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Members of the Commission: good afternoon, and thank you for the invitation to participate in this panel to discuss China's approach to global climate change.

I would like to begin with a few key points:

1. The Chinese leadership is concerned about climate change. Currently, however, they are more concerned about sustaining strong economic growth, and enhancing energy security. Increasingly, they are concerned about local environmental quality issues. Therefore, the best climate change approach for China will simultaneously address energy security, local pollution, and the economy.

2. China is already doing a lot to reduce its own emissions. It has an aggressive suite of policies and measures in place, including those targeting energy efficiency and renewable energy, which could have substantial implications for domestic greenhouse gas reductions. Implementation of many of these policies has proven challenging, however, as it is increasingly difficult for the central government to establish the correct incentives at the local level to ensure effective policy implementation.

3. China will need help in achieving significant emissions reductions, and an enhanced U.S.-China relationship focused on climate change and energy will be crucial. China needs international assistance, and not just in the form of the financial assistance and technology assistance they publicly demand. It needs technical assistance with data collection, with establishing accurate domestic systems to quantify and monitor emissions, and with modeling and projecting future emissions growth. Such baseline information is crucial to informing any domestic climate change policies, as well as to setting any international climate change commitments.

4. There are technical—not just political—reasons that China is unlikely to agree to cap its greenhouse emissions by committing to an absolute emissions reduction target. Committing to quantifiable emissions limits is challenging for a country that has little prescience into its future emissions pathway, as recent emissions trends well outside the bounds of expert modeling projections have illustrated. It will be more technically and politically feasible for China to commit to policies that will lead to absolute emission reductions; or to intensity targets, indexed to economic growth.

5. U.S. leadership on climate change is essential to engaging China. U.S. leadership is critical in its domestic climate policy, in the international negotiations, and in developing and demonstrating technology that will be critical for greenhouse gas mitigation around the world. One example of a technology where U.S. leadership will be crucial is carbon capture and storage technology applied to coal power plants. Ultimately, China is the one place where this technology may be most needed, but it may be the most challenging environment in which to deploy it.

Introduction

China's role in an international climate change solution cannot be overstated. Now the world's largest emitter of greenhouse gases, China has become the focus of scrutiny as climate change has become ever more important as a global issue. Increased international attention to the issue is reflected in China's domestic policy circles as well, primarily through institutional restructuring aimed at better government coordination on climate-related policy activities. China released its first national climate change plan last year, composed of measures being taken across the economy that may help slow China's greenhouse gas emissions growth. Yet, China faces substantial challenges in mitigating its increasing contribution to global greenhouse gas emissions, which will require a much higher level of effort than what may be achieved by measures already in place. Understanding the nature of these challenges in the Chinese context helps us to clarify China's negotiating position in international forums, and can provide insights into how the international community might best engage China to address global climate change.

Climate's Competing Priorities

China's climate strategy remains centered on its energy development strategy, as driven by its overall economic development goals. Although attention to climate change has recently increased among China's leadership, climate change has not surpassed economic development as a policy priority. Yet, the causes of climate change, namely greenhouse gas emissions from fossil fuels and land use, are inherently linked to economic development in the Chinese context. Continued growth in the prosperity of the Chinese population is viewed as fundamental to maintaining political stability, and progress to date in this regard has been impressive. China's economic growth over the past two decades, marked by its quadrupling in Gross Domestic Product (GDP) from 1980 to 2000, has been credited with pulling roughly 50 million people out of poverty.

The relationship between economic growth and energy utilization matters greatly, not only from an emissions perspective, but from an energy security perspective as well. Although China quadrupled its GDP between 1980 and 2000, it did so while merely doubling the amount of energy it consumed over that period, marking a dramatic achievement in energy intensity gains not paralleled in any other country at a similar stage of industrialization. This allowed China's energy intensity (ratio of energy consumption to GDP) and consequently the emissions intensity (ratio of carbon dioxide [CO_2]-equivalent emissions to GDP) of its economy to decline. Without this reduction in the energy intensity of the economy, China would have used more than three times the energy that it did during this period.

Between 2002 and 2005, however, this trend reversed, and energy growth surpassed economic growth for the first time in decades. This reversal has had dramatic emissions implications, with China's greenhouse gas emissions growing very rapidly since 2002. In 2007, it is estimated that China's emissions were up 8 percent from the previous year, which would make China the largest national emitter by far on an annual basis, surpassing U.S. emissions that year by 14 percent.[1] Currently, China emits 35 percent more CO_2 per dollar of output than the United States, and 100 percent more than the European Union. China's increase in energy-related emissions in the past few years has been driven primarily by industrial energy use, fueled by an increased percentage of coal in the overall energy mix. Industry consumes about 70 percent of China's energy, and China's industrial base supplies much of the world. For example, China today produces about 35 percent of the world's steel and 28 percent of aluminum, up from 12 percent and 8 percent, respectively, a decade ago.[2]

China relies on coal for over two-thirds of its energy needs, including approximately 80 percent of its electricity needs. Currently, more coal power plants are installed in China than in the United States and India combined. China's coal power use is expected to more than double in size by 2030, representing an additional carbon commitment of about 86 billion tons.[3] Although China is also expanding its utilization of nuclear power and non-hydroelectric renewables, these sources comprise 2 percent and 0.7 percent of China's electricity generation, respectively, whereas hydroelectricity contributes about 16 percent.[4]

China's overall economic development statistics reveal that, despite the emergence of modern cities and a growing middle class, China is still largely a developing country. Although rapid economic growth has made China the fourth-largest economy in the world, its GDP per capita is still below the world average. More than one-half of China's population lives in rural areas where GDP per capita lags that of urban areas. The gap between the best available technologies worldwide and what exists in China is still large, although advanced energy technology is increasingly available and in many cases being developed indigenously. China's per capita greenhouse gas emissions are below the world average and almost one-fifth those of the United States.

All of these factors shape the climate challenge faced by China's leadership. It is increasingly difficult for China to rein in its greenhouse gas emissions growth as investment surges continue in heavy industry. Changing China's emissions trajectory will require either a substantial shift away from coal or massive investments in capturing the CO_2 emissions from coal-based energy sources. Simultaneously, China must increase the efficiency with which it uses energy resources to minimize the environmental impacts of meeting the further economic development needs of its population.

Climate Action in China

China released its *National Climate Change Program* report on June 4, 2007.[5] Referred to as China's climate change plan, the report has provided a comprehensive synthesis of the policies that China currently has in place that are serving to moderate its greenhouse gas emissions growth and to help the country adapt to climate impacts. The majority of the policies and programs mentioned in the plan are not climate change policies per se, but policies implemented throughout the economy, and particularly in the energy sector, that have the effect of reducing greenhouse gas emissions. Many of these policies have been enacted to help the country meet its broader economic development strategies, and, if implemented effectively, will also serve as policies to mitigate China's greenhouse gas emissions. Three of these key policy areas are energy efficiency, renewable energy, and industrial policy.

Energy Efficiency

With the hope of achieving energy intensity improvements between 2000 and 2020 similar to those of the previous two decades, China has a broad national goal of quadrupling economic growth while doubling energy consumption. Beijing's eleventh five-year plan includes a near-term goal of reducing national energy intensity 20 percent below 2005 levels by 2010. Implementation of such centrally-administered government targets has proven challenging, particularly at the local level. In an attempt to improve local accountability, the NDRC is allocating the target among provinces and industrial sectors, and energy efficiency improvement is now among the criteria used to evaluate the job performance of local officials. These elevated implementation efforts appear to be having some impact. Following increases in energy intensity each year from 2003 to 2005, the trend was reversed in 2006, although the intensity decline achieved was short of the goal for that year.

Supplementary programs have been established to encourage specific actors to help meet this national intensity goal, including a program established in 2006 to improve energy efficiency in China's largest enterprises.[6] Another government effort targets the elimination of a number of small, inefficient power plants, totaling around 8 percent of China's total generating capacity, by 2010. Similar plant closings are planned across the industrial sector, including inefficient cement, aluminum, ferro-alloy, coking, calcium carbide and steel plants.

In addition, the 1997 Energy Conservation Law initiated a range of programs to increase energy efficiency in buildings, industry and consumer goods. China has efficiency standards and labeling programs in place for many key energy-consuming appliances and is adopting energy standards for buildings in regions with high heating and cooling demands. In the transport sector, China's fuel economy standards for its rapidly growing passenger vehicle fleet are more stringent than those in Australia, Canada and the United States, although less stringent than those in the European Union and Japan, and the average fuel economy of new vehicles is projected to reach 36.7 miles per gallon in 2008.[7]

Renewable Energy

Under the National Renewable Energy Law adopted in 2005, China has set a target of producing 16 percent of its primary energy from renewable sources by 2020, up from about 7 percent at present. For the electricity sector, the target is 20 percent of the capacity from renewables by 2020, which will require substantial increases in the use of wind power, biomass power, and hydropower. This law offers financial incentives, such as a national fund to foster renewable energy development and discounted lending and tax preferences for renewable energy projects. Although the increase in wind power in particular has been impressive in recent years, this energy source is still dwarfed by large-scale hydropower. Hydropower capacity is projected to more than double by 2020, requiring the equivalent of a new dam the size of the Three Gorges Project every two years.

Policies to promote renewable energy also include mandates and incentives to support the development of domestic technologies and industries, for instance, by requiring the use of domestically manufactured components. Chinese manufacturers are now producing about 40 percent of the wind turbines being sold in China and 3 percent of the wind turbines being sold globally. Tax and other incentives have targeted the solar photovoltaic (PV) industry, stimulating a six-fold growth in PV production from 2004 to 2005. China is now the largest manufacturer of solar PVs in the world, accounting for 35 percent of the global market. [8]

Industrial Policies

The recent surge in energy consumption by heavy industry in China has caused the government to implement measures to discourage growth in energy-intensive industries compared with sectors that are less energy intensive. In November 2006, the Ministry of Finance increased export taxes on energy-intensive industries. This includes a 15 percent export tax on copper, nickel, aluminum and other metals, a 10 percent tax on steel primary products; and a 5 percent tax on petroleum, coal and coke. Simultaneously, import tariffs on 26 energy and resource products, including coal, petroleum, aluminum and other mineral resources, were reduced. Whereas the increased export tariffs are meant to discourage the relocation of energy-intensive industries to China for export markets, the reduced import tariffs are meant to promote the utilization of energy-intensive products produced elsewhere.

Framing China's Negotiating Position

China's position in the international climate negotiations has rarely deviated from the rest of the developing world, as collectively articulated by the Group of 77 (G-77), a group of 130 (formerly 77) developing countries. Recently, the financial incentives for emissions reductions provided by the Kyoto Protocol's Clean Development Mechanism (CDM) has also helped shape China's views on the international regime.

G-77 Solidarity

Developing country solidarity has long been used as a strategy to influence the climate change negotiations, despite the growing economic differentiation within the developing world, and often disparate climate policy interests, within the developing world. Aware of their limited weight of acting in isolation, developing countries attempt to build common positions in the framework of the G-77, the largest intergovernmental organization of developing states in the United Nations. China has historically associated itself with the G-77, despite not having the problem of limited weight in acting alone. The consistent position of the G77 has been to emphasize the historical responsibility that the industrialized world brings to the climate change problem and the disparity between per capita emissions that persists between the developed and developing world.

In recent years, China's alliance with the G-77 has not waned. In fact, its willingness to step out of the pack has declined even further as its fear of being singled out grows due to increasing economic growth and energy use. Despite the EU's willingness to commit to post-2012 emissions reduction targets, the absence of international commitments by the United States, the world's largest industrialized-country emitter, provides the best excuse for China to not have to adopt commitments. Even as China's emissions surpass those of the U.S. on an annual basis, it will be decades before Chinese emissions surpass U.S. emissions on a cumulative basis, measured as historic contribution of emissions to the atmosphere. Greenhouse gases stay in the atmosphere for a century or more, so it is really the buildup of gases over time that is important from a scientific perspective. As previously mentioned, China's current per capita greenhouse gas emissions would have to quintuple to equal those of the United States.

Consequently, if the United States were to take on credible international climate change commitments, China would face renewed pressure to revisit its delay tactics. Another key dynamic that could shift in the near term is the G77 negotiating block. Countries within the G77 are beginning to diverge somewhat in their positions, which could leave China in a more isolated negotiating position. Some tropical forest countries have stated a willingness to take on voluntary avoided-deforestation targets in return for compensation;[9] historically, voluntary international targets of any form have not been part of the G-77 position.

Capitalizing on the Clean Development Mechanism

China has ratified the primary international accords on climate change—the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol—but as a developing country, China has no binding emissions limits under either accord. It is, however, an active participant in the CDM established under the Protocol, which grants emissions credits for verified reductions in developing countries, which can be used by developed countries toward meeting their Kyoto targets.

China has been consistent in its position that, as a developing country, it will not take on any binding international commitments to reduce its greenhouse gas emissions.[10] Some of China's hesitancy to make international commitments stems from reasonable concerns about energy data quality and

transparency. In developing countries, where resource constraints result in limited data quality, inventories of national greenhouse gas emissions are notoriously inexact.[11] The uncertainty associated with national inventories makes it very difficult to implement greenhouse gas reduction commitments that rely on baseline inventories and estimated annual improvements at the national level, particularly in developing countries. Having in place a national emissions inventory system will likely be a crucial step in enabling the adoption and enforcement of any binding emissions reduction policies, whether enacted nationally or internationally.

Another reason for China's hesitancy stems from broader concerns about the role of international actors in China. China was initially skeptical about the introduction of the Kyoto mechanisms under the UNFCCC, not only viewing the CDM as a way for developed countries to avoid their own responsibilities to reduce emissions, but also expressing concern about the potential for foreign exploitation of rights to ownership of emission credits. China has long resisted foreign involvement in various sectors and activities, particularly industries deemed to have an impact on national economic security.

Despite these restrictions, China has emerged as the leading CDM host country, with about 1.2 billion tons of CO_2-equivalent credits scheduled to be issued by the end of the Kyoto Protocol's first commitment period in 2012.[12] This means that over half (52 percent) of total emissions reductions under the CDM are taking place in China. At a price of $10 per ton, sales of the 1.2 billion tons of reductions currently in the pipeline would represent a total investment in China of about $12 billion.

Options to Advance International Negotiations

A central challenge in addressing global climate change will be arriving at multilateral arrangements that include adequate effort by all major economies to moderate and reduce their greenhouse gas emissions. The multilateral climate effort to date has relied on a particular form of emissions commitment, economy-wide emissions limits. Such limits for developed countries were voluntary within the UNFCCC, and later binding under the Kyoto Protocol. Developing countries have historically resisted emission limits, however, and will likely continue to do so in any discussion or negotiation of the post-2012 climate effort. Consequently, there is a need to explore alternative approaches to engage large developing countries, such as China, in real mitigation activities in the forthcoming climate change negotiations.

For China to increase its international commitment to climate change action, its overarching concerns will need to be addressed. These include, because of its reliance on coal, the large incremental cost it faces in moving toward higher-efficiency coal technology and in capturing the emissions from these plants; concerns about energy data quality and transparency that are at the root of its hesitancy to commit to quantifiable targets; and current limitations on the use of foreign investment and foreign technology to achieve its domestic development goals. Recognizing the unique challenges that China faces in addressing climate change can inform what it will be willing and able to undertake within a multilateral climate agreement. In the Chinese context, it may make sense to examine intensity targets, sectoral agreements, and policy commitments and crediting. Targeted international assistance will also be an important component of any international climate agreement.

Intensity versus Absolute Targets

Developing countries, including China, view absolute greenhouse gas targets, such as those under the Kyoto Protocol, as a cap on their economic growth. Intensity-based targets, whether measured as energy intensity or greenhouse gas intensity, are based on a ratio of the amount of energy or

greenhouse gas emissions per unit of economic output. Because such a target is inherently indexed to the economic growth of a country, meeting this target does not directly require a decrease in economic production to meet it. This type of target is therefore more palatable to developing countries that oppose caps on their economic growth on equity principles. Meeting this type of target requires countries to understand the core drivers of their emissions within their economy, while incentivizing more efficient energy consumption and eventually a decoupling of energy use from economic growth.

The main limitation of an intensity-based target is that, although it can lower an emissions growth trajectory below the projected business-as-usual level, it is unlikely to result in an absolute decrease in emissions. While the intensity of China's carbon emissions (ratio of energy-related CO_2 emissions to GDP) declined 67 percent between 1980 and 2000, its absolute emissions increased by 126 percent over this period.[13] Yet, if China's emissions intensity had remained fixed where it was in 1980, its emissions would be more than double what they are today.

Sectoral versus National Focus

Uncertainty is associated with all estimates of emission reduction, particularly in many developing countries in which the accuracy of national greenhouse gas emissions inventories are often constrained by limited capacity for data collection and estimation. The uncertainty associated with national inventories makes it very difficult to implement greenhouse gas reduction commitments that rely on baseline inventories and aggregated annual improvements at the national level. More exact estimates can be achieved, however, when estimating emissions from a smaller number of sources, such as within one sector of the economy where the sources of emissions are known and well documented. Consequently, understanding of emissions sources within a particular sector, such as the electricity sector or the cement-manufacturing sector, could form the basis for targeted mitigation efforts within that sector, even in the absence of a broader understanding of emissions sources and trends.

Sectoral agreements have been proposed as a way of structuring multilateral commitments to adopt targets or standards around one or more sectors, possibly including both developed and developing countries, potentially in concert with other commitment types such as economy-wide targets. International sectoral agreements could provide a means of coordinating key industrial producers to develop climate change goals and a forum for information sharing around best practices and technological innovations. Reduction targets or efficiency standards agreed among countries at the sectoral level could target mitigation efforts towards key greenhouse gas-generating activities and help to prevent competitive imbalances, particularly in energy-intensive industries that trade globally.[14] China plays an important role in many such industries. Globally, China now accounts for 48 percent of global cement production, 49 percent of global flat glass production, 35 percent of global steel production, and 28 percent of global aluminum production.[15] A major challenge to implementing sectoral agreements is integrating developing countries, which typically use less efficient technology and thus will bear a higher cost in meeting any sector-wide standards. In addition, if some sectors are targeted for mitigation while others are left unregulated, there may be an incentive for emissions to "leak" from one sector to another to the extent cross-sectoral substitutions are feasible.

Policy Commitments versus Project Activities

Currently, 820 discrete CDM projects have been proposed in China that, if approved and implemented, could amount to 1.2 billion tons of CO_2-equivalent emissions reductions by 2012. Yet, China's single national target to achieve a 20 percent reduction in energy intensity by 2010 could reduce its CO_2 emissions by about 1.5 billion tons. Consequently, this policy and others in China, such as those articulated in China's national climate change plan, could form the basis of policy-based commitments made under the UNFCCC. Such commitments could achieve more emissions reductions in the

developing world than project-based crediting mechanisms, such as the CDM, and potentially reduce the transactions costs associated with project-by-project verification. Policy commitments as part of a multilateral climate agreement could allow developing country governments to identify ways that emissions mitigation fits or advances national priorities, such as economic growth, energy security and public health, and would help to achieve broad participation in an international effort to reduce greenhouse gas emissions.[16] The stringency of policy-based commitments could evolve over time, perhaps beginning as voluntary actions reported internationally in fulfillment of existing UNFCCC commitments, and then be taken as new commitments negotiated as part of a post-2012 agreement.[17]

The World Bank, in developing its Investment Framework for Clean Energy and Development, concluded that an expanded carbon market backed by a global climate policy framework would be a principal source of finance for substantially de-carbonizing electricity generation in the developing world.[18] In a post-2012 framework that includes new emissions targets for developed countries, the strongest incentive for developing countries to take on policy commitments may then be the prospect of generating marketable emissions credits. Crediting as now structured under the CDM is on a project-by-project basis. If a future framework were to incorporate policy commitments, allowing crediting on the basis of those commitments could channel investment to industry- or sector-wide strategies that could deliver reductions on a far broader scale.[19] Yet, policy-based crediting would face the same fundamental issues that arise in project-based crediting: how to establish that actions to be credited are "additional," not "business as usual," and how to verify actual emissions reductions.[20]

International Assistance

An important part of any multilateral climate deal will likely include a commitment from developed countries to increase developing country access to advanced technologies, and to provide incentives and financial assistance for their mitigation and adaptation activities. China's own climate change plan has clearly identified its priority areas for international collaboration to include cooperation on advanced coal technologies, energy-efficient building technologies, clean vehicle technology and advanced industrial technologies. China has placed a particularly heavy emphasis on technology transfer in the international climate negotiations, recently proposing the establishment of a Technology Development and Transfer Board to oversee and implement technology-transfer related activities, as well as a Multilateral Technology Acquisition Fund to support the transfer of technologies to developing countries through the buying out of intellectual property rights.

The United States and China in particular share a common interest in determining a way to continue their reliance on coal while moving toward more efficient coal-combustion and gasification technologies and capturing and storing the emissions from coal power plants. With coal fueling almost 80 percent of electricity generation and two-thirds of primary energy consumption, it is going to remain a core part of China's energy future for decades to come. Carbon capture and storage may be the only means for China to continue to rely on coal in a carbon-constrained world. While China may be the place where this technology is most needed, it may be the most difficult environment in which to deploy it. Key challenges include the large incremental cost and the energy penalty of running the capture equipment, which can result in up to a 30 percent reduction in plant efficiency.[21] For a country that is already building one to two new coal power plants per week, the energy penalty associated with running capture technology would mean even more plants must be built to meet the same electricity demand.

China is also wary of pressures to demonstrate a technology that is not yet being used commercially in the developed world. This is therefore a critical area for U.S. technological leadership. The U.S. and China have a shared interest in continuing to use coal while capturing and storing its emissions, and the

U.S. possesses the financial and technical capacity to make this unproven technology viable. Increased bilateral assistance in this area can complement and even facilitate multilateral climate negotiations.

Engaging China on Climate

China must play a central role in any global solution to address climate change. Yet, it is also home to 1.3 billion inhabitants that desire the modern energy services and consumption habits enjoyed by much of the developed world. Recent institutional changes and renewed attention to implementing aggressive energy efficiency policies demonstrate the Chinese government's increasing awareness of the problems posed by climate change, and its interest in altering China's current energy development trajectory. China will face increasing international pressure in the coming months to devote more attention to climate change, both due to its emergence as the largest global emitter, and as international attention to climate change is elevated by government leaders and heads of state in high-profile forums around the world. Yet, the government will not likely be able to significantly alter its current energy development trajectory without meaningful international engagement during the next one to two decades, a period during which China's energy infrastructure investment decisions will have direct implications for the future stability of the global climate system.

There is new urgency, as well as opportunity, for each of the major economies to jointly examine and address linkages among their own economic development, their energy security, and their role in global climate change. Effective engagement with Beijing will only be possible if the major emitting developed countries lead by example, and serious U.S. engagement will likely be a precondition to China's engagement in any international climate effort. Meanwhile, understanding the challenges that China faces in reducing its own greenhouse gas emissions in the years ahead, particularly in decarbonizing its energy sector, is the first step to engaging China on climate cooperation.

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