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**Hearing on China's Energy Consumption and Opportunities for U.S.-China  
Cooperation to Address the Effects of China's Energy Use**

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Thank you for the opportunity to testify at today's hearing on China's energy consumption and opportunities for U.S.-China cooperation to address the effects of China's energy use. My name is Barbara Finamore. I am director of the China Program at the Natural Resources Defense Council (NRDC). NRDC is an international nonprofit environmental organization with more than 1.2 million members and online activists. Since 1970, our lawyers, scientists, and environmental specialists have worked to protect the world's natural resources, public health and the environment. NRDC has offices in New York City, Washington, Los Angeles, San Francisco, Chicago and Beijing.

I am also the co-founder and President of the China-U.S. Energy Efficiency Alliance. The Alliance is a nonprofit organization whose mission is to promote global sustainability by working with China to harness efficiency as a viable energy resource. Through its Board of Directors, Leadership Council, and Technical Advisory Group (TAG), the Alliance receives guidance and support from a variety of U.S. and Chinese leaders in energy efficiency technology, economics, policy and advocacy, and transfers that expertise into practical solutions to energy and environmental needs in China and the US. Active U.S. Alliance members include the California Energy Commission and Public Utility Commission, all three of California's investor-owned utilities, Lawrence Berkeley National Laboratory, Nth Power, the Energy Foundation, the Regulatory Assistance Project, and the Green Energy Economics Group.

My testimony will focus on three of the questions raised by the Commission: (1) the role of nongovernmental organizations in supporting energy and environmental policy initiatives in China, (2) the policies China can promote to encourage greater energy efficiency, and (3) how the United States and other nations can support development and implementation of these policies.

- 1. How can nongovernmental organizations support energy and environmental policy initiatives in China, and what role can they play in addressing the effects of China's energy consumption?*

Environmental NGOs such as the Natural Resources Defense Council and the China-U.S. Energy Efficiency Alliance can and do play a critical role in supporting energy and environmental policy initiatives in China. Given the necessary expertise, independence and on-the-ground experience, such NGOs can become influential advisors to China because they are not trying to further a political agenda or make a profit. NGOs are also often able to respond more quickly than governmental or multinational organizations to requests from China for assistance on particular issues. Most importantly, by making a long-term commitment to working in China, NGOs can provide both the sustained advocacy necessary to persuade China to develop sustainable energy and environmental policies, and the even harder efforts necessary to help China implement those policies. When NGOs work in partnership with experts from the private sector and governmental agencies – such as through the China-US EE Alliance - the impacts are even greater.

For more than 10 years, NRDC has been working in China with local partners to address some of the world's greatest environmental challenges and help create innovative

solutions for a cleaner, healthier environment. Our work in China builds on our longstanding expertise in the United States and elsewhere in the areas of energy, health, market transformation and environmental enforcement. NRDC's primary role in China is to support leading domestic efforts on environmental protection. We believe that successful, sustainable efforts at environmental protection must be driven from within China and are proud that NRDC has been on the ground in Beijing and around the country to help accelerate these efforts. To this end, we have partnered with the key actors in China's government, academia, non-governmental organizations, and legal community to help promote cutting-edge environmental solutions for China. NRDC is also partnering with the private sector, including multinational corporations, to help change supply chain practices that contribute significantly to China's environmental problems.

Our methods are varied. We work at the highest levels of government to assess key targets of opportunity, improve energy and environmental laws and policies, and transform market incentives. We also work at the local level on concrete pilot projects and grassroots efforts to build capacity and awareness. Our approaches are united by their potential to reduce energy demand and bring about major impact to the global environment.

NRDC was the first international environmental organization to establish a clean energy program in China. Over the last decade, our team of experts has helped China to develop clean, efficient and affordable energy and environmental policies, strategies and technologies. Our successes include:

- NRDC helped Chongqing, a city of 30 million people, develop China's first energy standard for residential buildings, which became a regional model. Since then we have assisted China's Ministry of Construction to craft national building standards that reduce energy needed for heating and cooling by 50 percent. NRDC also assisted the Chinese government in developing tough lighting standards for buildings that could stop 60 million metric tons of carbon from being sent into the atmosphere each year.
- To reduce the energy loss associated with power supplies (which waste as much as 70 percent of incoming electricity), we led a global, multiyear effort to establish a single worldwide specification. Fully adopted, this specification could help to avoid carbon emissions in China equivalent to that of taking 600,000 to 650,000 vehicles off the road.
- NRDC and the Alliance are working with Chinese experts to develop large-scale energy efficiency incentive programs that use a portion of electricity rates to promote widespread adoption of energy efficient technologies. Our analysis shows that such programs could avoid the need to build 500 to 700 coal-fired power plants in China over the next decade.

- Jiangsu, California's sister province, has relied extensively on NRDC and the Alliance to design China's first large-scale incentive program for installation of efficient technologies. Over the past four years, Jiangsu has implemented over 200 demand side management projects, completed the construction of a 150 MW "efficiency power plant" project, leveraged over \$300 million public and private investment and reduced CO<sub>2</sub> emissions by 2 million tons of carbon dioxide per year. China's Premier Wen Jiabao and Vice Premier Zeng Peiyuan recently cited Jiangsu's program with approval and have submitted it to China's State Energy Office with instructions to promote it as a national model.
- As part of a collaboration between the U.S. Department of Energy and China's Ministry of Science and Technology, NRDC managed the development of China's first internationally certified green building, which uses only one-quarter of the energy and produces only 40 percent of the wastewater of a typical Beijing office building. For this work, we received China's first Green Building Innovation Award. Most recently, NRDC assisted the Ministry of Construction in developing the first national green building design standard for China.
- For the last five years, NRDC has promoted the use of technologies that can help reduce pollution and the carbon impacts of coal, such as coal gasification with carbon capture. Our advocacy efforts helped to make coal gasification-based polygeneration one of the top priorities in China's 2006-2015 National Research and Development Plan. We also supported the creation of a national roadmap on coal gasification development that has led to the construction of several large demonstration facilities to be completed by 2010.
- On the local level, NRDC has also worked with partners to promote biofuels and hydrogen fuel cells in China. Our efforts resulted in the establishment of the Shanghai Partnership for Fuel Cell Vehicle Commercialization, a public-private program modeled on the successful California Fuel Cell Partnership.
- NRDC worked with China's State Environmental Protection Administration (SEPA) to create a comprehensive inventory of all significant industrial uses of this toxic metal in China. We identified a large, unique use in China's chemical industry that had not previously been recognized in the international literature. We are working with SEPA to identify safer alternatives to mercury in all major areas where it is used and to provide the scientific basis for further policy and regulatory development. We are bringing international experts to the table to help develop alternatives to mercury in instances where commercially viable alternatives do not currently exist.
- NRDC is working with local researchers and environmental officials to support the innovative Greenwatch environmental ranking system in Jiangsu Province. We are identifying factories and industrial sectors with large potential for environmental improvement in preparation for work with multi-national corporations to "green" their supply chains. NRDC will work with multi-national

retailers and manufacturers to develop “preferred supplier systems” and other incentives for factories with strong environmental performance in key industrial sectors. We will highlight opportunities to improve lagging facilities, and continue to promote the capacity of Jiangsu and other provinces to implement this innovative system.

2. *What policies can China promote to encourage greater energy efficiency? How could the United States support development and implementation of these policies?*
3. *What kind of support does the China need from the United States and other nations and multilateral organizations in order to successfully improve its energy consumption patterns and the resulting consequences?*

Energy efficiency is the largest, cheapest, fastest, and greenest resource available to solve the global warming problem. A year-long study recently completed by the McKinsey Global Institute (MGI) found that a concerted global effort to increase energy productivity – or the level of output we achieve from the energy we consume – could cut global energy demand by half or more over the next 15 years.<sup>1</sup> This would in turn contribute up to half of the greenhouse gas (GHG) emission abatement required to cap the long-term concentration of GHGs in the atmosphere at 450 to 550 parts per million.

Without increases in energy productivity, over one-third of the projected growth in global energy demand will be in China. Yet MGI also found that China can contribute more to improving energy productivity than any other country, because it starts from a lower base, is growing more rapidly than any other country, and can thus adopt the latest technologies at a lower cost. In fact, the MGI report concluded that two of the top three priorities for global efforts to improve energy productivity should be to help China build its new factories and buildings to global energy efficiency standards.

China recognizes that improving energy efficiency is essential to its own economic development and environmental sustainability. Its campaign to reduce national energy intensity – the energy used per unit of GDP – by 20 percent by 2010 is the most ambitious in the world. Yet China failed to meet this target after the first year of the campaign, prompting Premier Wen Jiabao to appear on a national teleconference to urge the country to intensify leadership and strengthen implementation in order to meet the targets. This level of central government pressure is strong evidence that, at least at the national level, China has the political will to tap into its enormous resource of energy efficiency opportunities.

Yet although it may have the will, it still lacks the way. China faces several strong obstacles to achieving its goals: lack of capacity to implement the energy efficient building codes already on the books, lack of information on best practices and cost-

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<sup>1</sup> “Curbing Global Energy Demand: The Energy Productivity Opportunity,” McKinsey Global Institute (May 2007). [http://www.mckinsey.com/mgi/publications/Curbing\\_Global\\_Energy/index.asp](http://www.mckinsey.com/mgi/publications/Curbing_Global_Energy/index.asp)

effective technologies, and, perhaps most important, lack of an adequate long-term funding mechanism to help energy users afford more efficient industrial equipment, commercial lighting and cooling technologies, and residential appliances. The United States and other nations can make an enormous contribution to China's efforts by helping China overcome these obstacles.

### ***Implementation of Building Energy Codes***

New construction in China is continuing at an unabated and growing pace - two billion square meters annually. China is home to half of the world's new buildings, making it the world's largest construction site. This immense rate of new construction presents both a challenge and an opportunity. The challenge is to turn around a vast industrial sector where emphasis is placed on making quick money in construction by using business-as-usual practices. However, the opportunity is that most of China's infrastructure of buildings planned for the year 2050 has yet to be constructed. By influencing new construction now, we will be able to help China lock in energy savings for the long term.

The Chinese government considers the adoption of energy-efficient technologies in buildings to be an essential path to ease its expanding energy crisis, and is actively seeking assistance. The country's latest five-year plan (2006-2010) calls for full implementation of China's existing building efficiency standards, which NRDC helped to develop. These standards require energy savings of 50% for new buildings nationwide and up to 65% for buildings in four large municipalities (Beijing, Shanghai, Tianjin, and Chongqing). China's Ministry of Construction has determined that full compliance with these standards would save 420 million megawatt-hours and more than 800 million tons of carbon dioxide annually. Yet only about 10% of new commercial buildings and 15% of new residential buildings are now complying.

NRDC is working with private and government partners in China to help develop an understanding of the chain of policy interventions necessary to overcome failures of the market and develop a culture of continuous improvement in energy efficiency, taking new technologies from the laboratory or best international practice first to the most innovative markets in China and later into the mainstream. The keys to this process are energy code development and implementation and financial incentives.

Because this approach requires the interaction of different policies that all lead to the same result – policies that can accomplish more in combination than any of them can do individually – NRDC will continue to work on the integration of a government-based code implementation process, and develop options for a parallel and complementary private-sector code-like implementation process that can be used by private property owners for their own economic benefits, as well as the achievement of national goals. Integration of these processes into demand-side management pilot programs and larger programs that are currently being developed (see below), and incorporation of long-term financial incentives for major improvements in technologies into this whole mix, is another important part of policy development and implementation that we will undertake. We welcome other interested government, private sector and NGO parties to join us in this effort.

NRDC's experience in the United States can offer good examples and models for China at both ends of the spectrum – the broad-based, code-like end of the spectrum and the more narrowly-based, high-technology end.

At the broad-based end of the spectrum, NRDC is exploring the options of creating a private sector code implementation network in China, analogous to the network that the Residential Energy Services Network (RESNET) has established in the United States (see <http://www.resnet.us>). This network serves all parts of the spectrum in the United States—RESNET certification is accepted for code compliance in 17 states, used as the certification method for the voluntary Energy Star program, and used by builders to certify compliance with the new homes tax incentives, which target 50 percent reductions in energy use compared to national model codes.

Private sector certification would serve two purposes in China. First, it would provide a backstop for the government-based certification system, which is struggling even in the most advanced provinces to reach a quarter of the market. RESNET has recently received recognition by private sector agencies that certify “white certificates” which can be used in verifying energy efficiency certificates. A similar process in China could be developed as part of a Clean Development Mechanism (CDM) approach to provide financial compensation for property owners or government entities that can demonstrate, based on this certification method, significant savings in carbon compared to business-as-usual construction. The European Union's Chair of Energy Performance in Buildings recently announced that the RESNET standards fit in the EU model for measuring building energy performance, demonstrating the possibility for international harmonization and thus similar application of RESNET standards in China.

Energy certificates can also be used to establish property value in real estate markets. Although many market analysts in the United States make the mistake of assuming that energy costs are constant, independent of the characteristics of buildings, energy costs are being recognized by the American real estate industry (particularly the Building Owners and Managers' Association [BOMA]) as the largest controllable element of operating cost. It is likely that large property owners in China would be interested in getting assurances, beyond those currently available from the government, that the properties they are thinking of purchasing meet minimum standards for energy efficiency. In the coming year, NRDC will explore this issue further in China.

In addition, it has now been over a year since the United States Energy Policy Act (EPAct) of 2005's tax incentives for energy efficiency have been in effect. NRDC is beginning to see real data on the effectiveness of these incentives that will be relevant to the use of parallel structures in China. NRDC will present this information as soon as it is available to relevant decisionmakers in China.

Perhaps the most exciting early piece of information we already have is that in the state of California, where DSM programs have complemented the national tax incentives for efficient air conditioners, these super-efficient products (which, previous to the tax incentives, had represented only eight products out of a field of 100,000) accounted for 15 percent of the entire residential air conditioner replacement market in 2006.

For the other EAct incentives, implementation delays by the administrative branch of the U.S. Government have slowed the ability of the market to respond. For example, for new homes, the software that is necessary to certify compliance was not even available until late June 2006 and the initial guidance on software contained a technical error that made it more difficult for builders to comply than was intended. The fully corrected implementation methods were not available until the end of 2006. Notwithstanding these problems, over 8,000 homes are known to have complied with the tax credit, representing almost one percent of new construction in the U.S.

For non-residential buildings, the Administration has yet to develop regulations that fully comply with the law. Usable software that could demonstrate compliance did not become available until well into the spring of 2007. NRDC will be monitoring the results to see how quickly the market is able to respond to the incentives in EAct, and then work to apply the results as appropriate to China.

### ***Demand-Side Management – Financial Incentives for Energy Efficiency***

Even if fully implemented, standards tend simply to “bring up the bottom” by ensuring the worst offenders improve efficiency to a moderate level. As a complement to these efforts, NRDC is also pushing the market to higher levels of voluntary efficiency through helping China design and deliver demand-side management (DSM) energy efficiency financial incentive programs.

Why are financial incentives needed at all? Why not just rely on energy markets to elicit these patently cost-effective energy savings? Compelling responses have been marshaled in recent years by the National Research Council of the National Academy of Sciences, the U.S. Congress’s Office of Technology Assessment, the National Association of Regulatory Utility Commissioners, and the national laboratories, among many others. These reasons are equally applicable to China.

Although “[t]he efficiency of practically every end use of energy can be improved relatively inexpensively,”<sup>2</sup> “customers are generally not motivated to undertake investments in end-use efficiency unless the payback time is very short, six months to three years . . . The phenomenon is not only independent of the customer sector, but also is found irrespective of the particular end uses and technologies involved.”<sup>3</sup> Typically, customers are demanding 40-100+% rates of return from efficiency improvements.<sup>4</sup> Of

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<sup>2</sup> U.S. National Academy of Sciences Committee on Science, Engineering and Public Policy, POLICY IMPLICATIONS OF GREENHOUSE WARMING, p. 74 (1991). A more recent review of energy-efficiency opportunities and barriers appears in National Research Council, Energy Research at DOE: Was it Worth It? (September 2001).

<sup>3</sup> National Association of Regulatory Utility Commissioners, LEAST COST UTILITY PLANNING HANDBOOK, VOLUME II, at p. II-9 (December 1988).

<sup>4</sup> Amory Lovins points out that business investments in energy efficiency “are often taken from operational, rather than capital, budgets,” and that “US households typically require paybacks within two years to invest in energy –efficient appliances, an implicit discount rate over 40%/year – an order of magnitude higher than a social discount rate, and several times even a credit card cost of capital.” Amory Lovins & Kyle Datta, WINNING THE OIL ENDGAME: INNOVATION FOR PROFITS, JOBS AND SECURITY, at pp. 140-41 (2004).

course, such expectations differ sharply from those of investors in, for example, electric generation and natural gas infrastructure; there, utilities' returns on capital average 12% or less. This imbalance invites large, relatively low-return investments on the supply side that could be displaced with much less expensive energy efficiency. These widely documented market failures generate "systematic underinvestment in energy efficiency," resulting in electricity consumption at least 20-40% higher than cost-minimizing levels.<sup>5</sup> "The market reality is that nearly all businesses fall far short of buying the economically optimal amount of energy efficiency."<sup>6</sup>

There are many explanations for the almost universal reluctance to make energy efficiency investments.<sup>7</sup> Decisions about efficiency levels often are made by people who will not be paying the electricity bills, such as landlords or developers of commercial office space. Many buildings are occupied for their entire lives by very temporary owners or renters, each unwilling to make improvements that would mostly reward subsequent users. And sometimes what looks like apathy about efficiency merely reflects inadequate information or time to evaluate it, as everyone knows who has rushed to replace a broken water heater, furnace or refrigerator, whether in China or the U.S.

Market failures like these mean that energy prices alone are a grossly insufficient incentive to exploit even the most inexpensive savings: energy prices would have to increase about eightfold to overcome the gap that typically emerges in practice between the perspectives of investors in energy efficiency and production, respectively.<sup>8</sup>

One important policy mechanism for overcoming these market failures is investment in organized energy efficiency programs that are managed by electric and natural gas providers, states, or third-party administrators. Long experience with energy efficiency programs in North America and around the world demonstrate that energy efficiency can provide energy and capacity to the electric system in much the same way that a base load power plant does, but at lower cost. Whenever they operate, high efficiency end-use equipment and systems provide benefits in the form of avoided demand and, in this sense, are always available when needed. Because of this, end-use efficiency programs can be designed to deliver the energy equivalent of conventional power plants.

DSM is well proven in the U.S. and other nations to significantly reduce electric loads and reduce or reverse electric load growth at costs substantially less than conventional generation. In addition, these programs bring other benefits that are extremely attractive to China, including reduced environmental emissions, including SO<sub>2</sub>, CO<sub>2</sub>, NO<sub>x</sub> and mercury; reduced demand on coal supplies and distribution; increased reliability of transmission and distribution systems; and economic development.

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<sup>5</sup> See M. Levine, J. Koomey, J. McMahon, A. Sanstad & E. Hirst, Energy Efficiency Policy and Market Failures, 20 ANNUAL REVIEW OF ENERGY AND THE ENVIRONMENT, at pp. 535, 536 & 547 (1995).

<sup>6</sup> Amory Lovins & Kyle Datta, note 6 above, at p. 142 (2004).

<sup>7</sup> An extensive assessment appears in U.S. Congress, Office of Technology Assessment, BUILDING ENERGY EFFICIENCY, at pp. 73-85 (1992).

<sup>8</sup> National Association of Regulatory Utility Commissioners, note 5 above, at p. II-10.

After many years of discussion and debate, China has decided to adopt DSM as a key policy mechanism for achieving its ambitious energy intensity reduction goals. With the help of NRDC and the Alliance, Jiangsu Province has already launched China's first large-scale DSM energy efficiency incentive fund. Over the past four years, Jiangsu has implemented over 200 demand-side management projects, completed the construction of a 150 megawatt "efficiency power plant" project at a third of the cost, leveraged over \$300 million public and private investment and reduced CO<sub>2</sub> emissions by 2 million tons of carbon dioxide per year. China's Premier Wen Jiabao and Vice Premier Zeng Peiyuan recently cited Jiangsu's program with approval and have submitted it to China's State Energy Office with instructions to promote it as a national model.

Our plan for the next year is to help the Jiangsu Economic and Trade Commission (JSETC) and its DSM Center strengthen implementation of its DSM energy efficiency incentive program in order to (1) achieve further cost-effective and verifiable energy savings and carbon reductions, (2) pave the way for scale-up in Jiangsu in order to achieve full implementation, and (3) provide successful pilot project models, training and technical materials that will promote replication in other provinces of China.

In addition, as an exciting next step, China's central government has accepted a proposal from NRDC and the Alliance to cosponsor an international DSM Forum on July 24-25 in Beijing. The purpose is to introduce the Jiangsu DSM model and other international best practices on energy efficiency to a group of 300 official decision-makers and experts from throughout China. Vice Premier Zeng Peiyan will kick off the Forum, and two of China's most powerful government agencies – the National Development and Reform Commission and the Ministry of Finance – will co-host. We expect this forum to be an annual event. We hope that the Ministry of Finance will use the Forum to announce the creation of a national DSM energy efficiency fund based on the Jiangsu model.

China is also interested in learning how to ensure the administration, cost-effectiveness and transparency of its efficiency incentive fund. Immediately following the DSM Forum, NRDC and the Alliance will work with our Chinese partners to establish a team of Chinese and U.S. experts to produce a national guide on implementation, monitoring and verification of energy efficiency programs that is suited to local Chinese conditions. This will involve an exchange program to place key individuals from China in U.S. institutions for work and training periods (and vice versa).

China is a big country, and as described above, there are tremendous opportunities for the U.S. government and other nations, as well as private companies, universities, research institutes and other organizations to support the development and implementation of energy efficiency policies in China. The China-U.S. Energy Efficiency Alliance provides a powerful network for coordinating and leveraging our efforts. I thank the Commission for the opportunity to testify today, and would be delighted to explore opportunities for potential collaboration. The potential benefits to the U.S. as well as China are enormous.