

ISSUE BRIEF

THE ATLANTIC COUNCIL OF THE UNITED STATES

REPORT ON

U.S.-China Energy Security Cooperation Dialogue

Beijing, 11-12 December 2007

Co-sponsored by:

- o the Atlantic Council of the United States,
- o the Institute for Sino-American International Dialogue, and
- o the US/China Energy & Environment Technology Center at Tsinghua and Tulane Universities

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Executive Summary

The 2007 U.S.-China Energy Security Cooperation Dialogue was held in a period when a broad range of activities and policy recommendations have been proposed to address global energy security and environmental issues. The Dialogue identified a number of further steps that China and the United States could cooperatively undertake to accelerate developments.

Participants from both countries agreed on a number of fundamental positions on the challenges posed by the concurrent need for energy security, environmental awareness and economic growth. These included the following:

- Both countries need to address energy security and environmental challenges as a strategic priority.
- Obtaining a sustainable solution is beyond the ability of any one country or region acting alone.
- Solutions will require dramatic changes in energy supply and demand patterns and paradigm shifts in policies.

*The agenda and list of participants of the conference are appended, and the presentations and this report are available on the Atlantic Council of the United States web site at www.acus.org under the Energy and Environment and Asia Programs homepages.



THE ATLANTIC COUNCIL OF THE UNITED STATES

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Francis J. Kelly	Dov S. Zakheim

- Solutions will require a stable investment in climate, global cooperation, intellectual property protection, and reliance on market forces, as well as regulatory and market-based incentives to alter existing consumption patterns and diversify energy portfolios.
 - Behavior change on a massive scale will be necessary to have a significant impact within the next 15-20 years.
 - Without a major refocusing of nearer-term efforts, the goals of dramatically improving the world's energy security and environmental outlook by the middle of the century are not likely to be realized.
 - Given the magnitude of the task and urgency for change, we cannot wait for the grand policy debates currently underway to be finalized before moving ahead to do all we can with existing and newly evolving technology and knowledge.
- particular industries; establish a fund or set of funds with adequate resources to support specific new technologies.
- Safe utilization of nuclear power: Establish joint activities to migrate to Generation IV reactors and cooperate on developing and commercializing gas-cooled pebble bed reactors; cooperation on reprocessing spent fuel, improving plant performance, engineering and construction.
 - Clean coal technologies: Undertake environmental and economic assessments to accelerate the commercialization of technologies for carbon capture and storage and identify the potential to reduce emissions and increase efficiencies by using beneficiated coal.
 - Renewable power: Joint activities to develop technologies, assess potential benefits and opportunities and establish fiscal and financial incentives.

The Dialogue resulted in the identification of forty-two specific recommendations in the following six areas:

- Energy efficiency and reduced emissions: Establish programs to develop and enforce national measurement, reporting and verification, set efficiency standards for manufactured goods, lighting and buildings, identify technologies and companies to meet more rigorous standards, assess the effectiveness of national, state and municipal incentives and regulations and assist in the development of market mechanisms to improve the allocation of resources. Joint attention to increasing the effectiveness of the Clean Development Mechanism and to the treatment of forestry.
 - New technology: Strengthen existing laws, including those affecting intellectual property rights; negotiate agreements clarifying the acceptability of cross-national investments in
- Transportation industries: Joint research on new fuels, assessment of the effectiveness of regulatory, fiscal and financial incentives, and collaborative development of analytic capabilities and information systems to create holistic inter-modal transportation systems in both countries. To support China's growing role in world energy markets, continue dialogue on the need to increase transparency in data from petroleum producing countries, participation in the IEA, and the maintenance of a Strategic Petroleum Reserve.

Although there is currently considerable cooperation between China and the United States, the report concludes that the scale and funding of this activity to date has not been large enough to meet the challenges posed by the current energy and environmental outlook.

Introduction

The 2007 U.S.-China Energy Security Cooperation Dialogue was held in a period when a broad range of activities and policy recommendations have been proposed to address global energy security and environmental issues. Throughout the world, numerous legislative and regulatory actions have already been approved, and many more are forthcoming. This report is not intended to review all these activities. Rather, it identifies a number of further steps China and the United States could cooperatively undertake to accelerate the pace of developments already in motion. While participants were very familiar with ongoing activities, the recommendations in this report do not reflect approved governmental positions. The recommendations have the potential to assist in the implementation of existing agreements as well as to lead to a number of new initiatives. Hence, participants hope both governments will carefully consider them as they move forward in their ongoing discussions.

Overview

During a December 11-12, 2007 meeting in Beijing, U.S. and Chinese participants reviewed the two countries' current activities to address energy security and environmental challenges stemming from pollution and greenhouse gas emissions related to growing energy requirements in both countries. Both sides strongly supported the belief that cooperation between the United States and China is critical to global efforts to improve the world's energy security and reduce greenhouse gas emissions. Together, the two countries consume over 40 percent of the world's primary energy resources and account for half of the world's carbon emissions. Only if the two countries work together, and with others, can the world develop solutions that will radically alter the current energy and environmental outlook. The unsustainable nature of the current outlook is clearly described in the International Energy Agency's World Energy Outlook 2007.

Participants from both countries accept that the task is a strategic priority for each nation and the global community. It is beyond the ability of any one country or region to solve by itself. Solutions will require dramatic changes in energy supply and demand patterns and paradigm shifts in policies.

Since the Atlantic Council's October 31-November 1, 2006, U.S.-China Energy Security Cooperation Dialogue, both countries held numerous conferences and meetings internally and between themselves on steps necessary to address growing concerns over energy security and global climate change. In each country there is broad consensus that major investments and policy changes need to be undertaken to address the challenges posed by these issues and the growing requirements for energy. In both countries, new legislation and regulations have or are in the process of being passed at the national and regional levels, and increased efforts are being made to diversify the availability of less-polluting indigenous energy resources. In both countries, there is now acceptance at the national level of the need to seriously address the potential for the major adverse impacts that could accompany global climate change.

The 2007 Dialogue provided the participants a chance to catch up on the numerous near- and longer-term activities which are on-going in both countries to mandate energy efficiency and conservation, to accelerate the development of a safer and less polluting nuclear power industry, to develop and commercialize clean coal technology, to expand the role of renewable energy, and to transform the transportation industry. Both the U.S. and China have independently and in collaboration taken key steps towards addressing these issues. In the United States, public concern about energy, the environment and climate change is causing a myriad of changes to energy and environmental

policies at the federal, state and local levels. In China, the central government has initiated critical changes to policy through the release of a Climate Change Action Plan and other efforts to balance environmental and development goals as seen through statements from the 17th Communist Party Congress. In addition, several of the major cities, such as Beijing and Shanghai, have taken more aggressive steps to address environmental concerns.

In the past year, international events related to the Dialogue included the release of the IPCC's fourth report on Climate Change, a G-8 conference, and the Major Economies Meeting sponsored by the United States. The United Nations Conference on Climate Change in Bali was in-progress during the Dialogue. Despite the frustrations experienced during the Bali conference, it ended with a Conference of Parties (COP) decision to move forward towards a comprehensive process to enable the full, effective and sustained implementation of the Convention. Negotiations over the next two years on mitigation, adaptation, technology and financing are to result in a decision by the end of 2009.

Although China and the United States rank as the number one and two consumers of energy and emitters of greenhouse gases, the wide gap in their development often causes them to emphasize different issues during international efforts to create a global response. As climate and energy security concerns have grown most countries also recognize that many of the same set of developments and policies that will increase energy security will address climate change issues. While this usually leads to compatible goals, concerns remain about the effect on mitigation, mandatory emission targets and other proposed greenhouse gas emission regimes that may impact economic growth, development and competitiveness.

Because burning fossil energy will continue to provide a substantial portion of global energy for the near and medium term, it will be critical for

major nations to collaborate in those arenas. In the international oil and gas markets, the United States and China should seek greater transparency and determine whether greater exchanges would allow for collaboration that would enhance the availability of secure sources. In the coal market, development of more efficient and cleaner coal technologies is critical. Specifically, this means that for some countries such as the United States, China, India and many countries in the European Union, it is imperative to develop and commercialize clean coal and carbon capture and storage technologies. While the scientists and engineers have proven a number of such technologies are possible, the challenge will now be to begin building power generation plants that incorporate these technologies in a manner that is both commercially viable and on a scale large enough to have a measurable impact.

Against this background, it is clear that China and the United States must become partners in technological innovation, policy development, and the promotion of standards, regulations, incentives, and enforcement mechanisms. Transparent methods for measuring, reporting, and verifying environmental performance need to be established. This will require the funding of major investments in both countries. Given China's level of economic development, it will also require the development of mechanisms and policy changes in both countries to support new technologies and the transfer of new and existing technologies to China.

Solutions will require a stable investment climate, global coordination, intellectual property protection, and reliance on market forces, as well as regulatory and market-based incentives to alter existing consumption patterns and diversify energy portfolios.

In the near term, both countries need to focus

primarily on increasing energy-use efficiency and conserving and diversifying energy supplies. Simultaneously, these early efforts should be designed to result in lower emissions of pollutants and greenhouse gases. Altering the longer-term outlook significantly will require additional major political and economic commitments.

The International Energy Agency's business-as-usual energy forecasts reflect real demands that will only be altered through major shifts in attitudes that create a willingness to change existing behavior. Such change will require:

- The education of political leaders and public opinion makers
- The creation of appropriate standards and measurements
- The development of regulations and incentives
- The establishment of monitoring and enforcement mechanisms and capabilities
- The empowerment of governments and industry
- The empowerment of the general public

These efforts will all need to be done on a massive scale to have a significant impact within the next 15- 20 years. Without a major refocusing of nearer-term efforts, the goals of dramatically improving the world's energy security and environmental outlook by the middle of the century are not likely to be realized.

The challenge for China to curb energy intensity and greenhouse gas emissions is even greater than for the United States owing to its state of development.

Even with China's impressive recent economic performance, the gap between its citizens' standard of living and that in the developed countries is enormous. In the United States the challenges are also formidable as changing the existing culture and markets will require overcoming the inertia associated with consumption patterns premised on the abundant availability of low cost resources.

Given the magnitude of the task and the urgency for change, it would be inappropriate to wait for the grand policy debates currently underway on energy and environmental issues to be finalized before moving ahead to do all we can with existing and newly evolving technology and knowledge.

The United States took a major step forward with the signing of the Energy Independence and Security Act of 2007 on December 18, 2007. The bill is complex and covers many new initiatives. The legislation will significantly increase U.S. energy efficiency by mandating a 35 miles per gallon average fleet fuel economy by 2020 for cars and light trucks (a forty percent improvement over current requirements). For the first time programs to set fuel economy standards for medium and heavy-duty trucks and work trucks are also established. The renewable vehicle fuel target was raised to 36 billion gallons by 2022 with 21 billion gallons to be obtained from advanced biofuels, such as cellulosic ethanol. For the first time the bill states that Congress believes "that by January 1, 2025, renewable resources should provide not less than 25% of total energy consumed in the U.S. and continue to provide safe, abundant and affordable food, feed and fiber."

The bill also specifically addresses many of the topics discussed during the Dialogue such as:

- Improving the energy efficiency of lighting and appliances
- Establishing a green building program for federal buildings
- Accelerating research on solar and geothermal
- Expanding the research programs on carbon capture and storage, increasing the funding for seven large-scale demonstration projects and developing a regulatory framework for such projects

While the bill legislates a large number of new initiatives, the magnitude of the challenge will require even greater actions and ongoing adjustments in the years ahead to reflect changing knowledge and technical developments.

During the Dialogue, participants agreed on a number of fundamentals on:

The global energy situation:

- Energy security and climate change are interrelated strategic challenges, which no one country can solve alone.
- Both countries accept the need to address global climate change challenges, and both favor applying the principle of “common but differentiated responsibilities” in designing post-2012 global obligations.

National energy outlooks:

- In both countries energy requirements will continue to grow, with China’s growth expected to be significantly greater.
- Both face growing requirements for imports of oil and natural gas, and the world’s continued reliance on remote and unstable oil and gas supplies carries significant risk.

- In both countries there will remain a high reliance on coal, especially for electric power. In China, new electric generating capacity of 100 Gigawatts is currently being constructed each year. At the end of 2007, China will have an installed power capacity of over 700 Gigawatts, and this will probably increase to 1,300 Gigawatts by 2020. (Note: China has a policy that inefficient and highly polluting coal fired plant capacity should be decommissioned each year.)

Opportunities for change:

- Energy efficiency improvements are a key priority in both the U.S. and China, although major reductions in China’s energy intensity will also require major structural adjustments to its economy.
- Both need to diversify the mix and type of energy supplies utilized for electric power generation with increased emphasis on renewables and nuclear.
- Both also need to diversify the mix and type of transportation fuels.
- Both share significant concerns over a worldwide shortage of qualified scientists, engineers and technicians.
- China’s ability to make further substantial progress on reducing greenhouse gas emissions in the near-term will be significantly enhanced if there is a major transfer of technology from developed countries.
- Both view cooperative research, development, and demonstration (RD&D) as a necessary approach to obtaining the technological innovations required to sustaining economic growth while contributing substantially to reducing the potential for extreme climate change.

- Both realize that funding mechanisms and investment regulations need to be established to accelerate the development and commercialization of new technologies.
- Both countries recognize the need to rely on mandatory as well as voluntary programs.

During the Dialogue, participants identified numerous opportunities for expanding an existing high-level of cooperation. Government policymakers and businesses in both countries should review these opportunities to determine which possibilities they should most vigorously pursue. Specific opportunities for further U.S.-China cooperation on energy security and environmental issues are listed in the following section. In some instances these recommendations may overlap or supplement activities agreed to in recently signed memoranda of understanding.¹ In other instances the recommendations relate to the possibility of an exchange of information on technical matters and policy effectiveness that could lead to improvements that could be independently implemented in parallel in both countries. In all cases, they are intended to accelerate activities that might otherwise only be undertaken over a much-extended timeframe. In doing so, it is important to note that the political and economic systems of the two countries have sufficient differences, and that these need to be taken into account in determining what will be effective actions.

A number of these recommendations involve joint R&D and commercialization efforts that should be undertaken or supported by the U.S. Government in the development of new technologies. It is important to note that American companies should be expected to engage in commercial ventures only if there is reasonable expectation of profit and under circumstances in which

proprietary technology will be safeguarded. Both countries acknowledge that technology transfers will be crucial to promoting energy security and environmental protection as China continues to accelerate its energy consumption as an engine of economic growth. But such transfers must be based on realistic economic expectations on both sides, including adequate protection of intellectual property.

¹ In addition to the U.S.–China Strategic Economic Dialogues held during 2007 there were Memorandums of Understanding signed on Vehicle Efficiency Cooperation, Biofuels Cooperation, and Industrial Energy Efficiency Cooperation.

Recommendations for U.S.- China Cooperation

Opportunities to improve energy efficiency and reduce emissions:

- 1) Create a cooperative working group to develop standard national measurement, reporting and verification procedures on emissions.
- 2) Establish training and education programs to greatly expand the manpower available to report and enforce regulatory requirements throughout China. This would only be effective if accompanied by Chinese commitment to fund and staff such an expansion at the national and local levels throughout China.
- 3) Jointly study the effectiveness of national, state and municipal incentives and regulations designed to encourage energy savings. The formulation of institutions and mechanisms to obtain an optimal allocation of resources through the use of market forces such as pricing and taxation will be important for China to improve energy efficiency and environment impacts. In this aspect the United States could provide some assistance in light of its experiences. Develop a set of recommendations that would achieve common goals/approaches and determine how to apply them through parallel actions in each country. Work with various industry groups, private companies and governmental agencies.
- 4) Establish education programs and training in undertaking energy audits and benchmarking. Develop common understanding and commitments to ISO standards and the value of building quality assurance into manufacturing processes.
- 5) Establish a common set of appliance efficiency standards. U.S.-Chinese standards could also be made consistent with those in the European Union.
- 6) Establish a program to identify technologies and companies, both Chinese and American, which would be capable of meeting advanced standards. Design a program with U.S. government and industry input and sponsorship.
- 7) The United States should support U.S. companies' efforts to establish commercial ventures in China through programs identified in section 911 of the Energy Independence and Security Act of 2007.
- 8) China and the United States should establish a group to examine the workings of the Clean Development Mechanism (CDM) and develop recommendations for ensuring that global emissions will be reduced through its functioning. Particular emphasis should be given to determining how to award credits for reforestation and the preserving of forests. We may want to consider undertaking this activity within the UNFCCC. Note: China has been successfully working with the CDM, and the National Development Reform Commission has approved more than US\$7 Billion in projects.
- 9) Expand the series of industry benchmarking studies to identify specific operational changes needed to improve energy efficiency to more than the 12 industries already covered by the September 3, 2007, Memorandum of Understanding on building institutional capacity for industry to work with China.
- 10) Jointly work with governmental and independent organizations supporting and establishing green building standards to develop incentive and regulatory frameworks for accelerating the implementations of these standards on new and existing buildings.
- 11) Establish a program to pilot and demonstrate the technology for zero energy-use buildings, and develop criteria on when and where to apply. Develop specific incentives and

financial support for developers and establish governmental programs to lead application of technology. Introduction of this technology needs to be accelerated and expanded.

- 12) Consult each other on the establishment of processes and programs for the evaluation of the effectiveness of policies, and for improving the initial analysis of policies. Goal is to reduce the potential for ineffective policies and/or unintended consequences.

Opportunities to increase the funding of new technology:

- 1) Establish a fund or set of funds with adequate resources to support the introduction and faster transfer of specific new technologies. Funds could be designed to support the movement of new technologies between the two countries. China, as well as the United States, is in the process of developing new technologies. Technologies owned by governments, institutions or private industry would need to be protected by intellectual property rights and undertaken on an appropriate commercial basis.
- 2) To promote transnational investments, the two countries should enter into a dialogue and seek to generate guidelines and/or reach an agreement, or set of agreements, that would clarify the conditions under which Chinese investment into the United States will be welcomed and U.S. investment into China will be welcomed.
- 3) Review existing laws that need to be strengthened to permit a greater flow of new technology into China on a sound commercial basis. Premier Wen Jiabao has noted that both China and the United States will benefit from further changes in the protection of intellectual property rights.

Opportunities to expand the safe utilization of nuclear power²:

- 1) China and the United States could establish a working group of industry and governmental agencies to determine if it is an opportune time to hold a joint review of their nuclear programs designed to migrate from Generation III reactors to Generation IV reactors that will dramatically reduce nuclear waste, reduce the production of weapons-grade materials, and reduce the long-run potential for uranium shortages. Specifically, this might lead to cooperation on the faster development of transmutation processes, with a pooling of intellectual and financial capital. It is important to note that China's long-term program appears to be very similar to that being pursued by the United States through the Global Nuclear Energy Partnership (GNEP).
- 2) A joint program could be undertaken to develop commercial reprocessing of spent fuel to reduce storage of waste with dramatically shorter half-life, and create more efficient fuel cycles. This could be coordinated with U.K. and French activities.
- 3) Government and industry in China and the United States should determine if it would be appropriate to cooperate on the joint development and commercialization of gas-cooled pebble bed reactors that could lead to the economic deployment of smaller sized and inherent safe nuclear power plants that would allow for better distributed electricity production in China and the United States, as well as throughout less-developed countries.
- 4) Establish cooperative programs between U.S. and Chinese nuclear power companies to improve

² China has committed US\$ 1.4 billion (about 10 %) to the cost of the International Thermonuclear Experimental Reactor (ITER) to be built in France and expected to go on line by 2016. The EU, Japan, China, Russia, the U.S. and India are supporting the project.

plant performance by increasing capacity factors and reducing refueling outages.

- 5) Establish a pilot program whereby U.S. and Chinese firms cooperate on engineering design, construction, and commissioning by exchanging knowledge, practices, and manpower.

Opportunities to create and commercialize clean coal technologies³:

- 1) Accelerate the development of Integrated Gasification Combined Cycle (IGCC) plants with carbon capture and storage (CCS) by having the United States provide assistance to the National Development and Reform Commission (NDRC) in the mapping of sites with potential for CCS. Based on the findings, identify Chinese firms in close proximity to these sites and provide financial support for the creation of additional U.S.-Chinese partnerships similar to that between Peabody Energy Corp., China Shenhua Energy Co. and Huaneng Power International, Inc.
- 2) The United States should offer to provide experts to undertake a national study on the characteristics of Chinese coal and identify potential for improving power plant efficiencies and lowering emissions by using beneficiated coal.
- 3) Create joint research and development programs with National Energy Technology Laboratory (NETL) on a range of subjects, including new technologies for removing particles and heavy metals, and novel technologies for carbon capture and storage.
- 4) Undertake parallel information exchange

³ With the Ministry of Science and Technology (MOST) financial support, the China Huaneng Group was participating in the U.S. Department of Energy's FutureGen project that would have used coal to produce electricity and hydrogen while limiting pollutants and greenhouse gas emissions.

activities to assist in environmental and economic assessments to accelerate the potential development of coal-to-liquid plants with carbon capture technology.

- 5) Consult and undertake parallel activities to establish regulatory and legal framework for dealing with ownership and liability issues related to carbon capture and storage.

Opportunities to accelerate the utilization of renewable power:

- 1) Cooperate in the development of equipment standards to accelerate international transfer of technology.
- 2) Develop a master list of companies and technologies with potential for utilization in renewable electric power that could be used to identify opportunities for cross-national partnerships.
- 3) Assist in the assessment of wind power resources and the planning of most appropriate technologies and installation designs.
- 4) Generate joint private industry and governmental research into mechanics, materials and designs to maximize the efficiency and effectiveness of wind power. Private companies' intellectual property rights would need to be protected.
- 5) Jointly cooperate on the identification of potential benefits and opportunities for the use of biofuels in coal power plants and for direct burning. Depending on findings examine the potential for U.S.-Chinese partnerships.
- 6) Assist each other in developing technologies and procedures required to manage the grid with distributed power utilizing multiple renewable sources.

- 7) With support from the electric power industry, design and implement the technology and systems required for a “smart grid.”
- 8) Assess opportunities to combine the use of renewable power with demand management.
- 9) Provide funding for joint public/private research and development of solar technologies to support both grid and off-grid power.
- 10) Jointly assess the effectiveness of various fiscal and financial incentives, as well as the use of feed-in tariffs at accelerating the development of renewable power.

Opportunities to transform transportation industries:

- 1) Design incentives and financial support to American and Chinese auto manufacturers to encourage the more rapid introduction and utilization of Plug-in Hybrid Electric Vehicles (PHEVs).
- 2) Support China’s development of a Strategic Petroleum Reserve, by holding a dialogue on the advantages and limitations of maintaining petroleum crude oil and product reserves, including an assessment of risks and costs. Coordinate on designing procedures for including China (and India) in the IEA and for increasing producing country data transparency.
- 3) Joint research on the development and introduction of new fuels including:
 - a. Cellulosic ethanol. Accelerate or supplement activities identified in the December 2007 memorandum of understanding.
 - b. Coordinate research on lowering the cost of hydrogen production from coal and nuclear power plants.
- 4) Collaboratively study and develop capacity to transform transportation systems by:
 - a. Working with American and Chinese universities to develop a comprehensive educational program on designing and managing holistic inter-modal transportation systems.
 - b. Establishing a working group of cities and universities in the United States and China to assist in the design of public transportation systems to reduce urban motor congestion and pollution.
 - c. Consult on the requirements for an integrated information system for transportation services.
- 5) Establish working group of regional governments (cities and states or provinces) to assess the effectiveness of regulatory, fiscal, and financial incentives to more rapidly introduce new vehicle technologies.
- 6) Assist China in assessing the feasibility of introducing tighter diesel fuel standards, more consistent with those in the United States and European Union.
- 7) Collaborate on designing and undertaking national assessments of the land and water resources available to support biofuels.
- c. With American private companies, establish some joint U.S.-Chinese partnerships for the development and commercialization of fuel cells.

Conclusions

The Dialogue indicated that there remain substantial opportunities for increasing the level of cooperation between the United States and China in addressing the challenges of increasing energy security while addressing environmental concerns. In the last few years there has been a drive in both countries to develop new energy policies and to utilize market forces to alter the pattern and efficiency of energy consumption. However, it is now apparent that the scale of this activity has not been large enough to meet the challenges posed by the current energy outlook. There needs to be a substantial increase in the level of investment in the development and commercialization of new technologies in both countries. This will require a substantial increase in funding and, in the case of China, a transfer of technologies from the developed countries, but that will need to be done on a commercial basis. It will also require a stronger effort by the Chinese government to protect the intellectual property of foreign companies engaged in technology transfer. Increasing the already high level of cooperation between the United States and China could play a significant role in accelerating the process of creating a greater level of global energy security and a reduced risk of destabilizing global climate changes.

This report will be distributed to governmental and industry organizations in both countries in order to identify their feasibility and the priority with which they could be undertaken. A subsequent meeting will be held to prioritize and refine the recommendations based on input received from interested parties in both countries.

Appendix I AGENDA

U.S.-China Energy Security Cooperation Dialogue

Building Strategic Understanding and Cooperation on
Energy Security between the United States and China

December 10-12, 2007

Conference to be held at Tsinghua University
Simultaneous translation of presentations will be provided

December 10—Monday

1800 Welcome Dinner hosted by Tsinghua University with opening remarks by Tsinghua representative and U.S. representative.

December 11—Tuesday

0830-0845 Opening comments by Shi Dinghuan and Richard Lawson

0845-1020 **Session I:** Vision of Energy Future and Near Term (next 10-15years) Policies in China and U.S.

Chinese Co-chair: Wu Zongxin
U.S. Co-chair: Katharine Fredriksen

- What factors are causing the continuing increase in energy consumption in China and the United States? What are implications for environmental pollution and greenhouse gas emissions?
- What can China and the U.S. do to improve the energy efficiency of current infrastructure and to reduce pollution? What pricing policies, fiscal and regulatory actions can mitigate the rise in energy consumption and pollution? What measures can be taken to encourage and enforce implementation of national policies at the local level?
- What are the further opportunities for U.S.-China cooperation? Are existing cooperative efforts moving fast enough? Are they effective? What can be done to improve and/or expand cooperation?

China Presentations: (20 minutes) Wu Zongxin, Tsinghua University

China Presentations: (20 minutes) Yu Chong, Energy Research Institute

U.S. Presentations: (25 minutes) Katharine Fredriksen, Office of Policy and International Affairs,
U.S. Department of Energy

Discussion: (30 minutes)

1020-1035 Coffee Break

1035-1225 Session II: Longer term (15 years plus) Solutions and Strategies to Create Sustainable Outlook in Each Country

Chinese Co-chair: Zhou Dadi

U.S. Co-chair: Frank Kramer

- Longer-term energy perspective
 - o How to encourage the adoption of new technologies
 - o Role of research and development support
 - o Role of international standards and institutions
- Strategies and measures to address global climate change
 - o How to reduce energy carbon intensity
 - o Potential use of carbon taxes and carbon trading regimes
- Are there technical, economic and political obstacles to US/China cooperation in implementing these strategies?
- How can we cooperate to eliminate or reduce national barriers to sharing energy and environmental technologies, including tariffs and non-tariff barriers?

U.S. Presentations: (20 minutes) Frank Kramer**U.S. Presentations:** (20 minutes) David Hawkins, NRDC**China Presentations:** (20 minutes) He Jiankun, Vice President, Tsinghua University**China Presentations:** (20 minutes) Zhou Dadi, Energy Research Institute**Discussion:** (30 minutes)**1225-1340** Lunch**1340-1530 Session III:** Nuclear Energy: Potential for new nuclear technologies

Chinese Co-chair: Wen Hongjun

US Co-chair: Joseph Snyder

- Outlook for nuclear power and can we expand and accelerate cooperation on nuclear power? What are the obstacles to such cooperation and if they can be overcome, what steps are necessary?
- Operating under GNEP, can the U.S. and China agree on and promote common global rules, structures and norms for managing the spread of nuclear technology in a way that does not increase the availability of nuclear material for weapons?

China Presentations: (20 minutes) Wen Hongjun, China National Nuclear Industry Company**China Presentations:** (20 minutes) Chen Jing, INET, Tsinghua University**U.S. Presentations:** (20 minutes) Nat Sadownik, Shaw, Inc.,**U.S. Presentations:** (20 minutes) Joseph Snyder—Presentation prepared by Dr. Paul Lisowski, Director of Global Nuclear Energy Partnership, U.S. Department of Energy**Discussion:** (30 minutes)

1530-1545 Coffee Break

1545-1715 **Session IV:** Role of Clean Coal Technologies

Chinese Co-chair: Wang Shujuan

U.S. Co-Chair: Richard Lawson

- Prospects for Carbon Capture and Storage; liquids from coal and coal/biomass conversion
- Opportunities to improve the efficiency of coal consumption through coal washing, power plant operations and use in industrial, commercial and residential boilers
- How can we expand and accelerate US/China cooperation on commercialization and dissemination of Clean Coal Technologies?

U.S. Presentations: (20 minutes) Chuck Taylor, NETL

U.S. Presentations: (20 minutes) Richard Lawson

China Presentations: (20 minutes) Wang Shujuan, Tsinghua University

Discussion: (30 minutes)

1745 Reception hosted by Atlantic Council and ISAID at Tsinghua

December 12—Wednesday

0830-1020 **Session V:** Role of Renewable Energy for Electric Power

Chinese Co-chair: Wang Zhongyin

U.S. Co-chair: Banning Garrett

- What is the potential role for renewable power technologies?
- Need for fiscal, regulatory and enforcement support to realize potential.
- Progress report on implementation of the Renewable Energy Law in China.
- Identify opportunities for cooperation on the development and commercialization of renewable technologies? What are the technical, economic and political obstacles to such cooperation?

China Presentations: (20 minutes) Wang Zhongying, Energy Research Institute

China Presentations: (20 minutes) Zhang Xiliang, Tsinghua University

U.S. Presentations: (40 minutes) Eric Martinot, Global Outlook, Tsinghua University and a presentation prepared on U.S. Outlook by Jodie Rousell, ACORE

Discussion: (30 minutes)

1020-1035 Coffee Break

1035-1225 Session VI: Increasing oil security by transforming the Transportation Sector in a Carbon-constrained World

Chinese Co-chair: Li Zheng

U.S. Co-Chair: John Lyman

- Alternative transportation fuels, excluding liquids from coal
- Creating sustainable transportation systems
 - o New types of vehicles
 - o Getting transportation on the Electric Grid
 - o Changing urban transportation modes
- Enhancing oil security thru diversification, sharing of stocks, the Role of Strategic Petroleum Reserves, and improving producer/consumer relations
- Opportunities for cooperation

China Presentations: (40 minutes) Li Zheng, Lu Huapu, Tsinghua University, Liu Keyu, CNCP**U.S. Presentations:** (20 minutes) John Lyman presentations prepared by Dr. Phyllis Yoshida (Alternative Transportation Fuels) Freedom Car and Fuel Partnership, Director, DOE, and by Prof. Joseph Szyliowkz (Sustainable Transportation) University of Denver;**U.S. Presentations:** (20 minutes) Mikal Herberg, (Enhancing Oil Security) National Bureau of Asian Research**Discussion:** (30 minutes)**1225-1245** Closing Comments by Frank Kramer and Chinese representative**1245-1345** Buffet Lunch**1345-1445** Sponsors meet to discuss next steps

Appendix II List of Participants

U.S. Participants:

Jonathan Adams, Deputy Director, Institute for Sino-American International Dialogue

Katharine A. Fredriksen, Principal Deputy Assistant Secretary of Energy for Policy and International Affairs

Patrick deGategno, Assistant Director, Asia Programs, Atlantic Council of the United States

Banning Garrett, Executive Director, Institute for Sino-American International Dialogue

Lee Hwa Gebert, Office of Policy and International Affairs, DOE

Mikkal Herberg, Director of Asian Energy Security and Globalization, the National Bureau of Asian Research

S.T. Hsieh, Professor, Tulane University; Director, US/China Energy & Environment Technology Center

David Hawkins, Director Climate Center, National Resource Defense Council

Franklin D. Kramer, Chairman, Asia & Global Security Committee, Atlantic Council
former Assistant Secretary of Defense for International Security (ISA)

General Richard Lawson, Vice Chairman, Atlantic Council of US; Chairman, Energy and Environment Program,
Atlantic Council; former President, National Mining Association

John R. Lyman, Director, Program on Energy and Environment, the Atlantic Council of the United States; former
Vice President, Amoco Corporation

Erica McCarthy, Assistant Director, Program on Energy and Environment, the Atlantic Council of the United
States

Eric Martinot, Tsinghua-BP Clean Energy Research and Education Center

Robert S. Price, President, International Risk Strategies LLC; former Department of Energy

Michael Reed, Senior Systems Analyst, National Energy Technology Laboratory

Nat Sadownik, Vice President, Nuclear Services, the Shaw Group, Inc., Shanghai

Joseph Snyder, Director, Asia Programs, Atlantic Council; former Executive Director, Asia Society Washington
Center and officer in U.S. State Department

Chuck Taylor, Director of Chemistry and Surface Science Division, National Energy Technology Laboratory

Additional U.S. Presentations prepared by:

Dr. Paul Lisowski, Deputy Director, Office of Nuclear Energy, DOE

Jodie Roussell, Chief Operating Officer, American Council on Renewable Energy (ACORE)

Prof. Joseph Szyliowicz, Graduate School of International Studies, University of Denver

Dr. Phyllis Yoshida, FreedomCAR and Fuel Partnership Director, DOE

Chinese Participants:

Shi Dinghaun, Counsellor of the State Council of P. R. China

Wu Zongxin, Counsellor of the State Council of P. R. China, Director, Energy and Environment Technology Center, Tsinghua University

Yu Cong, Director, Beijing Energy Efficiency Center, Energy Research Institute, NDRC

He Jiankun, Vice President of Tsinghua University, Tsinghua University

Zhou Dadi, Former Director General, Energy Research Institute, NDRC

Wen Hongjun, Chief Engineer, China National Nuclear Industry Corp.

Chen Jing, Director, Nuclear Chemistry and Engineering Division, INET, Tsinghua University

Wang Shujuan, Associate Professor, Depart of Thermal Engineering, Tsinghua University

Wang Zhongying, Director, Center for Renewable Energy Development, Energy Research Institute, NDRC

Zhang Xiliang, Director, Energy System Analysis Division, INET, Tsinghua University

Li Zheng, Director, BP Clean Energy Research & Education Center, Tsinghua University

Lu Huapu, Director, Institute of Transportation Engineering, Tsinghua University

Liu Keyu, Vice Director General, CNCP Research Institute of Economics and Technology

Chu Shulong, Deputy Director, Institute of International Strategy and Development, Tsinghua University

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