.caea.gov.cn/n602669/n602673/n602687/n607857/appendix/200741310370.doc> "China Ups Targeted Nuclear Power Share From 4% to 5% for 2020," Xinhua News, August 5, 2008. Available at: http://news.xinhuanet.com/english/2008-08/05/content_8967806.htm.

¹⁰China Daily, November 19, 2008: http://www.chinadaily.com.cn/bizchina/2008-11/06/content_7180851.htm.

¹¹China Daily (May 29, 2009).

¹²For a fuller explanation of potential avenues of future United States-China cooperation to address climate change, see: Kenneth Lieberthal and David Sandalow, "Overcoming Obstacles to United States-China Cooperation on Climate Change" (Washington: The Brookings Institution John L. Thornton China Center, 2009), available in .pdf at www.brookings.edu.

how the United States and China can best work together to address the challenge of global climate change.

Within this very broad mandate, I was asked to talk about two specific issues this morning. First, how can the United States help support measuring, reporting, and verification in China? And second, what might be some of the priorities for a clean energy partnership between our two countries?

In terms of MRV, these are, of course, the very building blocks of an effective domestic climate program for China, as well as China's commitment to a robust international regime. China is still at a very nascent stage of capacity in these areas. The central government, for example, has called for the provinces to develop their own climate action plans, but many of these provinces have very little idea about how to proceed, other than to copy blindly what Beijing has already issued. I think this offers some real opportunities for United State-China cooperation.

First, we can begin by helping the provinces to develop inventories of their greenhouse gas emissions. We can assist China with both the technology and the methodology, from ground sampling for methane emissions from rice production to advanced-stage continuous emissions monitoring. It's not going to be easy. Beijing has many strictures on information transmission, not only to its foreign partners, but also within the government. But this is an essential first step for any real commitment that China might be willing to sign on to.

Second, I think we have the opportunity to work with Chinese companies to begin to develop a registry of their greenhouse gas emissions and mitigation measures. I think this is an important resource for China and for Chinese companies as the country moves toward a time when it will have to assume a cap on its emissions, and perhaps it will eventually adopt a cap-and-trade system. Some Chinese companies, mostly those with ambitions to be global leaders, are already moving in this direction. I sit on a board of a Chinese group that scorecards multinational and Chinese companies on their sustainability initiatives. Two years ago, we only had a multinational scorecard; this year we had two dozen Chinese companies that wanted to be evaluated; and, of those, I would say five or six actually had greenhouse gas mitigation measures listed as part of their sustainability initiatives. Their initiatives were not systematic, systemic, or comprehensive in any way, and certainly the number of companies in China that is undertaking these kinds of efforts is still small. But I do think, here in the United States, we have extensive experience with this, and we can begin to share this expertise on a company-to-company basis. Again, this is very important as China moves toward a true carbon commitment and a capped emission system.

Third, and in some ways most difficult, is verification. There are few incentives within China's political system to enforce environment-related laws and regulations. Even when Chinese factories and powerplants have pollution-control equipment, they often don't use it, or they may use it only when the inspectors appear. There is very poor data collection, transmission, and transparency at every level of the Chinese system, and the incentive is often to hide negative information. We saw this in the runup to the Olympics,

when the Beijing city government simply moved the air-pollution monitoring equipment from one part of the city to another in order to put forth better air-quality statistics than were actually there.

So, I think that this effort to help China develop a more transparent, accountable, and rule-based system will be a long process, but an absolutely critical one. California is beginning an initiative that is going to try to address some of this problem. It has a climate governance partnership that it's trying to establish with a number of provinces, in which members of different parts of the bureaucracy at the local level will form climate action task forces, and to encourage information-sharing and transparency and accountability at the local level. Again, this is going to be a very long process, but it is an absolutely essential one.

The second area I was asked to discuss was what the priorities might be for a clean energy partnership between the United States and China. As Ken was indicating, the partnership needs to look ahead over the next 10 to 20 years at the profound changes, both within China and in terms of China's role abroad, and structure the partnership in that context. Within China, this means working closely with the Chinese Government as it is transforming the country from a rural- to an urban-based society. Ken mentioned they plan to urbanize 400 million people between 2000 and 2030. Significantly, urban residents use $3\frac{1}{2}$ times more energy than their rural counterparts. With this as our future, I think we need to be looking at partnerships that focus on alternative energy vehicles. We already have an ecopartnership on this issue under the Strategic Economic Dialogue between Chang'an Motors and Ford Motor Company and the cities of Denver and Chongqing. We should be looking aggressively at what's taking place with that initiative, seeing what the obstacles are, what the opportunities are, and whether this is something that can be replicated throughout other parts of China. If it's not working, how do we revise it?

Another priority for both our countries would be capacity-building for the enforcement of energy-efficient building codes, as well as the deployment of new building materials. Half of all new building space in the world is going up in China. We are missing an enormous opportunity right now. Currently China is at about a 5-percent compliance rate with their own energy building efficiency codes.

Ken also mentioned energy-efficient appliances. This may sound insignificant, but if you imagine about 800 million more people using air-conditioners and dishwashers and refrigerators and televisions, you begin to get the picture that this is going to be quite a significant source of new energy use within the country. I recently spoke with a major retailer in China who told me that energy-efficient appliances make up only 1 percent of their appliance sales in China. There's a lot of work to be done in terms of promoting an Energy STAR rating system within China, and educating the Chinese consumer about such standards.

Last on this point, there's a lot of discussion about technology transfer, joint R&D, and making clean-coal technologies in China commercially viable. These are all very important, and I think there are a lot of already very interesting partnerships emerging.

Before I came to provide this testimony, I spoke with a friend of mine, Patrick Jenevein, who heads a wind power company based in Texas and has a joint venture in China. The company makes the blades for wind turbines, and it just received \$300 million in financing from the parent company of his Chinese joint-venture partner to develop wind farms here in the United States. Forty percent of the components will be made here and 60 percent of the components will be made in China. This is the kind of partnership and development that we want to see happen, and we need to think through how to do that on a larger scale.

Still, I think it's important to remember that technology doesn't matter unless the political and economic systems are there to support it. When I speak with United States companies, what they talk about in their dealings with China is contract sanctity, enforcement, and certainty of regulation. That all takes us back to governance and capacity-building.

Finally, I mentioned that the partnership ought to address the profound changes in China's role abroad. Something not very many people have been thinking about is how China's drive for resources—timber commodities, food crops, oil, and gas—has brought tens of thousands of Chinese companies to Africa, Latin America, Southeast Asia, along with millions of Chinese workers, with very little to no environmental supervision. China is now the largest importer of timber in the world and the largest importer of illegally logged timber in the world. It is contributing to rampant deforestation in places as far flung as Cambodia, Myanmar, Mozambique, Russia, and Indonesia. Even as China is undertaking positive climate mitigation efforts with its forest program within its own borders, it is contributing to the opposite in many countries abroad.

Again, I think that as we think through a climate partnership with China, it ought to be in the context of a global sustainability program that would encourage China, the United States, and developing countries to discuss the actions of Chinese multinationals abroad.

The CHAIRMAN. Would you say it's contributing to the opposite; is that just by virtue of demand?

Ms. ECONOMY. It's contributing by chopping down all the old-growth forests.

The CHAIRMAN. Right.

Ms. ECONOMY. There are many areas in which the United States and China can cooperate on global climate change. And from my perspective, as my remarks have indicated, the most important is building capacity and transparency, official accountability, and the rule of law. I think these are the essential elements of a Chinese system that's going to be able to deliver not only on its promises for global climate change, but also on issues like intellectual property rights, or as Senator Kerry mentioned—and I think it's important to remember today, on June 4—for the protection of individual rights and freedoms.

Thank you.

[The prepared statement of Ms. Economy follows:]

PREPARED STATEMENT OF ELIZABETH ECONOMY, C.V. STARR SENIOR FELLOW AND
DIRECTOR FOR ASIA STUDIES, COUNCIL ON FOREIGN RELATIONS, NEW YORK, NY

Chairman Kerry and distinguished members of the committee, I am delighted to have the opportunity to discuss China's efforts to address climate change and the prospects for United States-China cooperation on this critical issue.

I. INTRODUCTION

China's climate policy is driven by the belief, widely shared within the government elite, that a lower carbon economy will be good for economic modernization, that there is money to be made through the development and sale of climate-related technologies, and that domestic energy security depends in part on expanding the role of renewable energy resources at home. When useful, China's leaders also link climate change mitigation to domestic environmental concerns such as air quality and flood prevention.

Many in China also appreciate the serious challenges the country will face if the global climate is not stabilized: An estimated 37 percent decline in agricultural output of three of the country's four major grains by 2050; rising sea levels that threaten hundreds of millions along China's wealthy coastal region; and increasing desertification that already plagues more than 20 percent of the country. In interviews, farmers in rural China will often attribute their poor land quality and growing water scarcity to climate change. Nonetheless, few within China's elite discuss climate change with a sense of urgency; the priorities remain continued rapid economic growth and social stability. To the extent that these priorities coincide with addressing climate change, China's leaders are enthusiastic about moving forward to address this global challenge.

Within these parameters, the range of initiatives that China has undertaken to mitigate its contribution to global climate change is vast. In fact, the number of actors in China now engaged in climate-related activities has exploded over the past several years. Beijing issues top-down targets for energy efficiency and provides subsidies for research and development on climate-related technologies, while local officials in China become climate entrepreneurs, actively seeking partnerships with cities abroad or bidding for their cities or provinces to become experimental low-carbon zones. Some of China's best known companies, such as Haier, Lenovo and Baoshan Iron and Steel have also begun to publicize their efforts to reduce their carbon footprint. One voice still largely missing in China's climate discussions, however, is that of Chinese environmental NGOs, who, with a few exceptions, remain focused exclusively on domestic environmental concerns.

II. THE LANDSCAPE OF CHINA'S CLIMATE INITIATIVES ¹

Many of China's Greenhouse Gas (GHG) reduction efforts have been highly publicized and are well-known. These efforts include: Reducing energy intensity (energy consumption per unit of GDP) by 20 percent during 2006–2010; increasing the role of renewable energy within the primary energy mix to 10 percent by 2010 and 15 percent by 2020; a top 1,000 program to improve the energy efficiency of the top 1,000 energy consuming enterprises in nine sectors (iron and steel, nonferrous metal, chemicals, petroleum/petrochemicals, construction material, textiles, paper, coal mining and power generation); a fuel consumption tax on gasoline of 1 rmb per litre;² replacing and adding to the country's stock of coal-fired powerplants with more efficient models; and a massive afforestation program that has raised the level of forest coverage in the country from approximately 12 percent in 1998 to 18 percent in 2009.

New targets and policy initiatives are also announced with striking frequency. For example, the government has discussed more than tripling its wind-power generating capacity to 100 GW by 2020 from its previous target of 30GW; floated a proposal for a 40-percent Renewable Electricity Standard by 2050; pushed forward new rules on compulsory green procurement for local governments; and raised the possibility of a carbon tax and a carbon trading regime at some undisclosed time in the future.

China is also actively investing in new technologies that will help slow the rate of growth of the country's GHG contribution. It has announced a US\$1.5 billion research subsidy for automakers to improve their electric vehicle technology. (China's

¹ The number of climate-related initiatives underway in China—as a result of central and local government, as well as international effort—is far too great to detail. This represents a sampling of some of the broadest and most highly publicized of China's GHG reduction efforts.

² Testimony of Barbara A. Finamore before the select committee on Energy Independence and Global Warming, United States House of Representatives (March 4, 2009).

leaders have called for 500,000 “new energy” vehicles, such as hybrids and electric vehicles, to be produced this year. Shenzhen is reportedly already establishing twenty 220-volt charging pillars in office and residential areas. According to one international consulting firm, Frost and Sullivan, it will take a minimum of 10 years for China to transition to electric vehicles.) State-owned power developer China Huaneng Group has announced that it will pursue the development of technologies to capture and sequester carbon (CCS) with the assistance of the ADB and the Chinese Government.³ Shenhua Group is also pursuing CCS technology in conjunction with its planned coal-to-liquid fuels plant in Inner Mongolia. Moreover, powerplant efficiency technology may soon also make its way from China to the United States. In April 2009, Xi’an Thermal Power Research Institute, a subsidiary of Huaneng, signed a preliminary agreement to supply Houston-based Future Fuels with a two-stage pulverized coal pressure gasification technology for an IGCC plant to be built in Schuylkill, PA, in 2010.

China has also become the test bed for the rest of the world’s GHG reduction efforts, technology development and transfer, and capacity-building. Forty-two percent of the world’s Clean Development Mechanism projects under the auspices of the Kyoto framework are in China. These projects have helped China expand its wind power capacity, develop coalbed methane capture projects, and provided a profit of several billion dollars for the Chinese Government. (The windfall is slated for a green technology fund.) The international community is also actively pursuing ecocity or province partnerships (e.g., the European Union with Jilin, Chongqing and Guangdong, Singapore with Tianjin and California with Jiangsu). While these partnerships are not yet well defined, they all will likely embrace both capacity-building for the Chinese Government as well as the development of industries that will serve a low carbon economy (e.g., producing wind turbines). Certainly, the private sector, including multinationals and international NGOs are all deeply engaged in climate-related activities in China: BP has a clean energy research center at Qinghua University in Beijing, Wal-Mart has launched a campaign to reduce significantly the energy used by its stores and factories; the Natural Resources Defense Council is working to promote energy-efficient buildings and demand-side management; and the Environmental Defense Fund has a pilot project to help reduce GHG emissions from the agricultural sector.

III. THE CHALLENGES AHEAD

Despite the commitment of China’s leaders and the rest of the world to move the country aggressively to a low carbon economy, however, the rate and nature of China’s economic growth suggest that without significant new investment and international assistance, the country will fall well short of what it needs to do to help stabilize the global climate.⁴ Part of the challenge is related simply to the magnitude of the task at hand. Under a business as usual scenario, the International Energy Agency estimates that China’s energy-related CO₂ emissions will be twice that of the United States by 2030. If China succeeds in meeting its target of reducing its energy intensity by 20 percent by 2010, it will avoid emitting approximately 1.5 billion tons of CO₂, the greatest contribution to GHG reduction currently underway in the world.⁵ Yet despite this effort, China is on track to overwhelm the global effort to address climate change. In 2006, China added 90 GW of coal-fired power capacity—enough to emit over 500 million tons of CO₂ per year for 40 years⁶; by comparison, the European Union’s entire Kyoto reduction commitment is 300 million tons of CO₂.⁷

Beyond the sheer magnitude of the problem at hand, China’s GHG reduction efforts are greatly complicated by emerging trends in the pattern of economic development, competing priorities within China’s political system, and weak capacity for

³“Green Hops: New Renewable Energy Targets, More Carbon Tax Chatter, Singapore-Nanjing Eco-city Announced,” Green Leap Forward blog (May 8, 2009). <http://greenleapforward.com/2009/05/08/green-hops-new-renewable-energy-targets>.

⁴The Tyndall center, for example, argues that China’s energy portfolio will need to be 60 percent renewable by 2050 to stabilize the climate. The McKinsey report’s baseline scenario for China’s GHG emissions, in which China doubles its carbon emissions from 2005 by 2030, necessitates that China has 100GW of wind generating capacity by 2030. In its abatement scenario, however, in which China limits the growth of its carbon emissions to 10 percent above 2005 levels by 2030, McKinsey suggests that China would need 300GW of wind generating capacity.

⁵“Coal and Climate Change Facts,” Pew Center on Global Climate Change. <http://www.pewclimate.org/global-warming-basics/coalfacts.cfm>.

⁶Statement of Stephen Chu, Director, Lawrence Berkeley National Laboratory, before the U.S. Senate Committee on Finance (March 27, 2007).

⁷“Fact Sheet: China Emerging as New Leader in Clean Energy Policies,” The China Sustainable Energy Program. <http://www.efchina.org/FNewsroom.do?act=detail&newsTypeld=1&id=107>.

monitoring and enforcement. An effective climate program in China will need to address these issues.

Emerging Trends in Economic Development

- *Urbanization*—China plans to urbanize 400 million people during 2000–2030. This will translate into significant growth in energy demand: Urban residents use 3.5 times more energy than rural Chinese. China already is building two billion square meters of floor space each year, half the world’s total. Lighting, heating and appliance use will all add to China’s energy bill: Despite efforts by retailers and by the Chinese Government to promote the use of energy efficient appliances, one major retail chain reports that only 1–2 percent of the appliances they have sold over the past quarter qualify as energy efficient.
- *Transportation*—China’s transportation sector is exploding. Its fuel economy standards (36mpg) are significantly higher than those in the United States (30mpg in 2010), but passenger car sales in 2008 were just shy of those in the United States: 6.76 million compared to 6.79 million; and this year China is on track to surpass the United States in car sales.⁸ In April alone, China sold 1.15 million cars. By 2020–25, it is anticipated that China will have more cars on its roads than the United States.
- *Increasing population*—After decades of an aging and largely stable population, China may well experience some significant population growth. Children of one-child families who marry each other are permitted to have two children. Particularly in urban areas, where family planning has been strictly enforced, virtually all children 27 years old and younger are only children. The potential for a population boomlet should be incorporated into future climate scenarios.
- *China Going Global*—China’s going out strategy has encouraged thousands of Chinese enterprises to exploit natural resources in Africa, Latin America, and Southeast Asia, often with devastating environmental consequences for the local environments. China’s global logging practices are particularly relevant to climate change. Although China has a significant afforestation program at home, its companies often log indiscriminately abroad. China has become the largest importer of timber in the world, half of which is estimated to be illegally logged. A global sustainable forestry program should be part of China’s portfolio of climate activities.

In Competing Priorities, the Economy Wins

- *China’s “Green” Fiscal Stimulus Package*—China has received significant international acclaim for its “green” fiscal stimulus package. Both HSBC and the World Resources Institute claimed that slightly under 40 percent of the package is green (included in this was \$98.65 billion for railroad construction; \$70 billion for electric grid construction; \$51.15 billion for water and wastewater treatment plants; and \$1.5 billion for low-carbon vehicles). Yet as the Shanghai-based lawyer, Charles McElwee, has pointed out, “It is admirable that China is building more railroads and more grid infrastructure, but to suggest that with these investments China is engaging in a major shift of the focus of its economy to a sustainable one is far fetched. China is building more railroads to move more products. There is nothing in China’s stimulus package that will prevent it from more than doubling its 2005 carbon emissions by 2030.”⁹ According to Vice-Minister Li Ganjie of China’s Ministry of Environmental Protection, during the first quarter of 2009, only 10 percent of the 230 billion yuan (US\$30 billion) of central government funds for the stimulus package targeted environmental protection, energy efficiency or emissions control.¹⁰
- *Economic Growth vs. Environmental Protection*—In the midst of the global economic slowdown, Chinese environment officials have expressed serious concern as to whether provincial and local governments are ignoring environmental standards. In the rush to launch investment projects, over 150 large-scale infrastructure projects have been subjected to a “green passage” process, which is a highly abbreviated environmental impact assessment process. In addition, provincial and local governments in a number of regions have ignored the account-

⁸“US LDV Sales Down 35.5% in December, 18% for the Year,” Green Car Congress (January 5, 2009). <http://www.greencarcongress.com/2009/02/us-ldv-sales-fa.html>.

⁹“Fast & Loose,” China Environmental Law blog (April 21, 2009). <http://www.chinaenvironmentallaw.com/2009/04/21/fast-loose/>.

¹⁰Jing Fu, “Local Governments May Ignore Standards,” China Daily (April 27, 2009).

ability system that links government officials performance to energy saving and emissions control to their careers.¹¹

The Capacity Challenge

- *Compliance*—Compliance with environmental laws and regulations is a long-standing challenge in China. China's top environmental lawyer, Wang Canfa, estimates that only 10 percent of China's environmental regulations and laws are actually implemented. In 2006, for example, compliance with building energy efficiency standards was roughly 5 percent. A recent MIT study that surveyed 85 coal-fired powerplants discovered that although many plants installed state-of-the-art desulfurization control technology, they did not appear to be operating the equipment.¹² Moreover, when companies are penalized for failing to comply with environmental laws or regulations, the central government reports that it collects only 30 percent of the fees. As the United States considers how best to assist China in moving aggressively to combat climate change, building in effective monitoring and compliance incentives and constraints will be essential.
- *Weak Overall Monitoring Capacity*—Although China has administrative measures for pollution monitoring in place, the guidelines provide no specific rules for monitoring or sanctions for failing to do so. According to Renmin University Professor Song Guojian, there are no documents detailing how many times per year a factory must be monitored. As a result, there is no assurance that a Chinese facility will remain in compliance on a sustained basis. Factories might well use their pollution control equipment or monitor their emissions only when there are inspectors present.¹³
- *Underdeveloped Climate Modeling Capacity*—Despite over 15 years of experience in climate modeling in China, significant barriers to best modeling practices remain. According to one Chinese analyst, climate modeling is controlled by a few analysts who do not necessarily have the most expertise. The sensitivity of greenhouse gas emission-related issues also has undermined the integrity of some climate research projects. In October 2008, for example, the Chinese Academy of Sciences released a report projecting that China's national GHG emissions may more than double within the next two decades, but they failed to report the current level of emissions. There are also concerns that the global financial crisis will undermine funding for climate modeling in China from the West, which has been a significant source of support in the past.¹⁴

IV. HOW CAN THE UNITED STATES ACCELERATE THE POSITIVE TRENDS IN CHINA?

Critical to the success of the international community in meeting the challenge of global climate change is helping China forge a new developmental path. As one European analyst has noted, the United States and the rest of the world need China to do more than any other country in terms of deviating from business as usual.

This will not be cheap. McKinsey & Company estimates that to realize its abatement scenario for China (a 10-percent increase in carbon emissions in 2030 over 2005 levels) will require that China spend on average between US\$195–\$260 billion annually in incremental capital investment over the next 20 years. Of these investments, McKinsey estimates that one-third will have positive economic returns, one-third will have a slight-to-moderate economic cost, and one-third of the technologies will have a substantial economic cost associated with them.¹⁵

It will also not be easy. United States-China cooperation on climate change will not be a panacea for all the other difficulties in the relationship, no matter how much we would like it to be so. Climate change is already laden with very challenging political and economic dynamics both within China and between China and the United States. Moreover, unlike China's WTO accession, which raised many similar issues of sovereignty, verification, and compliance, intellectual property rights, and China's relative economic status, there is no one in China that has yet stepped up to seize global climate change as his/her issue and to shepherd it through the bureaucracy in the manner of former Chinese Premier Zhu Rongji.

¹¹Jing Fu, op. cit.

¹²Steinfeld, E.S., et al., "Greener Plants, Grayer Skies?" A report from the front lines of China's Energy Sector, Energy Policy (2009).

¹³"An Assessment of Environmental Regulation of the Steel Industry in China," Alliance for American Manufacturing (March 2009), p. 32–33.

¹⁴Jianjun Tu, "Future Prospects of China's Policy on Climate Change," China Brief, Vol. 9, Iss. 1, (January 12, 2009).

¹⁵McKinsey & Company, "China's Green Revolution" (February 2009), p. 10.

With that said, it is nonetheless imperative for the United States to step up to the plate. A number of organizations and experts have already weighed in with specific recommendations for high profile cooperative projects such as CCS joint research and development, smart grid technology and deployment, assisting in China's monitoring capacity, promoting building energy efficiency, etc.¹⁶ All of these are critically important avenues for cooperation.

Equally important, however, is thinking through the political context of how best the United States can affect China's climate change path.

- *Lead by Example*—Although China will find its own path to a low carbon economy, the United States has the opportunity to demonstrate how it can be done, whether through best urban planning practices, the rapid development and spread of energy efficient building codes and new building materials, the development of alternative fuel vehicles and/or the rapid deployment of renewable energy and smart grid technology. The United States will have no credibility in pushing China to forge a new path if we, ourselves, are not already well down that road. Moreover, we will lose a critical opportunity for our own environmental and economic future if we do not seize this moment to develop our own clean energy economy.
- *Help Transform China's Urbanization Process*—While most international attention has been focused on the role of heavy industry and the power generation sector in China's contribution to climate change, the urbanization of 400 million Chinese by 2030 will have a profound impact on China's energy use patterns. Energy efficient buildings (including new building materials) and appliances, electric cars, renewable, smart urban planning should be top priorities for United States-China collaboration. These partnerships, which may develop into ecocity or province/state partnerships should target first off China's national environmental model cities (about 10 percent of China's 660 cities) because the leaders and businesses in these cities have a proven track record of commitment to environmental protection in their cities. Similarly, companies that are members of China's Green Companies Program have begun to develop a track record of running their businesses in more efficient and environmentally sound ways. These should be the first candidates for joint projects.
- *Listen to the Chinese*—China knows what it needs and what it can deliver. Do the Chinese place a priority on assistance with their monitoring capacity for example? Understanding the priority issues for China will prevent the United States from squandering valuable financial and human capital trying to push against a closed door. For example, in a previous United States-China Strategic Economic Dialogue, the Chinese have stressed the importance of water scarcity, watershed management, etc. Helping China conserve and make more efficient use of its water is a critical aspect of climate adaptation, and will affect China's future agricultural opportunities as well as address growing concerns throughout South and Central Asia over China's river diversion efforts in the Qinghai Tibetan plateau as the glaciers in the region melt.
- *Buildup from the Strategic Economic Dialogue*—The United States should avoid the temptation to think it must create an entirely new structure for cooperation with the Chinese on energy and environment issues. The SED has outlined many important climate-related issues and initiated some collaborative public/private projects, such as a partnership on electric cars and grid management. Cooperating with China is difficult and time consuming. The United States should take advantage of the foundation that has already been established.
- *Conduct an Off-the-Record "lessons-learned and where-to-from-here" summit with U.S. NGOs and Businesses*—Many NGOs and multinationals have well over a decade of experience working with China on environmental and energy issues related to climate change. Their experience should be tapped to understand what works, what doesn't and why. They will also be the United States Government's emissaries for much of the climate partnership work that is eventually established with China.
- *Coordinate with Japan and the European Union*—Japan and the European Union already have extensive cooperation with China on climate issues either underway or in development. The United States should not waste its time and energy duplicating or undermining others' efforts. We should develop at least

¹⁶These include "Common Challenge, Collaborative Response: A Roadmap for US-China Cooperation on Energy and Climate Change," Asia Society and Pew Center on Global Climate Change (January 2009); "Overcoming Obstacles to U.S.-China Cooperation on Climate Change," Brookings Institution (January 2009); and "Strengthening US-China Climate Change and Energy Engagement: Recommendations for Leaders and Policymakers in the US and China," Natural Resources Defense Council (February 2009).

loosely coordinated strategy to help move China much more aggressively to a low carbon economy. This coordination should extend to developing frameworks of assistance for other large developing country emitters such as India and Brazil.

The CHAIRMAN. Thank you very much, Ms. Economy.
Mr. Chandler.

**STATEMENT OF WILLIAM CHANDLER, SENIOR ASSOCIATE AND
DIRECTOR OF THE ENERGY AND CLIMATE PROGRAM, CAR-
NEGIE ENDOWMENT FOR INTERNATIONAL PEACE, WASH-
INGTON, DC**

Mr. CHANDLER. Thank you, Mr. Chairman, Senator Lugar. I very much appreciate being included in this important session.

I'm happy to say I agree with everything you both said in your opening statements. And, Senator Kerry, I agree with you that, as your visit demonstrated last week, we have, now, a historic opportunity to make a climate deal with China that will make a big difference. If we succeed, we can protect the global environment. If we fail, we will suffer grave damage to our coastal cities, our energy, food, and water supplies, and the majesty of our parks and wildlands. If we succeed, we'll also create American jobs and American businesses.

Why do we have this historic opportunity now? Three important reasons: Newly energized leadership in the United States; and second, it's clear that China recognizes the importance, as you said, of responding to the threat of climate change; and, third, because of efforts on both sides to discuss the important elements of how we can cooperate, I think we are beginning to make some progress.

Over the past couple of years, American and Chinese experts, with the support of this committee, I'm happy to say—and I want to thank you for the staff time and the support the committee has provided to these Track II discussions—they have helped get past what Senator Lugar described as an important problem of the public presentation of China's position, versus what is said in private. So, in moving beyond the camera lights and trying to get out of the glare of the lights, we hoped we could arrive at a consensus on the kinds of things that would make a difference.

The Chinese delegation reciprocated our expressions of interest with enthusiasm and placed Minister Xie Zhenhua at the head of these discussions, and he, as China's chief global climate negotiator, made an important contribution.

The three areas on which we felt we came away with consensus, in which we should begin our cooperation, included the following things: First, rapid deployment of energy efficiency technologies to achieve quick wins in reducing greenhouse gas emissions. And in that area, building capacity—human capacity, particularly at the provincial level, as Liz said, is a top priority.

Second, joint research and development, both on low carbon automobiles, transportation, and coal-fired powerplants. A mechanism something like what we did in Russia at the end of the cold war with the Civilian Research and Development Foundation, where we have joint funding with both United States and Chinese support, might be a good mechanism to pursue those kinds of R&D approaches.

And third, collaboration—again, to the extent that we can, in frank and honest discussions—to reach a global deal in which both the United States and China can participate.

I think they—the Chinese side clearly wants to work with the United States in these areas. And if they do, we can implement scenarios such as those produced by the Energy Research Institute, which is the leading think tank in China, as a part of the National Development and Reform Commission, in which they suggest that what China can do—on a different schedule from ourselves, but on an important and compressed schedule—reducing growth in emissions over the next decade or so, to half the rate of growth of the economy, and then from that level, making an absolute reduction in emissions by the middle of the century. If we can get on such a trajectory, we have a serious chance of achieving an atmospheric concentration below 500 parts per million, which many of us think is really crucial.

Cooperation in science and technology is going to be vital for China, but it's not enough. China needs the benefit of our experience in using market mechanisms to achieve environmental goals. And we would urge this committee and the Chinese Government to consider the following policy changes that might make a big difference: No. 1, encouraging investment in more efficient industry and buildings; two, providing tax holidays and easing foreign exchange and foreign investment restrictions on clean energy companies and services; and three, making it easier for banks and the financial system in China to do risk-based lending for clean energy projects. These are things we sometimes take for granted, but they don't work very well, and they contribute to barriers that frustrate American clean energy companies trying to do business in China.

Our own top priority should be—again, in an asymmetric way, but an important thing to show to China that we are serious—is to enact cap-and-trade legislation to control our own greenhouse gases. And the draft legislation in the House of Representatives has already made a strong impression on China that we are serious.

As Ken and Liz both said, I agree we should recognize the strenuous efforts China has already made. It frustrates the Chinese to think that many people outside the country don't get how hard it has been for them to take serious efforts to close down, not just powerplants, but many old, inefficient industries. I go to China once a month, and I see it every time I go. There are many old factories closed down, and new standards imposed on the new modern systems.

So, we can ask China to take further action, not necessarily to cap their emissions in the short term, but to set ambitious emissions targets with verifiable and enforceable measures to achieve them.

The Chinese are practical. If we make it in their interest to work with us, they will do so. Just to reiterate, I think it's important that, first, we show leadership, and if we do, then the rhetoric of the G77 countries—that it's all our fault and all our responsibility—loses its power.

The Chinese Government accepts the science and threat of climate change, and I believe they will work with us.

Thank you.

[The prepared statement of Mr. Chandler follows:]

PREPARED STATEMENT OF WILLIAM CHANDLER, DIRECTOR, ENERGY AND CLIMATE, CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE, PRESIDENT, TRANSITION ENERGY, WASHINGTON, DC

The United States has a historic opportunity to forge a climate partnership with China as a result of the convergence of new climate leadership in the United States, China's recognition of the serious threat that climate change represents for its future, and the hard work of specialists and leaders in both countries to make climate change cooperation a reality.

Together, China and the United States produce 40 percent of global greenhouse gas emissions. Their actions to curb or expand energy consumption will determine whether efforts to stop climate change succeed or fail. If these two nations act to curb emissions, the rest of the world can more easily coalesce on a global plan. If either fails to act, mitigation or adaptation strategies adopted by the rest of the world will fall far short of averting disaster on large parts of the Earth.

These two nations, until recently, have been locked in what energy analyst Joe Rohm aptly called "a mutual suicide pact." Neither China nor the United States has made binding commitments to reduce emissions. American leaders point to emissions growth in China and demand that Chinese leaders take responsibility for climate change. Chinese leaders counter that American greenhouse gas emissions are five times their own on a per capita basis and say, "You created this problem, you do something about it." Mainstream Americans fear that China is gobbling up oil and driving up the price of gasoline. Chinese fear that the Americans control Middle East oil and shipping lanes to China.

United States-China cooperation on climate change can help both countries play a role in global change befitting global leaders. Leadership can stem from central governments, states, provinces, business, and scientific institutions. Effective leadership, however, requires understanding both Chinese and American energy realities, and grasping the need for immediate action to reduce carbon emissions. This approach will be intrinsically valuable to each country, and can help facilitate a post-Kyoto global climate treaty.

Failure to act will expose these two nations to sanctions from a global community increasingly alarmed by the speed of climate change. That the European Union recently considered sanctions on trading partners lacking greenhouse gas emissions policies spotlights the geoeconomic risk.

For the past 2 years, the Carnegie Endowment for International Peace has sponsored a United States-China Climate Track II Dialogue to provide leaders from each country the opportunity to speak frankly and discuss the types of collaboration likely to produce results. Over the course of this dialogue, it became clear that Chinese experts believe that China could cut its current emissions growth rate by half through 2020, and from that level reduce absolute emissions by one-third by 2050. This scenario would put within reach a global goal of stabilizing atmospheric concentration of carbon dioxide below 500 ppm. Such a commitment would represent a profound shift in China's position, and could be pivotal in reducing the worst risks of climate change.

Given China's new recognition of the threat posed by climate change and of the opportunities to avert that threat, participants in the dialogue identified two key outcomes for bilateral cooperation:

1. Consensus on realistic carbon emissions reduction targets and timetables for each country, and
2. Mutual understanding of the strategies for implementing those targets and timetables that are most likely to overcome political hurdles in China and the United States.

With these goals in mind, participants also identified three priorities for action:

1. Building human capacity to accelerate market deployment of technologies, including evaluating policies such as the creation of low carbon economic development zones and creating incentives for clean energy investments;
2. Assessing priorities for joint United States-China research and development cooperation, as well as considering a framework for cooperation; and
3. Discussing elements of a global climate deal in which both the United States and China may participate.

Dialogue participants also agreed that successful cooperation will require contributions from many types of United States and Chinese institutions. These include:

1. State and provincial leaders;
2. Nongovernmental environmental and business associations; and
3. Scientific and technical experts.

The Carnegie Endowment and the leading Chinese environmental nongovernmental organization, the Global Environmental Institute, are working together to support these objectives, which we hope are now becoming mainstream thinking in both countries. Our initial analyses have focused on developing a technology deployment protocol that will eliminate specific policies favoring energy consumption over energy efficiency; support the development of market-based tax and regulatory policies; and facilitate finance for energy efficiency. We are currently concentrating on Guangdong province, a major energy consumer and home to 110 million people, by providing organizational, planning, and financial expertise to train leaders in a learning-by-doing model.

Further, we aim to accelerate market-based deployment of cost-effective, proven energy-efficiency technologies. The central government in China requires provincial leaders to cut “energy intensity” by an average of 20 percent by 2010, relative to 2004. To achieve this goal, China would have to be more successful in energy efficiency policy than any nation in history.

Yet the priorities of local leaders often diverge sharply from those of national leaders. National leaders are more concerned with security, stability, macroeconomic balances, and equity than local leaders. Local leaders are far more concerned with growth, meeting demand for services, and generating revenues to pay the cost of operating their agencies. While clean energy development generates national benefits that cannot be fully captured by a city or province, the time and cost of promoting efficiency falls on local leaders. This mismatch of expectation and benefit is a fundamental flaw in Chinese sustainable energy policy, and undermines the effectiveness of otherwise admirable policies.

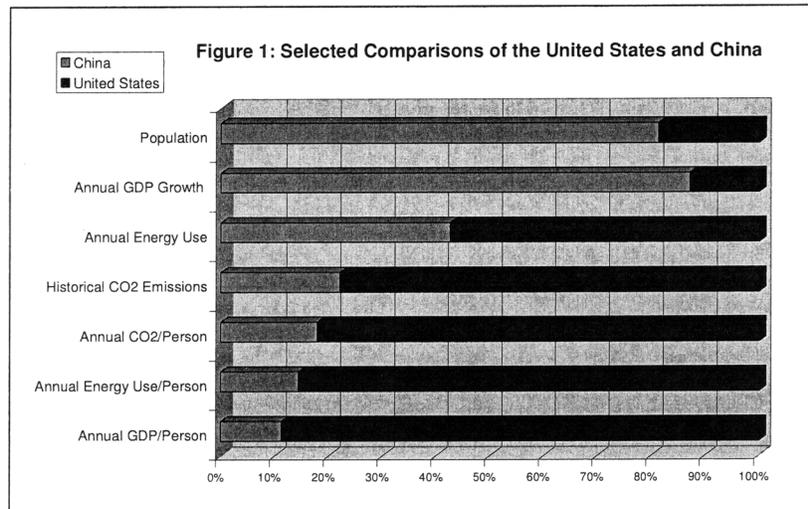
Local authorities have the responsibility, but not the authority, to implement energy efficiency policy. Moreover, responsibility for action is dissipated across agencies and bureaus. The local economic and trade bureaus and the local development and reform commissions jointly regulate energy-intensive industry. These agencies are often uncoordinated and implement conflicting policies. Approval authority for projects and regulations is split between the economic and trade bureau and the local development and reform commission. For example, the economic agency may seek to shut down old energy-intensive industry and replace it with more modern and efficient firms. The development and reform commissions, however, are intent on not giving business licenses to new energy-using firms.

The expertise provincial leaders need to acquire is a combination of specialized legal, economic, technical, and financial skills. These skills are used elsewhere—in American regions like the Northeast and Northwest or the State of California, for example—to choose priority technical measures and design behavioral incentives necessary to achieve energy efficiency goals. To further the goals of the dialogue, we are facilitating peer-to-peer cooperation at the state and provincial levels. We are encouraging cooperation on:

- Rationalizing and coordinating regulation of industrial energy use.
- Providing value added tax (VAT) and income tax holidays or exemptions for clean energy companies and services.
- Making it worthwhile for banks to do risk-based clean energy lending.
- Replicating the successful experience of the International Finance Corporation (IFC) in providing loan guarantees for energy-efficiency projects in China.
- Reducing the paperwork necessary to make clean energy investments in China.

Strikingly, given the urgency of climate action, resources are meager within both China and the United States for energy efficiency and power sector decarbonization. Technology deployment gets little support within either nation. Official funding for clean energy cooperation between the countries amounts to only about 1 million U.S. dollars per year. The private U.S. Energy Foundation provides 20 times more grant money than this, but even this level of funding is far below the need.

United States-China collaboration should not be envisaged as a threat to the climate leadership of any nation or to global cooperation. It should not challenge existing or planned emissions cap-and-trade systems. Rather, it would be, and should be, considered an act of mutual self-preservation, helping both the United States and China to avert climate disaster and the eventual sanctions of other countries if they do not act, and laying the basis for successful global action.



The CHAIRMAN. Thank you. Thank you, all three of you.

Let me try to establish, here, sort of a baseline, if you will. One of the things that I run into a lot—and it’s understandable—is people sort of viscerally react and say, “What do you mean China’s a developing country?” And they assert that notion because most people obviously don’t see the 800 million people who are living on \$2 a day or less, who are yet to come into the urban society. They see only the Beijing, Shanghai, Quanjiao, so forth, that are these unbelievably energized, teeming manufacturing centers, and they see “Made in China” on all the products coming in here, and there’s an automatic sense, “Well, they may not be fully developed, but they’re not like other developing countries, either.”

So, what do we do here? Create a different category, try to reach an understanding that, indeed, they’re not yet a fully developed industrialized country, but, on the other hand, nor are they the undeveloped country that we contemplated when we designated Annex 1 and Non-Annex 1 countries during the climate treaty negotiations in the Kyoto? It’s something new and different now, and they need to understand that. Is that fair?

Mr. CHANDLER. I think that’s fair. I think the thing that Chinese leaders wake up worrying about at night is instability in their own country, and that is generated, as much as anything, by disparities in income. So, providing China with a way to achieve its economic ambitions and to grow, while, at the same time, separately achieving emissions reduction goals through identifiable and enforceable measures, is going to be key. Different schedule, different approach of measures and policies, but enforceable ones.

The CHAIRMAN. Well, I understand that. But, the key is also for China. One of the things that I emphasize every time I get into that discussion—and we’ve done this for a long time now—is, this whole notion of tying them to a standard as an effort to try to restrain growth in China. And I think it is finally dawning on people that, no, we’re not out to restrain growth; we want China to grow.

We'll all be better off. China will grow. We want it to grow clean, just as we need to grow clean. I mean, what we're really talking about here is the transformation to a sustainable economy.

And so, when you talk about the building codes, Ms. Economy, buildings are roughly 40 percent of global greenhouse gas emissions. And so, in order to reduce greenhouse gas emissions, you don't just look at the transportation sector or the manufacturing sector, you have to look at buildings, also.

And the question is, How do you get them in this process, in these next days, to buy in more to this—to bending over backward to embrace the new components, new materials—new building materials, new building codes, new standards by which you can very dramatically reduce emissions, and, in fact, make it pay for itself? This is not out-of-pocket money; it pays for itself to do these things. How do we achieve that?

Mr. CHANDLER. Well, it's not very hard to convince them that it's in their best interest to make those changes. I do think they need assistance with capacity-building at the provincial level in writing the kinds of codes and incentive policies that the private-sector needs to put those technologies into place.

I think there's a disconnect between the provincial level and the central government—the central government makes orders and asks the provincial level to achieve the goals to meet those targets. Provincial leaders don't have the tools to achieve those goals, the ones that they need. They don't have authority over changing taxes. They can't implement standards on their own, organizing finance for the private sector to make investments. Working with the central government to help them close that gap with the provincial leaders, who are under the gun to make improvements, will help the provincial leaders achieve their own goals.

The CHAIRMAN. Yes, Mr. Lieberthal.

Mr. LIEBERTHAL. If I can add a couple of comments to that.

One, I think that it's obviously important to get the provincial leaders more positively engaged in this, but I think you have to keep in mind that China has five levels of governance: Center, province, city, county, and township. Each of those levels is important. And for purposes of building codes, I think the most critical level is actually the municipal level. There are over 650 municipalities in China, and a lot of the building takes place within that jurisdiction.

One of the biggest problems at municipal level is simply the lack of human capital to understand, for example, energy audits. China has 220 local energy centers around the country. They have almost no one at any of those centers who knows how to do an energy audit. That's a wonderful area for us to get engaged in and train some of the auditors in what we know about doing energy audits. It can have an enormous impact.

They have the codes—but sometimes the incentives are wrong. I very much agree with Bill on that. But, beyond that, they just simply lack the technical human capability at the critical nodes in their system. And that's where I think we can come in—in very positive and not very expensive fashion—to work with them to try to realize some of these gains and help them to acquire the tools to do so.

Finally, going back to your original question, I think it is very important for us to get out of this kind of categorization of treating the developing countries as a block. When it comes to carbon emissions, they are anything but, and we need to individualize that much more.

One of the proposals in China is to think in terms of the human development index and what percentage of the population in each of the major countries is at what level on the human development index, and therefore, how should you sculpt policy or sculpt obligations around this, country by country. I say that simply to say there is creative thinking going on regarding this, and we ought to try to join that and encourage it.

The CHAIRMAN. So, as the team goes over there to negotiate, next week—what would you want to see them achieve? What are the priorities that you'd lay out, in terms of that negotiating process?

Mr. LIEBERTHAL. Sir, I'd answer that on two levels. First, we have a kind of two-track negotiation going on with the Chinese. One is to develop a United States-China clean energy partnership. This would be a bilateral agreement. The other is to try to get more forward-looking stance at Copenhagen. And if we can do the clean energy partnership, I think that will add a lot of momentum going into Copenhagen. But, those are two different negotiating contexts. When you raise Copenhagen with the Chinese, the Foreign Ministry gets deeply engaged, and G77 and related considerations move to a prominent position on the agenda.

So, I would first of all encourage our team to keep those two tracks distinct, because I think we can make much more rapid and effective progress in the coming months if we focus on the clean energy partnership. And then, hopefully, when the President goes to China toward the end of this year, before Copenhagen, we'll be able to announce a clean energy partnership and have the two Presidents address Copenhagen in that context. I think that's simply the more effective negotiating track.

Second, on substance, I think the Chinese really are now looking for, "Let's do a partnership, but let's not just make it rhetoric. We've had about 42 bilateral energy agreements with the United States in the past. None of them has met the goals of the agreements." So, they're asking, "What will you concretely be interested in committing to?" And, to my mind, the three big areas—there are obviously more priorities that warrant attention, but the three big areas are coal—carbon capture and sequestration for coal power generation—electric vehicles, and energy efficiency in buildings. And I think if you can do something serious in each of those three areas, you are going to make a significant dent in the problem, and they are interested in all three.

Mr. CHANDLER. Mr. Chairman, can I jump in and underline what he just said?

In the past, in the 1990s, I sat across the table from Chinese—our counterparts—trying to implement many of these memorandums of understanding. Too often they end up just being talking, talking, talking. If you try to do too many different things without enough resources, then everyone gets frustrated. That's why I think it's important to focus on the things that really matter and take them seriously. Focus on those things that the United States

and China have to do together if we are going to solve those problems.

The CHAIRMAN. Well, a key to solving this, under any circumstance, and particularly to getting Copenhagen to come together, is going to be the MRV—measurable, reportable, verifiable. Ms. Economy, you've talked about the difficulty of getting some of the accountability that you need here, and the capacity for that. So, it would seem to me that one of the urgent needs here that ought to be discussed over the course of the next days is how we're going to work on that together so we don't wind up, in November or September, sitting there saying, "Well, gee, that sounds nice, but we're just not able to do it," or we're sitting there saying, "Thanks for saying that, but we have no way of measuring what you've just said you're going to do." We've got to now set up a structure to build the capacity and have confidence that we can come in with something that is truly measurable and verifiable. Now, how do we do that?

Ms. ECONOMY. As I mentioned, I think California is taking the lead, at least in looking at this issue, and I think they see this as a long-term process. I would imagine that the best you're going to be able to offer within 1 month or 2 or 3 months is going to be the framework of agreement for moving forward on MRV. Beijing has certain provinces in mind where they want to have test cases. These may not be the most progressive places, which means it's likely that we could be knocking our heads against a closed door rather than an open door. The situation changes from province to province and municipality to municipality.

One of the suggestions that I often make is that, when we look to cooperate with China—and I think this would be true with MRV, as well—is that we look to the national model environmental cities. These are cities where the local leadership is already committed to doing much more, frankly, than the vast majority of cities in the country in terms of meeting their own domestic environmental laws and regulations. About 10 percent of China's 660-odd cities meet these national model environmental targets. I would suggest that we go to those cities and begin with this process of MRV. I think these cities are where we'll have an open door—or a relatively more open door, because they're already more transparent, and they're already looking to turn the corner, in terms of their own environment. That would be my primary suggestion for how we would move forward.

The CHAIRMAN. Senator Lugar.

Senator LUGAR. Well, thank you, Mr. Chairman.

Mr. Chandler, you mentioned the 500-parts-per-million limit in which many scientists feel that, if the world comes to that with regard to CO₂, there are catastrophic results. Now, the question I ask this morning is one of how you, as thought leaders, and we, in the political realm, can try to bring some case to the American people of what the catastrophe is, or even how the catastrophe is progressing. The reason I say this is, that in the intelligentsia in the scientific community and the think tanks, there's a given, that we're progressing toward catastrophic results; therefore, as you inform us today, there's no doubt in your minds that action plans

are required, and they are very difficult. We're discussing a very large part of that problem of Chinese-American relations today.

But, now, very specifically, here in this country we have a debate going on; the cap-and-trade legislation that you've mentioned is now being discussed by the House of Representatives and its various committees. Some of you may have noted, as I did, an editorial in Monday's Washington Post by economist Martin Feldstein, who cited the Congressional Budget Office analysis that reducing U.S. carbon dioxide emissions by 15 percent would cost the typical American household \$1,600 a year, immediately and proceeding. And he asks—Americans should ask whether this tax of \$1,600-plus per family is justified by the very small resulting decline in global CO₂ since the CO₂ production, he says, is now less than 25 percent, and its projected decline—as China and other developing nations grow, a 15-percent decline in United States CO₂ would lower global CO₂ output by less than 4 percent. And the impact on global warming, therefore, he says, is unnoticeable.

Now, he reflects a skepticism, not just among certain economists, but I would say perhaps even a majority of my constituents. And they see the \$1,600 coming along, and they see us discussing, theoretically, how the United States and China and others might meet in Copenhagen. But, the case has not been made demonstrably by the American people as to what the problem is, why this is worth \$1,600 a year, or more, as the case may be, as we progress.

Now, just discuss broadly what kind of a public education situation is conceivable in this particular timeframe, or really, for that matter, for the next few years, so that there is, in fact, a general feeling in the country that action should be taken, and the debate then comes down to the specific measures of meeting something that is really seen to be, by a majority, a perceived need?

Does anybody have a thought—yes, Dr. Lieberthal.

Mr. LIEBERTHAL. Thank you for raising that question, Senator. We've discussed it before, and it is crucially important.

I think that, first of all, we have to communicate to the American public that they are already paying a high price for carbon emissions, whether it is the reality that California now has a fire season that extends 12 months a year, or the reality that we have lost hundreds of square miles of forests in the Northwest, or the reality of increasing storms and their damage in the gulf coast, or the reality of prolonged drought in the Southeast—you name it, we are already paying a high price.

The problem is that the price is not structured in a way that there's any incentive to reduce carbon emissions. And so, part of what we have to communicate to the American people is not this kind of broad, "polar bears are going to have a tougher time," and "100 years from now, we may be in trouble" type of message; it's got to be articulated, in part, in terms of current pocketbook issues, with some reasonable numbers attached.

Second, I believe very strongly that the President personally has to lead the charge on this and that the rhetoric is not going to resonate if it focuses on Copenhagen or on global obligations and that kind of thing. We have a President who has extraordinary communications capabilities. He's going to do even better than Al Gore did a few years ago in bringing home the reality of what we are con-

fronting, the risk to the next generation, and the cost to our current generation.

And third, in terms of our reductions only being a very small part of global reductions, the reality is that if America is going to have a leadership position in the world, it must recognize that this is one of the most important issues the world faces as we go forward. And if we don't lead here, we aren't going to lead very effectively anywhere else, either.

So, I think those themes have to be articulated in a vivid fashion, led by the President, backed up by the Cabinet, hopefully with support of articulate Members of this body, in order to get the message across to the American people and change the politics of the issue.

Senator LUGAR. Ms. Economy.

Ms. ECONOMY. I agree with everything that Ken just mentioned. There's a second part to that, which is the idea that climate change, in essence, is also an opportunity. I think that President Obama began very early on, even before he took office, to talk about green energy and a clean energy future for our country. This has to be an integral part of how we put forth a message on climate change to the American people. It is what will get them excited about moving forward on this issue. In addition to the "watch out" message, there should be an opportunity presented to the American people to move our country forward into the 21st century and to take a leading economic role so that, as Senator Kerry mentioned, we're not chasing the Chinese, 5 or 10 years from now, on electric cars and a vast array of other renewable and energy efficient technologies.

Senator LUGAR. Mr. Chandler.

Mr. CHANDLER. I want to thank you for giving me the opportunity to correct any impression that I may have given that 500 is OK, because I'm more and more coming to agree with Jim Hansen that 500 may be even too much.

Senator LUGAR. And where are we now?

Mr. CHANDLER. Oh, 380—I forget the latest number, but increasing a couple of ticks per year.

Senator LUGAR. And what do you think, then—reduce 500 to what?

Mr. CHANDLER. Well, I've always been an advocate for 450, but Jim Hansen tells me that's not ambitious enough. So—the point about 500 is, if you go beyond that, because of acidification of the oceans, you lose the barrier reefs, you lose the protein source for tens of millions of people, the exclusive protein source, a third of the world's fisheries. I mean, it's clearly a threshold. But even that may be too high.

As for the cost of responding, I simply don't believe those numbers, about the high costs. I don't believe them, for two reasons. One, I spent 30 years of my career doing energy and economic modeling for a national laboratory in which we estimated those costs, and none of the credible analyses I have seen suggest that the costs would be much more than a fraction of a percent of GDP.

But also on the personal level, I don't do very sophisticated things at my house; I don't have solar panels or even a solar water heater. But, I have simple things like a clock thermostat and a timer on my water heater. And—well, I do have LED lights now,

I'm proud to say. But, it's relatively easy to cut your emissions by 40 percent, relative to the American average, as we've done in our home.

The President is the person to make that case, both to dispel the doubt—any remaining doubt—that this is a potentially catastrophic issue, and that we don't have the means to deal with it. We do have the means.

Senator LUGAR. Let me shift quickly, in my time, to the International Energy Agency. It appears to me to be—and Secretary Clinton has discussed this in testimony—that Chinese membership in the IEA would be a constructive development, because the Chinese can come together with various others, in terms of both of the verification situation, as well as an understanding of international predicament. It's not a cure-all, but in our talk about cooperative diplomacy and movement ahead, the lack of Chinese membership in the IEA is conspicuous. Have any of you given any thought to the efficacy of its membership or its importance?

Yes?

Mr. LIEBERTHAL. I actually wrote about that roughly 3 years ago and encouraged United States leadership to try to get China invited to join the IEA and to accept the invitation. A major problem, as I understand it, is that because the IEA grew out of the OECD, it—

Senator LUGAR. Right.

Mr. LIEBERTHAL [continuing]. Has requirements for membership that China objectively does not meet. And certainly in the past, a big stumbling block has been some of the European members of the IEA who simply will not bend on those requirements. I understand that we have in the past few years diplomatically been encouraging the IEA to do something to get China in. China does in fact engage in some cooperation with the IEA, but it is not a full member with membership responsibilities.

My sense is, we may have to try to develop a special category of membership—perhaps something like a “partnership” that would effectively bring China fully in, but would not run into the qualifications issue. If we succeed in offering that, I think it will then take a lot of articulate diplomacy to get the Chinese to accept second-class membership, which is what that effectively would mean, and I don't know whether that would be successful or not.

So, I agree with you, the problem is real. I think the problem doesn't lie here; it lies in Europe. And we just have to try to work with that.

Senator LUGAR. Well, you raise an important point about our diplomacy with European friends, in addition to the Chinese. In other words, if we're all going to approach this as a worldwide effort, we somehow will have to get over the nit-picking that is involved here. And I use that word advisedly. But, at the same time, as you say, the Chinese may be reticent to join, anyway.

This is the whole problem of the diplomacy, and I think Secretary Clinton understands this. But, I was encouraged, at least, that she was at least prepared to begin to tackle it.

Yes?

Ms. ECONOMY. Can I raise one issue? I had a visit from a staff member from IEA last October. He suggested to me that they're

actually not that interested in having China join the IEA right now, because of issues of transparency, and that the——

Senator LUGAR. Yes.

Ms. ECONOMY [continuing]. Chinese are not ready to participate in that respect.

Senator LUGAR. Precisely.

Ms. ECONOMY. There needs to be some capacity-building done before the Chinese join, in any form.

Senator LUGAR. Yes. Well, we're back to transparency, which you've illustrated so well. But, clearly this is critically important. If we're talking about 380, 450, 500—at some point, I would hope, even in this country, we will have visible thermometers or some illustration so the American people have some idea, Where are we this year? We're at 390, heading to 391, or so forth. This takes for granted, by that point, a majority of us feel that it's important whether we're at 390 or not. But, let's say we establish that that really becomes a pretty critical element in all of our longevity, and that of our children and our grandchildren. Then this transparency becomes very acute to illustrate whether really 390 is the figure. How do we know, in this vast area of China, what, in fact, is going on, in terms of CO₂ emissions? But, in any event, I really appreciate your answers.

And I ask, Mr. Chairman, as a matter of privilege, that a letter that I've written to the administration asking for much greater exposition, be made a part of the record.

The CHAIRMAN. Absolutely. It will, indeed.

Senator LUGAR. Thank you.

[The letter referred to follows:]

APRIL 22, 2009.

Dr. JANE LUBCHENCO,
Administrator, National Oceanic and Atmospheric Administration,
Washington, DC.

DEAR DR. LUBCHENCO: I write today in support of your comments noting the need for the Administration to dramatically increase education efforts on climate change for the American public and for policymakers, as quoted in CQToday on April 21, 2009.

I am in complete agreement with your statement, "What everybody wants to know is, What does this mean to me and the decisions I'm making?" While many people claim that the scientific debate on climate change is settled, in fact for my constituents the question is not settled. Hoosiers want to be good stewards of the environment, but they also want to have jobs. Without solid information about how climate change will affect them and the economic opportunities entailed in meeting the climate and energy challenge, it is unlikely that the majority of Americans will choose to embrace higher energy bills during this time of economic uncertainty.

Passing and implementing far-reaching legislation requires that elected officials explain clearly to the American people why it matters in their daily lives. Americans need detailed information on state-by-state, district-by-district and county-by-county levels on what the impacts of climate change would be on them and what opportunities exist in a new energy economy. Such information should be based on the best science and economics available, and it will have maximum credibility if it is not biased toward a particular policy agenda.

I encourage you and your Administration colleagues with scientific and economic expertise to speed and augment delivery of such unbiased information to members of Congress and, more importantly, directly to the American people. I look forward to working with you.

Sincerely,

RICHARD G. LUGAR,
United States Senator.

The CHAIRMAN. Thank you, Senator Lugar.

If I could just comment, Senator Lugar, on the Feldstein numbers and the CBO analysis, the Feldstein number of \$1,600. What I hope, here, is, as we go forward in this debate, which is critical, that we're going to have a kind of baseline, if you will, of how we're judging some of the costs that people are throwing around, because there's a range. First of all, the Feldstein numbers from the CBO report do not factor in any energy efficiencies and they do not factor in any of the final rebates to consumers that are given in the Waxman-Markey legislation. So, it's not, in fact, a fair representation of an increase of costs.

The EPA has estimated, based on the actual Waxman-Markey bill, that, as it currently—and this was prior to even some additional changes being made which reduced the costs further—that you were looking at about \$98 to \$140, and that's before further changes were made that reduced the costs even more. It's interesting to note, you've got the EPA saying \$98 to \$140, you've got the Heritage Foundation, which says \$1,500 a year for average family, and you've got the Republican National Committee saying \$3,100 a year. So, we're going to have a range, here, that is obviously going to be based on interests that people are trying to express in the process.

What I want to do, and I think we all have a responsibility to do it, is to get a real economic model, here. It is clear, with the \$80 billion that we are investing in clean energy, alternative energy, renewable energy, et cetera, energy efficiency—as noted in the McKinsey & Company report that has created a carbon cost abatement curve which shows that about 35 percent of these reductions, for the first 10 to 15 years, pay for themselves. That's not reflected in these models. Nor are any of the household income benefits—i.e., let's say more families are switching, as they will, I'm confident, as Detroit goes through a transformation—a lot more families are going to be buying hybrids and getting better mileage in their car. None of these studies reflect how much household income they're going to be keeping as a consequence of paying less for fuel. So, while the per-unit kilowatt hour may go up to some small measure—and, as I've shown, I think it's a small measure, in the end—the actual out-of-pocket expenses of the household is going to be less because of the other efficiencies and gains that are going to come.

Now, we have to, obviously, show this as we go forward. But, there was an analysis of Indiana recently, which I will obviously get to you, that shows that, with whatever cost increase there will be, there'll still be a continued economic growth in Indiana, recognizing what the Waxman-Markey bill is doing and what we're going to try and do in the Senate, which is significant mitigation against coal costs, where I know you are dependent on Indiana.

And so, I think that there's about a billion dollars a year of dedicated funding just for clean coal technology over 10 years, and there's a wait period before that even cuts in. So, while the bill would be passed—I think there's about a 5-year period before it even becomes active that those reductions would have to take place. So, you get \$5 billion of clean coal technology effort before there's even a requirement that they comply.

Our hope is that, in the end, we're going to be able to show that this is going to have a really marginal—in fact, may even have, in the first 15, 20 years, very beneficial net gain to households because of the efficiencies and other gains we put in.

Would any of you like to comment specifically on that, or on any of that modeling?

[No response.]

The CHAIRMAN. I see a huge willingness to leap into the fray, here. [Laughter.]

Mr. CHANDLER. Well, again, that's what I used to do for a living. And I think if you take the net costs and the net benefits, and include all of those factors in a general equilibrium model that is sophisticated enough to include exactly those technologies, the answer you get is exactly the one you articulated. I agree with that—with your analysis completely.

The CHAIRMAN. Mr. Lieberthal.

Mr. LIEBERTHAL. The additional layer I would stress is that, as we move to the future, a lot of the competition in the global economy is going to be focused on innovation around cleaner energy and cleaner appliances, et cetera, and so there are job opportunities out there. It is hard objectively to factor in, you know such as, "What jobs will we not get because the next Microsoft is being developed in China, not in the United States?" But, if there's anything that's clear about the global future, it's that there is going to be an increasing premium on being able to be more energy efficient and more low carbon. And we're going to benefit from that if we're moving ahead, and we're going to miss that and be buying other folks' products if we aren't. So, if there's a way to get that into the model, my guess is, Senator, it would make your argument still stronger. And I very much agree with your basic points.

The CHAIRMAN. Mr. Chandler, when I visited a American-owned wind power company in China, they're now going to go after the provincial government rather than the central government because the central government did not seem willing to buy from the American companies, at least in the bidding that went out. It was only awarded to Chinese companies. Now, that's obviously one of those market-access, market-share issues that are going to be very important in this process. And I wonder if you could share with us any thoughts about how that might be addressed here in the next months.

Mr. CHANDLER. That's a subject close to my heart. In a different incarnation, I started a business developing clean energy projects in China. It's still going, it's still successful. But, getting a clean energy business started in China is very time consuming, very frustrating, very expensive. I think we spent \$½ million in legal fees before we even had the business plan in place. That's a function of having to get the business license, to get the approval for the foreign exchange, the foreign investment, to get all the provincial and municipal leaders to stamp and chop the documentation. And then, once you have all of those things, enforcing contracts, getting utilities to treat you fairly vis-a-vis the competition—these are issues on which the U.S. Government ought to, and could, help companies like ours, like that wind company.

I think that probably wouldn't take a lot of arm-twisting, but it does require paying some attention to those issues, understanding them and talking to the Chinese Government about them, and asking for their help. I, frankly, think that, at the very highest levels, many of the leaders in China simply don't get it, because, you know, they haven't been in those trenches. So, bringing those problems to the attention of the leadership would be a contribution.

The CHAIRMAN. I think, Ms. Economy, you specifically talked about—not "I think," I know you talked about the lack of the institutional technology capacity of the Chinese to do some of these things. A lot of people sort of don't understand that the Chinese are doing unbelievable buildings, they're building these railroads, et cetera, and they have great technical capacity. So, can you describe more what you mean by that? And in addition to the California example, can you try flesh out, a little more, how we might define those capacity-building tasks and go at it.

Ms. ECONOMY. Thank you. Let me first go back to what Bill said. I would take a slightly different tack, and I think it's going to take a lot of arm-twisting for that wind power company. China puts into place many requirements—for example, 70-percent local content for wind power producers in China. In China's most recent stimulus package, there was a big push to say that anything related to infrastructure development was going to have to be bought from Chinese companies. There is significant work that will need to be done on those market-access issues.

In terms of exactly what we could—

The CHAIRMAN. Well, is it a mistake to confuse a trade issue that belongs over here, and meanwhile we've got to get the capacity-building and do the other pieces that belong to the global climate change?

Ms. ECONOMY. Capacity-building is such a large and broad term. It's all going to be difficult. The easiest thing to do is to begin with the Chinese laws, as they're stated in regulations, and then look to the Chinese to enforce those, and then help them enforce those laws.

Above and beyond that, addressing what we perceive to be unfair Chinese laws and regulations is another step.

The CHAIRMAN. Well, do you believe that, come Copenhagen, we will have an ability to be able to measure sufficiently, and that they will be able to report, based on how we're measuring, and it'll be verifiable?

Ms. ECONOMY. No.

The CHAIRMAN. You don't.

Ms. ECONOMY. No.

The CHAIRMAN. You believe there's no capacity to do that.

Ms. ECONOMY. Not right this minute.

The CHAIRMAN. No, I mean by December.

Ms. ECONOMY. Well, no, not by December. For example, they have almost no capacity in rural areas to measure emissions. There's no inventory of greenhouse gas emissions.

The CHAIRMAN. I'm not talking about measuring them all across the country. What I'm talking about is measuring the reductions. If they come to Copenhagen and say, "We are going to reduce emissions, and we're going to reduce them in the following sectors and

try to achieve the following amounts,” while they’re not going to sign up to the same Annex-1 standard per the prior negotiations, there’s no way we’re going to get a legally binding agreement, through the U.S. Senate or elsewhere, if they’re not reducing their emissions. And we’re going to need to know that they are.

Ms. ECONOMY. What we would like to have is a baseline, which we don’t have for all the sectors across the Chinese Government. Even with the targets that Ken mentioned, in terms of Chinese energy intensity reduction targets and the top 1,000 company program, in the first year they didn’t meet their target, then in the second year they came closer, and in the third year they met it, and now they’re going to surpass the target.

The CHAIRMAN. Well, let me stop you for a minute. When you say we don’t have a baseline, we measured that China’s emissions went up by some 300,000 megatons last year, and that they are now surpassing us by X amount. And we are measuring their annual total emissions.

Ms. ECONOMY. Right. But that’s largely from inputs of their energy use. I don’t know whether that factors in emissions from methane in different kinds of soil and other variables. The kind of measurement that takes place in this country, for example, doesn’t take place there. In terms of the program that they initiated, the Lawrence Berkeley National Laboratory is currently trying to determine the reality of a verification of those energy intensity reduction targets. It will be interesting to see how well they do in their efforts, especially given the issues with Chinese data.

The CHAIRMAN. I have heard that, and I understand that, and I know that is an issue, which is why I’m trying to get at this now, because if we don’t get it adequately, I think you have a problem trying to persuade some colleagues here that they’re doing their share. You’re going to have to have the ability to be able to measure.

Mr. Chandler,

Mr. CHANDLER. There are two different categories of measurement. There are these aggregate measures, the energy intensity numbers, and then there are the specific measures of specific investments and specific projects. And in those cases, you have meters on the waste heat recovery power generators, you have meters on the wind turbines. You know how much they produce. You have to get approval for every RMB of investment, so you know how much investment is going in. You follow the tax data on how much coal is being consumed.

I personally think that this larger issue of additionality and measurement is an overrated issue. I think it’s relatively easy to follow specific actions and measure their success. And if we’re talking about enforceable and verifiable measures, I think you can follow those.

The CHAIRMAN. My judgment is that, based on what we’re aware they’re doing, and once we expand this cooperation, which is the purpose of these meetings, we should be able to. It’s going to take a team of people to be able to have access and to be able to share information, and we’re going to have to work at it. I’m not suggesting it’s like that. But, it’s doable. And we have to make sure it’s done. That’s what I’m trying to emphasize, here, just because

of the politics of this. I mean, how are you going to get this done? You're going to have to be able to have some standard in place.

Mr. Lieberthal.

Mr. LIEBERTHAL. I think the Chinese are providing the best numbers they have. And I think they'll continue to do that. So, I don't think that you're going to run into a problem—I hope I'm correct on this—I don't think you'll run into a problem of their making commitments at Copenhagen and then simply purposely lying to fake that they aren't meeting those commitments. But, there are severe institutional limitations. Some of these are technical—monitoring devices and that kind of thing; some are the way the political system operates, where reporting goes up the political hierarchy level by level. I mentioned the five levels earlier—the township reports to the county who reports to the city who reports to the province who reports to the center. There's a lot of room for distortion in this multilayered reporting system.

On balance, I think the trends tend to be correctly reported, but the absolute numbers grow out of a very imprecise system. There are ways we can be helpful. I think if we develop a clean energy partnership with China, that will give us much more access to this process, to the ability to work with them to improve these things. The national-level leaders in China want desperately to get better numbers. So, where we can help with database management systems and training and that kind of thing, I think we have partners there in that. Also, I think one of the big tasks at Copenhagen is to develop better objective measurements, globally. A lot of what goes on globally now, in CDM and other things, de facto enable participants to play with the numbers a lot, and that will apply to China, too.

The CHAIRMAN. It will apply across the board.

Mr. LIEBERTHAL. Yes.

The CHAIRMAN. We have to find a mechanism.

Senator Lugar.

Senator LUGAR. Just following through on this line of questioning, Mr. Chairman, it seems to me that Ms. Economy has brought forward a point of view which is important, that is, if you're trying to gauge whether you're going up or down, there has to be a baseline to begin with, and there isn't one here.

Now, I think your point, Mr. Lieberthal, is that, as we cooperate with the Chinese, we get a better idea of their measurements, a better idea of how they might even go about it. But, it still doesn't get to the rural China problem and the lack of measurement, or almost any indication of whatever may be happening with hundreds of millions of people in the country. This is why I think we have to be careful in our statements, as public officials, to give an impression that somehow we've quantified this down to any particular degree. We're sort of generally in the ballpark.

But, to get back to Mr. Chandler's point, whether we're in the ballpark or not, we believe that there are worldwide indications, in this parts-per-million business, that we are still adding, year by year, and getting closer to what I hope will be a more comprehensive debate among scientists—and the public—so we understand why that is important, whether it's 450 or 500 or so forth.

I think if the American public really did understand even indications you've given, that California has 12 months of fire these days or that parts of our country already are experiencing severe agricultural difficulties—perhaps these were not the most productive sections, but, nevertheless, we can see sort of a creeping. Facts of this sort are not well understood; not very well publicized with regard to this situation. So, I appreciate the debate or discussion we're having.

At the risk of blatant self-advertisement, let me just say that the Lugar Center for Renewable Energy at Indiana University Purdue University in Indianapolis—I have no vested interest in it, I do not manage the center, but, it was named for me a while back because of my enthusiasm for the subject—and they're going to cooperate with Sun Yat-Sen University in China, host a forum for energy and environmental leaders, really for the purpose of trying to bring some understanding to Midwestern States that will be participating in this. And Midwestern States have coal. And Midwestern States have a number of situations that are critical to this debate, whether we're doing a domestically—so, this forum will occur in October, not too far from now, and before Copenhagen, or in the midst of it.

And I mention, also, something outside of that. An NGO known as CHASP has been effectively working with Chinese officials to implement efficiency energy standards similar to our Energy STAR Program. This is still just another movement among many, but one which I endorse, because it does get down to such things are refrigerators, air-conditioners, televisions, ways in which NGOs who are subscribing to this can be helpful with Chinese residential occupants in reducing whatever they're doing over there.

I would just simply ask, as we've discussed this subject back and forth today, whether we've got accurate measurements or a perception of how bad the situation is. Can you help us quantify this in the future? We've talked about things occurring in climate change already in our country, and I don't stress that just simply in a nationalistic way, or that climate change is unimportant to Africa. But, in terms of our foreign policy, we do reach out to other countries. We've had very good discussions—and Senator Casey, who was here earlier on today, has been partner in a bipartisan bill to try to reorganize our food programs, both from the standpoint of emergencies, but, likewise, in terms of productive agriculture, especially in Africa and Southeast Asia, where about 800 million people are perpetually hungry, and will remain that way, without very substantial advances in their production, quite apart from any emergency food aid we can do.

Now, even while we're going about this, we're having this debate in another forum in which several of these countries are affected, at least many of the articles about Africa, for example—so that this is a pretty grim situation, even with, the one hand, if we're going to constructively try to help the Green Revolution occur in Africa, which never occurred, for a variety of reasons, including lack of productive agriculture. Single women trying to farm less than an acre, with not very good seed and no fertilizer, and often very little prospects, and having to cart whatever they do 2 kilometers to get

to the next road. These are the realities in the world that is facing climate change.

So, I ask you, as we proceed, we can understand this better, in terms of American agriculture, and therefore, transpose it, if we know really what to expect. For instance, to be very parochial again, in my home State of Indiana, a big agricultural State—soybeans, corn—on my own farm; I'm interested in how climate change is going to affect that in this generation or the next. Now, some have said "not very much." Conceivably even the growing season may be longer. On the other hand, you may have torrential rains that wash out the whole crop so that, growing season or not, you've got a problem.

I just want to try to reduce this to something that is manageable, in the understanding of all of us, as to why this is important.

There are charts, graphs, data that indicate how agriculture in America, for example, might be affected, how the growing seasons, or even the probability of crops, whether it be in the Midwest or the South or the West or New England or so forth, will be affected? Do you—are you aware of literature or a good book that we could all read or—help us out, if you can.

Ms. ECONOMY. I'm a China expert, but I will say that beginning as early as the early 1990s, at least, there were climate modelers based at Princeton and other places that were doing precisely this kind of work and trying to sketch out, within the United States, by region, how agriculture would be affected, not only from droughts and floods, but also from increased pestilence, for example. I am sure that there is literature out there, and I am happy to go and try to find it for you. I know the Chinese have done this kind of work, so there's no doubt in my mind that we have, as well.

Senator LUGAR. Yes, sir.

Mr. CHANDLER. I should add that in the modeling that I've seen done for the Intergovernmental Panel on Climate Change, and that we did in the Pacific Northwest National Lab when I was there, moisture distribution, which is so crucial to agriculture, is notoriously difficult to model and to forecast. And so the uncertainty of the impacts, region by region, is very high, which in some ways makes the situation even worse, because if you knew that you were going to dry out or if you know you were going to have torrential rains on a regular basis, then you could adapt. But the uncertainty in the models, the large scale of the grids, makes it very difficult to deal with and increases the risk.

Senator LUGAR. Well, that's important for us to know, too, as people plan how to use their land over the course of time or what to anticipate in the next generation, for example, in probabilities.

Let me just—and I appreciate, as you say, Ms. Economy, you're an expert on China—this is related to China only so far as—before we get very far with China we're going to have to resolve some of these problems in the United States, at least in terms of our own understanding and our advocacy, or we will have diplomats out there in Copenhagen, or wherever they may be, who are doing the best they can, but back home it's not really certain what the political atmosphere is, backing whatever they are saying. And this is why the credibility of all of our activities at the grassroots is very important.

Let me just add one more factor. Once again, a blatant self-advertisement. My staff have very skillfully calculated how much money I'm saving each year by driving a Prius car. Now, many Senators drive Prius cars, so this is not a unique experience coming into the Hart lot every day, but they've calculated, at 49 miles to the gallon over the course of 4 years of time, a figure, which we have shared with our constituents. Now, this doesn't mean everybody has rushed out to buy a Prius or another hybrid car or something of that variety. In other words, demonstrably there are savings in this. Hopefully there will be in other things we do, different kinds of light bulbs we're putting in and all sorts of renovations of buildings.

But, let me just ask, at what point, even if there are savings involved for households, lifestyles in the United States or in China take over, really, in people's decisionmaking—at what point is the economic thing important? At what point is fear of what is going to happen, in terms of world catastrophe, more important? In other words, what are the motivating factors that, in our democracy, we will have to contend with? Even in China, as you say, stability is the key factor. How much political pain can occur in the countryside or somewhere else before the government says, "Although we had the most noble ambitions here, Communist Party retentions comes first—stability—as opposed to what we're doing"?

Yes, sir.

Mr. LIEBERTHAL. I'd like to make a comment about the United States side and a comment about the Chinese side, although, like Liz, I am a China specialist and a United States citizen. I frankly think that on the United States side, there is enormous capacity—and I mean this very seriously—I think there is enormous capacity to motivate people positively to do the right thing without depending primarily on fear and on comments about lifestyle. Americans like to be good people. I think, if this is framed correctly, therefore, there is a lot of positive motivation that can be generated. And then, if it's backed up with things like smart metering in homes so that people can see, every day, whether they're doing the right thing or not, I think that that is a combination that could produce at least some of the results we're seeking.

In China, the reality, I think, is that leaders increasingly see climate change itself as a threat to stability. Let me just give you an example of that. Currently just a little under 50 percent of China's GDP is produced in three coastal areas—the Pearl River Delta, the Yangtze River Delta, and along the Gulf of Bohai. Two of those are extraordinarily vulnerable to sea-level rise. The Yangtze River Delta—Shanghai and the surrounding areas—is about 1 inch above sea level. The Chinese have modeled out how much flooding will occur with each degree of rise in sea levels, and it is almost mind-boggling when you look at the results, especially in the Yangtze area.

Melting glaciers in the Hindu Kush affect the major rivers that run all across China. This is fundamental to the Chinese water system. And no one quite knows what the actual consequences will be, but they are very worried about them. And they see these as potentially producing large-scale displacement that can be catastrophic for the country.

So, I think actually the leaders don't view the issue as stability versus climate change—that is in terms of, “Should we focus on stability or focus on climate change?”—they have their ways of trying to assure stability, but they see climate change as something that they've got to adapt to and mitigate or there will be no way to maintain stability over the long run. I think that argument is one that they accept very readily.

Senator LUGAR. Thank you, sir.

The CHAIRMAN. Thank you. That was an important point, and we appreciate it.

Senator Cardin.

Senator CARDIN. Thank you, Mr. Chairman.

I thank our witnesses for being here today. I'm working with the chairman in an effort to try to advance climate change legislation in this Congress.

I think that we need to move forward on this, even if we are the only country in the world to do so, because I think it would be good for our Nation, it would create clean jobs here in America, keep the technology here, and it's important for our economy.

But, I want to go into an area that I hear frequently in the State of Maryland, a State that had a proud tradition in textiles, a State that used to be more heavily involved in manufacturing than it is today, in which many of my constituents say, “Well, if the United States enacts strict standards on carbon emissions, all it's going to do is make it easier for China to have a larger penetration into the United States market because they won't impose the same strict standards, and then you're putting United States manufacturers and producers at a disadvantage in regards to international competition.”

Now, this issue was recognized last year in the Lieberman-Warner bill that made its way through the Environment and Public Works Committee. In that bill, there was a provision that would have triggered some form of an import tariff against countries that exported products into United States that didn't meet the U.S. standards on carbon reductions, to try to provide a level playing field for products entering America from countries that were not dealing with the global climate change issue.

Now, that trigger was sufficiently far down the road so that many of us thought it would not generate a lot of interest, as far as the challenges within the WTO or public relations issues with countries that we deal with.

I want to get your views as people who understand more than I do what's happening in China. There are two ways we could go on this issue, and perhaps three. One is to do nothing. The other is to try to impose some type of a unilateral tariff to reflect what we believe should be the international commitment, perhaps using standards adopted later this year in Copenhagen. The third would be to try to negotiate within the World Trade Organization some recognition of the fact that it is legitimate for countries that have an interest in advancing global climate change to establish this type of regime.

So, I guess my question to you is, How would this go over in China? Now, our relationship with China is somewhat mixed. Trade issues have been subject to a great deal of debate over time.

China, of course, has the largest surplus, with the United States, of any country. We certainly are concerned about this balance of payment. There are legitimate concerns that we don't want to enact legislation here that would exacerbate the trade imbalance we already have with China.

Mr. LIEBERTHAL. First of all, Senator, I understand the sentiment behind the legislative proposal. The Chinese are very worried that American environmental efforts will be used to establish protectionist walls around the American market. You hear that sentiment all the time in China. The current global economic stress has heightened that worry.

But, second, there's a more fundamental issue at stake. Senator Kerry raised this earlier. It is the question of whether the United States is seen as using concern about the environment to try to slow down China's economic growth because we're worried about China as a global rival. The chairman indicated that has been a major concern in China; now that is fading somewhat. I think, at the central leadership level, it is fading considerably, but at a popular level, it is still a very, very widespread concern.

If we do establish barriers at the border as part of our cap-and-trade legislation, I think that will be seen by many in China as kind of confirming their view that this is really aimed at China, not, as it's seen up here on the Hill, as being focused on economic competitiveness. Rather, many Chinese will see this as a strategic move to try to keep China from realizing its own rightful potential.

My own sense is that if China were to do nothing or do very little to control its own carbon emissions, then I agree that we really need to worry about the future impact on competitiveness. But, if China is making a maximum effort that is verifiable, then I think that we ought to back off a little bit. I think we need to be more sensitive to the reality that we have more money, we have higher tech industry, we are somewhat late to the climate game, and we are not fully trusted out there on this issue.

Senator CARDIN. I would just point out that Americans would believe that we are already helping China with money, since we have such an imbalance with them, so they clearly have a cash surplus with the United States.

Mr. LIEBERTHAL. That's absolutely true. Behind those trade statistics—

Senator CARDIN. Some would also argue that China has arbitrarily kept its currency low, holding down the wealth of its country, at the cost of the United States, so that we really are contributing to China's development. So, aren't we already contributing to what they—what we think should have been used to deal with reducing its carbon emissions?

Mr. LIEBERTHAL. Well, there are three points in my response to that, sir.

First, is China's exchange rate below what a market would have dictated? I agree with you that the answer is, "yes."

Second, is the trade imbalance with China something that we should take extremely seriously as a bilateral issue? I think the answer to that is, "not quite." Our trade deficit with Asia overall as a percentage of our global trade deficit has actually gone down virtually every year since the early 1980s. But our trade deficit

with China, within Asia, has gone up. That is because the other countries of Asia that formerly ran huge trade surpluses with us—Japan, South Korea, Taiwan, Hong Kong, Singapore—have all shifted substantial final assembly to China. As a consequence, two-thirds to three-quarters of the value of the average Chinese export to the United States consists of Chinese imports from elsewhere in Asia that are bolted together in China, packaged, and sent to the United States. Our trade calculations attribute all that value to China, but this misses the underlying reality. So—

Senator CARDIN. I understand what you're saying, but still, the trade imbalance of the United States, internationally, is troublesome.

Mr. LIEBERTHAL. Absolutely.

Senator CARDIN. And China's the major player in that.

Mr. LIEBERTHAL. Well, actually, China is now part of a regionally integrated Asian manufacturing system. I don't want to split hairs, here, sir, but our trade deficit with that Asian regionally integrated manufacturing system has actually gone down, as a percentage of our global trade deficit, steadily for 20 years now. So, I think pointing to the China component of that and saying, "Well, that's explaining our problem," doesn't fully identify the problem. Our problems are more that we don't have enough domestic personal savings, and there are a lot of systemic issues involved.

The China figure is very attractive to point to, because it's so dramatic. But, it really masks the real supply chains and flows of goods that describe what's actually taking place out there.

Senator CARDIN. But, you did say that if China does not take respectful action in regards to carbon emissions, then it may be appropriate for the United States to take some action. What action?

Mr. LIEBERTHAL. I believe it is actually already doing quite a bit, and I think it is prepared to do quite a bit more. If the United States and China cannot begin to cooperate on a serious level to address carbon emissions to produce some real results that are verifiable, that are not just rhetorical, I would agree with you that the political case for some kind of trade action, especially in the future, so that it incentivizes the Chinese, would be hard to resist. I personally wouldn't favor it, but I can certainly understand the political case for it. But I do believe that there is now an opportunity to engage the Chinese very substantially. And I would add that the Chinese are already, at a national level, doing more than most Americans realize in concrete programs to reduce their carbon emissions to below what they would have been without those efforts.

Senator CARDIN. Our chairman reminds us of that frequently here, sir.

Mr. LIEBERTHAL. Well—

Ms. ECONOMY. Could I just add one thing to that?

Senator CARDIN. Absolutely.

Ms. ECONOMY. I think there are real issues in our trade relationship with China. We should address them, whether it's intellectual property rights, market access, or the currency issue, as you suggest.

My fear is that establishing some kind of carbon tariff on goods coming from China is going to provoke a whole round of similar

issues and tariffs and other kinds of penalty measures, not just between the United States and China, but it could happen around the world. That would be very counterproductive to what we're trying to do with this global climate change regime.

When you look at the history of international environmental treaties, some of them have sanctioning mechanisms. The Montreal Protocol on ozone-depleting substances has a sanctioning mechanism in it, for example. My feeling is that if we want to try to develop a sanctioning mechanism within the framework of Copenhagen, then that's where we should do it, but not as a bilateral punitive measure against one country. It will have all sorts of far-reaching negative ramifications for the United States-China relationship, as well.

Senator CARDIN. But, if China does not become party to that, then, of course, the mechanisms would not have any impact.

Ms. ECONOMY. When we weren't party to Kyoto, the Europeans were talking about what they might do to us.

Senator CARDIN. They might. But, then they had the WTO to fall back on. Unless you have some other agreement—it seems if they're not party to it, enforcement would be very difficult. Even within the WTO, America's record hasn't been great on enforcement issues.

Ms. ECONOMY. That's true, we haven't been great on enforcement. But you can certainly find ways to penalize countries that are not part of the agreement.

Senator CARDIN. I'm not sure.

Thank you.

The CHAIRMAN. Well, the key is obviously to have a framework where they're part of the agreement. And that's what we're all aiming for. That's the effort, here. And hopefully we'll get there.

I believe that that is going to be possible, albeit, as we have all articulated, with the differing responsibilities that we accept, at least in the first years, there has to be a melding, here, and that's one of the things that I tried to make as clear as I could within my portfolio to the Chinese, that, you know, whatever happens there, we're going to get together every year, we're going to be reviewing it, and we're all going to have to be ready to react to the scientific realities as they continue to come in. And I think that the issue of how many years, is going to be up to the negotiators and the administration, and their relationship with China. But, clearly that's going to be part of this.

Are there any other issues to come before us?

Senator Lugar.

If not, this has really been helpful and informative, and I hope we can continue to call on you as we go forward in the next months. And I thank you very, very much for being here today. Thank you.

We stand adjourned. Thank you.

[Whereupon, at 11:55 a.m., the hearing was adjourned.]

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

PREPARED STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM CALIFORNIA

Thank you for convening this hearing today, Mr. Chairman, and thank you for your ongoing leadership on the issue of global warming.

The world is looking for American leadership on this issue, and they are watching closely what we are doing here in the Congress.

When it comes to China and global warming, we have several important challenges. China has likely become the world's largest emitter of carbon pollution. If we want to influence China's participation in an international agreement on climate change, we must demonstrate America's commitment to take real action to cut our own greenhouse gas emissions. When we act, we will renew our leadership—and our leverage—on this issue in the international community.

We must also seize the economic opportunities in clean energy. Legislation to curb U.S. global warming pollution will put us on a path toward a new clean energy economy that creates millions of American jobs and breaks our dangerous dependence on foreign oil. America has led nearly every technological breakthrough in recent years—there is no reason why we should not lead the clean energy revolution. But China is not waiting for us to act.

China is reportedly making enormous investments in renewable energy, energy efficiency, and less-polluting vehicles and transit, and has indicated a goal of 40 percent renewable energy by 2050. In addition, the New York Times (May 11, 2009) reported that China's latest coal-fired powerplants are both more efficient and less expensive than their U.S. counterparts.

Thomas Friedman put it concisely in his most recent book, "Hot, Flat and Crowded": ". . . the ability to develop clean power and energy efficient technologies is going to become the defining measure of a country's economic standing, environmental health, energy security, and national security over the next 50 years."

Again, thank you for holding this important hearing today.

RESPONSES OF WILLIAM CHANDLER TO QUESTIONS SUBMITTED BY SENATOR BARBARA BOXER

Question. Please describe the actions that China is now taking to reduce its greenhouse gas emissions.

Answer. China's energy efficiency effort—including shutting down many inefficient factories and powerplants—is without precedent in the world. China's 5-year plan for 2006–2010 contained a number of significant energy efficiency goals and programs, including the ambitious target of reducing energy intensity (the amount of energy consumed per unit of GDP) by 20 percent by 2010, compared to 2005 levels. The plan focuses on increasing efficiency in the industrial and power generation sectors, with a combination of incentives and regulations that will save the equivalent of hundreds of millions of tons of coal every year.

Furthermore, China aims to increase its share of clean energy by expanding its nuclear capacity, hastening coal-bed gas development, and boosting renewable energy capacity to supply 10 percent of all primary energy as early as 2010. Thanks in part to a set of economic policies that prioritize renewable energy, China already ranks fifth in the world in installed wind power capacity—installed wind capacity has more than doubled each year for the past several years—and it is the world leader by far in installed solar thermal capacity. The government also aims to control methane emissions with improved agricultural methods and plans to increase forest coverage 20 percent by 2010, compared to 2005 levels.

The Chinese Government is investing monumental sums of money in energy efficiency and other green technologies. The stimulus package released in late 2008 included \$31 billion for energy conservation, emissions reduction, and ecosystem reconstruction projects, plus over \$200 billion for infrastructure such as dams, high-speed railways and electric grid improvements that will ultimately reduce emissions. The government is also in the process of drafting another stimulus package focusing specifically on renewable and low-emission energy sources, although the official amount of this investment has not yet been announced.

Question. Please describe ways that China and the United States can work together to reduce greenhouse gas emissions.

Answer. Key areas for cooperation include:

- Building human capacity to accelerate market deployment of technologies, including evaluating policies such as the creation of low-carbon economic develop-

- ment zones and creating incentives for clean energy investments—especially energy efficiency technologies that can obtain “quick wins.”
- Facilitating joint United States-China research and development cooperation; for example, on low-carbon cars, coal-fired powerplants, and carbon sequestration technology. As part of this effort, we should foster closer links between American laboratories and Chinese markets, and vice versa. We will need to develop models that ensure equitable cost-sharing, fair access to the use of intellectual property, and protection of intellectual property.
 - e.g. Establish a jointly funded civilian research and development foundation for clean energy technology, where the United States and China would share both the costs and the associated intellectual property rights.
 - Lending our expertise to help China develop market-based tax and regulatory policies and market-based energy pricing, to remove perverse incentives and encourage energy conservation.
 - Facilitating finance for clean energy and energy efficiency technologies within China (details provided in written statement submitted for the record).
 - Establishing state-to-province and private sector partnerships to accelerate market deployment of low-carbon technologies; and expanding existing programs.
 - Under this type of partnership, Chinese provinces could become observers of United States state and regional cap-and-trade programs. Ultimately, this model might even provide the basis for broader United States-China cooperation on emissions trading.
 - Working with China to jointly propose more effective, streamlined CDM regulations for the next global treaty.
 - Making climate cooperation integral to trade policy, and establishing agreements to prevent either country from taking advantage of the other.
 - e.g. Both countries could agree that after 2015 they would export only appliances, cars, and equipment with efficiency levels higher than the world average today, they could jointly set production standards to limit the energy used in manufacturing exports, and they could both agree to provide tax breaks for investment and impose tax penalties on high-carbon energy.

Question. There is universal agreement that China must curb its emissions if the world is to avoid unchecked climate change. Some argue that the United States should not reduce its emissions until China does so. Do you agree with this argument? Would a “wait for China” approach help persuade China to take on international climate change commitments?

Answer. While it is true that China must curb its emissions, it is equally true that the United States must curb its emissions if the world is to avoid the worst effects of climate change. If either country fails to act, the mitigation strategies adopted by the rest of the world will fall far short of averting disaster for large parts of the earth. United States refusal to act will absolutely not persuade China to agree to international commitments; rather, it will continue to give China an excuse to point fingers while they wait for us to take the lead. If we lead, on the other hand, then the rhetoric of the developing countries loses its power.

Question. Given the serious threat that global warming represents to our country, and the dynamics of international climate negotiations, would you agree that the United States must act regardless of the level of commitment from China?

Answer. Yes, the United States must enact strong climate policy that can stand on its own two feet and is not held hostage to other countries’ actions. Bold action on our part is essential not only because it is our moral responsibility and an environmental necessity, but also because of the effect it will have on China. Draft legislation in the House of Representatives has already made a strong impression on the Chinese, indicating to them that we are serious about climate change. Strong leadership on our part will encourage China to follow. United States-China cooperation, in turn, is our best hope for achieving a successful outcome at Copenhagen.

RESPONSES OF KEN LIEBERTHAL TO QUESTIONS SUBMITTED BY SENATOR BARBARA BOXER

Question. Please describe the actions that China is now taking to reduce its greenhouse gas emissions.

Answer. China is taking many measures, including increasing mileage standards and providing government incentives to purchase smaller cars, developing an elec-

trified rail system in central and western China, shutting down small and inefficient coal-fired powerplants, creating a few model “ecocities” in order to gain experience in low carbon urban development, upgrading building codes (China constructs about 50 percent of world’s new floor space each year), and so forth. The most significant national level policies, each of which is backed by substantial levels of funding, include:

- Seeking a 20-percent reduction in energy intensity for all GDP during the 11th five-year plan, which covers 2006–2010.¹ According to Chinese authorities, total carbon emissions would decline by roughly a billion tons of CO₂ over the course of the plan as against a “business as usual” (BAU) model, if this target were fully met. At present, progress toward the target is behind schedule, but the gap between targets and performance is closing.
- Adopting the target of having renewable fuels account for 10 percent of China’s total energy consumption by 2010 and 15 percent by 2020.² As part of this:
 - Establishing major programs to improve technology in solar and wind power. China has rapidly become the world’s leading producer of solar panels, although solar power’s installed generating capacity is to increase to only 300,000 kW in 2010. For wind power, tax breaks, and other forms of government support are already in place as of 2008. The installed generating capacity of wind power is to increase from 1.26 million kW in 2005 to 10 million kW in the year 2010.³
 - Enhancing China’s hydropower generation (despite the fact that the country already has the greatest concentration of hydropower facilities in the world). The installed hydropower generating capacity is to increase from 117 million kW in 2005 to 190 million kW in 2010⁴ and will provide 6.8 percent⁵ of the country’s anticipated energy consumption in the latter year.
- Taking serious measures to reduce the emissions from highly polluting power-generation facilities. Coal remains king in China, and about 70 percent of power still comes from coal-fired plants. Over the past 5 years China has built the equivalent of America’s entire coal power generation system. These plants will stay on line for another 30–50 years while 60 percent of U.S. coal-fired powerplants will be over 50 years old by 2025. The technologies involved in generating power in these new plants are thus very important. Fortunately, China is building many of these plants to be relatively clean⁶ and is investing in development and deployment of clean coal technologies.⁷
- Aggressively expanding nuclear power capabilities, with a target of building 9 new generators in the next 2 years and at least 30 over the coming decade. Nuclear is slated to provide 5 percent of China’s total installed power-gener-

¹“The Energy Development Plan for the 11th Five-Year Period,” the National Development and Reform Council (NDRC), Government of the People’s Republic of China, April 2007. Available at: <http://www.ccchina.gov.cn/WebSite/CCChina/UpFile/File186.pdf>.

²“The Medium and Long-Term Development Plan for Renewable Energy,” the National Development and Reform Council (NDRC), Government of the Peoples’ Republic of China, August 2007. Available at: <http://www.ccchina.gov.cn/WebSite/CCChina/UpFile/2007/20079583745145.pdf>. China passed a renewable energy law in 2006. In 2007 renewables accounted for 8.5 percent of China’s energy production.

³“The Renewable Energy Development Plan for the 11th Five-Year Period,” NDRC, PRC, March 2008. Available at: www.ccchina.gov.cn/WebSite/CCChina/UpFile/File186.pdf.

⁴“The Renewable Energy Development Plan for the 11th Five-Year Period,” *ibid*.

⁵“The Energy Development Plan for the 11th Five-Year Period.”

⁶Government regulations now require that: New plants be synchronously equipped with flue gas desulfurization (FGD) technology before 2010; existing plants begin to be retrofitted with FGD technology before 2010; all plants meet SO₂ requirements before 2015; and new plants set aside space for future flue gas denitrification equipment installations. New power-generation units are equipped with low-NO_x burners, and many existing units have been retrofitted with this technology: Zhao, Lifeng and Gallagher, Kelly Sims, “Research, Development, Demonstration, and Early Development Policies for Advanced-Coal Technology in China,” *Energy Policy*, Vol. 35, 2007, 6467–6477.

⁷This includes, for example, substantial work on direct hydrogenation of coal, with production starting up in the Inner Mongolian Autonomous Region in 2008. Beijing is also focusing on coal gasification and is constructing 35 plants using this technique.

ating capacity by 2020.⁸ There have been recent suggestions that the nuclear output target has been raised from 40 GW to 70 GW by 2020.⁹

- Investing over 600 billion RMB (\$88 billion) on ultra-high voltage transmission projects by 2020. The installed capacity of China's clean energy will be increased to 579 billion kW when the smart grid is completed by 2020.¹⁰

Question. Please describe ways that China and the United States can work together to reduce greenhouse gas emissions.

Answer. The potential menu here is long and varied. Types of potential cooperation include:

- Codevelopment of new technologies. This involves taking ideas from the lab and bringing them through test beds, scaling up and development of viable business models. In many critical areas, both the United States and China have made technical advances, but much remains to be done to make those technologies applicable in the market and at scale. American and Chinese capabilities are largely complementary, and working together can move things forward more rapidly and at less cost than working separately. Two prominent examples are in carbon capture and sequestration and in electric vehicles.
- Foster local-to-local cooperation. Various municipal governments in both countries have done a great deal to improve urban transit, upgrade building stocks, optimize energy provision, etc. There is some United States-China city-to-city cooperation now under way, but a great deal more can be done. Establishing a national level platform to foster that local-to-local collaboration (e.g., by providing data repositories, facilitating communications, providing some translation services, etc.), could greatly enhance the ability of local officials in each country to cooperate with and learn best practices from the other.
- Create activities to galvanize the public's imagination. Forming, for example, a binational Clean Energy Corps with volunteers from both countries to work on upgrading and retrofitting buildings in both countries (and eventually elsewhere, too) could have an impact akin to that of the Peace Corps for an earlier generation.
- Cooperate to lower the costs in both countries to moving to a low-carbon economy. For example, adopting common metrics and standards (e.g., in appliances) where feasible will make it far easier for new products to gain necessary scale.
- Cooperate to reduce the obstacles to overall cooperation between developed and developing countries on reducing carbon emissions. The differences between the United States and China on principles (concerning the responsibilities that should be assigned because of historical cumulative emissions versus current emissions, per capita emissions versus total national emissions, and the current stage of economic development) are the key divisions over principles that have plagued global climate change negotiations. If the United States and China can find ways to cooperate despite these disagreements over principles, it should have a beneficent effect on the global negotiations and therefore on global carbon emissions reduction.

Question. There is universal agreement that China must curb its emissions if the world is to avoid unchecked climate change. Some argue that the United States should not reduce its emissions until China does so. Do you agree with this argument? Would a "wait for China" approach help persuade China to take on international climate change commitments?

The United States absolutely should not adopt a posture of waiting for China before undertaking its own emissions reductions. In part, the science drives this response—emissions from anywhere move the world toward potentially unmanageable climate challenges in the future, and the United States accounts for more than 20 percent of global emissions annually. Waiting for China is therefore directly increasing the dangers faced by every American and all others around the globe.

The United States should, though, use its own demonstrated willingness to take very serious measures to address climate change as a vehicle to move China along to greater efforts. To date, in terms of national level policy the Chinese have done

⁸"The Nuclear Industry Development Plan for the 11th Five-Year Period," the Commission of Science, Technology, and Industry for National Defense (COSTIND), the Peoples' Republic of China, August 2006. Available at: <http://www.caea.gov.cn/n602669/n602673/n602687/n607857/appendix/200741310370.doc>. "China Ups Targeted Nuclear Power Share From 4% to 5% for 2020," Xinhua News, August 5, 2008. Available at: http://news.xinhuanet.com/english/2008-08/05/content_8967806.htm.

⁹China Daily, November 19, 2008: http://www.chinadaily.com.cn/bizchina/2008-11/06/content_7180851.htm.

¹⁰China Daily (May 29, 2009).

considerably more than America has done on reducing carbon emissions (but American localities have undertaken many serious programs on their own). China has not been simply standing by waiting for others to act. But failure of the United States at a national level to address this issue seriously to date has made it far more difficult for China's leaders to do what they should do on this. The arguments heard in China have been: 1. The United States is rich and technologically advanced—why should we move on low-carbon efforts before America does? 2. The United States seeks to slow or halt China's rise—and America's pushing China to reduce carbon emissions is simply part of this strategic United States effort.

Now that the United States is demonstrating that it is serious at home, China is changing its own tune very rapidly. In many meetings I have had (and our officials have had) with Chinese officials this year, the positive change has been obvious—and the Chinese point to America's shift in position since January as an important ingredient. In addition, in a very important way American life styles define for middle-class Chinese what “being modern” is all about. As we raise the importance of considerations of reducing emissions, that potentially impacts on the types of pressures China's leaders are under from their own population.

Put simply, America's taking the lead moves China in the right direction, while waiting for China increases very significantly the power of voices in China that say China should wait for the United States.

Question. Given the serious threat that global warming represents to our country, and the dynamics of international climate negotiations, would you agree that the United States must act regardless of the level of commitment from China?

Answer. Absolutely, but I think we can also do better than that. We should be able to build a bilateral United States-China Clean Energy Partnership this year that in turn imparts momentum to the Copenhagen negotiations and positions China to take a more forward-leaning attitude toward those global talks.

RESPONSES OF ELIZABETH ECONOMY TO QUESTIONS SUBMITTED BY SENATOR
BARBARA BOXER

Question. Please describe the actions that China is now taking to reduce its greenhouse gas emissions.

Answer. China's Greenhouse Gas (GHG) reduction efforts include: Reducing energy intensity (energy consumption per unit of GDP) by 20 percent during 2006–2010; increasing the role of renewable energy within the primary energy mix to 10 percent by 2010 and 15 percent by 2020; a top 1,000 program to improve the energy efficiency of the top 1,000 energy consuming enterprises in nine sectors (iron and steel, nonferrous metal, chemicals, petroleum/petrochemicals, construction material, textiles, paper, coal mining and power generation); a fuel consumption tax on gasoline of 1 rmb per litre;¹ replacing and adding to the country's stock of coal-fired powerplants with more efficient models; and a massive afforestation program that has raised the level of forest coverage in the country from approximately 12 percent in 1998 to 18 percent in 2009.

New targets and policy initiatives are also announced with striking frequency. For example, the government has discussed more than tripling its wind-power generating capacity to 100 GW by 2020 from its previous target of 30GW; floated a proposal for a 40 percent Renewable Electricity Standard by 2050; pushed forward new rules on compulsory green procurement for local governments; and raised the possibility of a carbon tax and a carbon trading regime at some undisclosed time in the future.

China is also actively investing in new technologies that will help slow the rate of growth of the country's GHG contribution. It has announced a US\$1.5 billion research subsidy for automakers to improve their electric vehicle technology. (China's leaders have called for 500,000 “new energy” vehicles, such as hybrids and electric vehicles, to be produced this year. Shenzhen is reportedly already establishing 20 220-volt charging pillars in office and residential areas. According to one international consulting firm, Frost and Sullivan, it will take a minimum of 10 years for China to transition to electric vehicles.) State-owned power developer China Huaneng Group has announced that it will pursue the development of technologies to capture and sequester carbon (CCS) with the assistance of the ADB and the Chi-

¹ Testimony of Barbara A. Finamore before the select committee on Energy Independence and Global Warming, U.S. House of Representatives (March 4, 2009).

nese Government.² Shenhua Group is also pursuing CCS technology in conjunction with its planned coal-to-liquid fuels plant in Inner Mongolia. Moreover, powerplant efficiency technology may soon also make its way from China to the United States. In April 2009, Xi'an Thermal Power Research Institute, a subsidiary of Huaneng, signed a preliminary agreement to supply Houston-based Future Fuels with a two-stage pulverized coal pressure gasification technology for an IGCC plant to be built in Schuylkill, PA, in 2010.

Question. Please describe ways that China and the United States can work together to reduce greenhouse gas emissions.

Answer. Clean energy and capacity-building are two major areas where the United States and China can cooperate on climate change. First, a United States-China clean energy partnership needs to look ahead over the next 10 to 20 years at the profound changes, both within China and in terms of China's role abroad, and structure the partnership in that context. China plans to urbanize 400 million people between 2000 and 2030, which will have a profound impact on China's energy-use patterns (urban residents use 3½ times more energy than their rural counterparts). Energy efficient buildings (including new building materials) and appliances, electric cars, renewable, smart urban planning should be top priorities for United States-China collaboration. These partnerships, which may develop into ecocity or province/state partnerships should target first off China's national environmental model cities (about 10 percent of China's 660 cities) because the leaders and businesses in these cities have a proven track record of commitment to environmental protection in their cities. Similarly, companies that are members of China's Green Companies Program have begun to develop a track record of running their businesses in more efficient and environmentally sound ways. These should be the first candidates for joint projects. We already have an ecopartnership on this issue under the Strategic Economic Dialogue between Chang'an Motors and Ford Motor Company and the cities of Denver and Chongqing. We should be looking aggressively at what's taking place with that initiative, seeing what the obstacles are, what the opportunities are, and whether this is something that can be replicated throughout other parts of China. If the initiative is not working, we should consider how to revise and strengthen it.

It is important to remember that technology does not matter unless the political and economic systems are there to support it. United States companies in China want contract sanctity, enforcement, and certainty of regulation, which circles back to governance and capacity-building. To this end, the United States can begin to work with China by assisting with emissions monitoring, reporting, and verification. United States efforts to help China develop a more transparent, accountable, and rule-based system will be a long process, but an absolutely critical one. California is beginning an initiative that is going to try to address some of this problem. It has a climate governance partnership that it is trying to establish with a number of provinces, in which members of different parts of the bureaucracy at the local level will form climate action task forces, and to encourage information-sharing and transparency, and accountability at the local level.

Finally, the partnership ought to address the profound changes in China's role abroad. Something not very many people have been thinking about is how China's drive for resources—timber commodities, food crops, oil, and gas—has brought tens of thousands of Chinese companies to Africa, Latin America, Southeast Asia, along with millions of Chinese workers, with very little to no environmental supervision. China is now the largest importer of timber in the world and the largest importer of illegally logged timber in the world. It is contributing to rampant deforestation in places as far flung as Cambodia, Myanmar, Mozambique, Russia, and Indonesia. Even as China is undertaking positive climate mitigation efforts with its forest program within its own borders, it is contributing to the opposite in many countries abroad. I think that as we think through a climate partnership with China, it ought to be in the context of a global sustainability program that would encourage China, the United States, and developing countries to discuss the actions of Chinese multinationals abroad.

Question. There is universal agreement that China must curb its emissions if the world is to avoid unchecked climate change. Some argue that the United States should not reduce its emissions until China does so. Do you agree with this argu-

²Green Hops: New Renewable Energy Targets, More Carbon Tax Chatter, Singapore-Nanjing Eco-city Announced," Green Leap Forward blog (May 8, 2009). <http://greenleapforward.com/2009/05/08/green-hops-new-renewable-energy-targets>.

ment? Would a “wait for China” approach help persuade China to take on international climate change commitments?

Answer. The United States should not wait for China and should act regardless of China’s commitment at Copenhagen. President Obama began very early on, even before he took office, to talk about green energy and a clean energy future for our country, including his promise to build 5 million green jobs in the next decade. This must also be an integral part of the U.S. leadership’s climate change message to the American people. It is what will get them excited about moving forward on this issue. China, despite its recalcitrance, is not waiting to develop its clean energy market. It is already forging ahead in developing electric cars and renewable energy technologies. There should be an opportunity presented to the American people to move our country forward into the 21st century and take a leading economic role, so that 5 or 10 years from now, the United States does not lag behind other countries, including China, on electric cars and a vast array of other renewable and energy-efficient technologies.

Equally important is the need for the United States to lead by example. Although China will find its own path to a low carbon economy, the United States has the opportunity to demonstrate how it can be done, whether through best urban planning practices, the rapid development and spread of energy efficient building codes and new building materials, the development of alternative fuel vehicles and/or the rapid deployment of renewable energy and smart grid technology. The United States will have no credibility in pushing China to forge a new path if we, ourselves, are not already well down that road. Moreover, we will lose a critical opportunity for our own environmental and economic future if we do not seize this moment to develop our own clean energy economy.

Question. Given the serious threat that global warming represents to our country, and the dynamics of international climate negotiations, would you agree that the United States must act regardless of the level of commitment from China?

Answer. Please refer to response to previous question above.

Question. Do you believe that China’s political leaders are aware of the impacts and consequences for China that would result from unchecked global warming?

Answer. The Chinese Government has called on experts within the bureaucracy to assess the impacts and consequences of climate change and conducted extensive studies on the issue. In April 2007, Beijing published a three-part National Assessment Report on Climate Change, the result of a 4-year collaborative study between China’s Ministry of Science and Technology, Meteorological Administration, and the Chinese Academy of Sciences. In June 2007, China released its National Plan for Coping with Climate Change, in which Beijing outlined for the first time a blueprint for how the country should address the challenge.

Nonetheless, few within China’s elite discuss climate change with a sense of urgency; the priorities remain continued rapid economic growth and social stability. To the extent that these priorities coincide with addressing climate change though, for example, energy efficiency and energy security, China’s leaders are enthusiastic about moving forward to address this global challenge. Beyond this, however, the rate and nature of China’s economic growth suggest that without significant new investment and international assistance, the country will fall well short of what it needs to do to help stabilize the global climate.³ Part of the challenge is related simply to the magnitude of the task at hand. In addition, China’s GHG reduction efforts are greatly complicated by emerging trends in the pattern of economic development, competing priorities within China’s political system, and weak capacity for monitoring and enforcement. Moreover, there is a lack of political will in Beijing to make the necessary fundamental changes to tackle the climate change challenge effectively, such as the rule of law, transparency, and official accountability.



³The Tyndall center, for example, argues that China’s energy portfolio will need to be 60 percent renewable by 2050 to stabilize the climate. The McKinsey report’s baseline scenario for China’s GHG emissions, in which China doubles its carbon emissions from 2005 by 2030, necessitates that China has 100GW of wind generating capacity by 2030. In its abatement scenario, however, in which China limits the growth of its carbon emissions to 10 percent above 2005 levels by 2030, McKinsey suggests that China would need 300GW of wind generating capacity.