The Environment in U.S.-China Relations: Themes and Ideas from Working Group Discussion on Energy Issues

by Aaron Frank

The People's Republic of China (PRC) is becoming an increasingly important player in international affairs, given its staggering 1.2 billion population, growing military and economic power, and ability to affect regional stability in Asia and important global issues. The United States recognizes that it needs Beijing's cooperation to achieve key regional and international objectives. Yet, U.S.-China relations continue to be strained. Similarly, America's approach to China on environmental issues has lacked a guiding framework that fits appropriately into an overall approach to China. Such an overall approach has been difficult to achieve — especially given the considerable constraints associated with Beijing's dedication to rapid industrial growth, its stances on climate change and nuclear nonproliferation, and the country's relative absence of nongovernmental environmental organizations.

The United States has important interests in developing a more cooperative relationship with the PRC on environmental issues, for these problems will increasingly affect the global environment and could affect China's internal stability. Rapid industrialization combined with population growth is putting enormous strains on China's domestic natural resources while harming the global environment. China is already the second largest contributor to greenhouse gas emissions (the United States is the leader[1]), and its emissions are growing; if the global community is to negotiate successfully for binding limits on greenhouse gases to address climate change, China's cooperation will be pivotal. Meanwhile, the health of the Chinese economy and the welfare of Chinese citizens are increasingly being affected by a plethora of domestic environmental problems. These include scarcities of water and arable land, air and water pollution, overcrowding, flooding and other issues — all of which contribute to population movements, health problems, food security problems and rising disparities in income. Beyond the humanitarian concerns involved, the United States cannot ignore these problems since they have the potential to affect China's stability. The U.S. government, however, will have to approach China on these issues in a way that enhances, not hinders, the overall U.S.-PRC relationship.

To address these important concerns and develop strategies for engaging the Chinese on environmental issues, the Environmental Change and Security Project created the Working Group on Environment in U.S.-China Relations. In an effort to concentrate on the Chinese environmental issue of utmost concern to the United States — climate change — the working group focused on energy issues during its first six monthly meetings. The themes of these meetings included multilateral cooperation, domestic Chinese environmental issues which have ancillary impacts of importance to the United States, and the impediments to cooperation on U.S. led projects within China. In addition, working group members identified specific areas on which U.S. efforts in the Chinese energy sector should concentrate (most notably energy efficiency, pricing reforms, and technology transfer) and areas of debate (such as whether U.S. efforts in China should focus on technology or policy changes). Working group meetings also provided numerous engagement strategies for U.S. policy-makers, and highlighted the context in which these strategies could be implemented.

The themes, lessons, and engagement strategies which emerged from working group discussions on energy can be applied to other environmental concerns with China and to overall U.S.-China relations, including water issues, biodiversity, food security — and even economic development; the overriding sentiment from working group members was that the United States should continue to engage the Chinese in a constructive manner, providing assistance for environmental projects and policy reforms in China, and opening markets for U.S. environmental technologies. Such a policy would provide the framework under which engagement on environmental issues — at the governmental, non-governmental organization (NGO) and private business levels — could take place.

I. The Working Group on Environment in U.S.-China Relations

The Woodrow Wilson Center's Working Group on Environment in U.S.-China Relations, coordinated by the Environmental Change and Security Project in partnership with the Center's Asia Program, is an ongoing multidisciplinary forum for discussion on environmental and foreign policy concerns with regard to China. The aims of the working group are to: (1) identify the most important environmental and sustainable development issues in China and discern how those issues relate to U.S. and Chinese interests; (2) develop creative ideas and opportunities for government and non-government cooperation on environmental projects between the United States and China; and, (3) discuss promising government and non-government strategies for engaging China on these issues.

The working group has had particular success in

drawing upon the expertise of its over forty members, which include government, NGO, academic and private business representatives. Working group speakers also have represented a broad mix of backgrounds. [For a list of working group speakers, please refer to page 39.] Working group meetings are co-chaired by Elizabeth Economy of the Council on Foreign Relations, and P.J. Simmons of the Carnegie Endowment for International Peace, and are held on a not-for-attribution basis.

Small group sessions of the working group concentrate on more specific topics of interest and have included visits by Qu Geping, Chairman, Committee on Environmental Protection and Natural Resources Conservation, National People's Congress; and the Citizen Involvement in Environmental Protection Delegation from the People's Republic of China.

II. Main Themes of Working Group Discussion

The themes of the first six monthly meetings have wide applications for environmental issues and overall U.S.-PRC relations. From trade issues to human rights, the lessons learned from working group discussion underscore the basis for overall engagement strategies. Working group members agreed that a useful engagement strategy in the area of environmental protection should include: (1) a clearly defined and articulated overall China policy; (2) constructive engagement with the Chinese; (3) financing mechanisms for environmental projects; (4) multilateral cooperation; (5) a focus on local problems with secondary global impacts; and, (6) close examination of U.S. and Chinese domestic impediments to cooperation on environmental issues.

A Clearly Defined and Articulated Overall China Policy

The relationship between the United States and China is complex and multifaceted; while progress has been achieved on many issues in recent years, others still raise considerable tension. In addition, recent changes in both U.S. and Chinese policy (such as the linking and then delinking of human rights to trade on the United States side, and differing actions towards Taiwan on the Chinese side), have created corresponding shifts in the warmth of U.S.-PRC relations. It is not unreasonable for the Chinese to view U.S. policy as a see-saw which balances itself according to pressures from Congress, the public or the media. To combat this Chinese perception and to enhance domestic credibility on relations with the Chinese, many working group members felt that the primary U.S. government action to enhance U.S.-PRC relations on the environment should be a clearly articulated, coherent China policy with explicit objectives and guidelines by which progress on a variety of issues could be measured. Such a policy was considered to be a means to avoid the public perception that policy changes are the result of economic incentives or 'pandering' to Chinese interests.

The lack of a clearly defined and articulated overall China policy was regarded by many working group members as the major U.S. domestic impediment to cooperation between the two countries on environmental issues. Changes in the status of U.S.-PRC relations not only impact government sponsored and managed programs, but can also cause dramatic shifts in Chinese governmental cooperation with NGOs and U.S. businesses. As one working group member remarked, increased tension between the countries can either slow down or completely halt a proposed U.S. business venture in China. Vacillations in U.S.-PRC relations can also affect NGOs working in China: a stable environment provides the framework within which businesses and NGOs can independently operate in the PRC. Even though the U.S. government may not be able to fund extensive environmental projects in China, its outspoken support for them can be equally as valuable, as can sharing its experiences — good and bad — in formulating and implementing regulatory and market approaches to environmental protection in the United States.

> The overriding sentiment from working group members was that the United States should continue to engage the Chinese in a constructive manner, providing assistance for environmental projects and policy reforms in China, and opening markets for U.S. environmental technologies.

Constructive Engagement with the Chinese

Working group members emphasized the importance of offering technological and policy assistance to the Chinese rather than lecturing them about their missteps. This approach was considered imperative when engaging the Chinese on environmental issues: the Chinese are still very suspicious of U.S. assistance on environmental matters and fear that the United States is pushing sustainable development as a means of keeping Chinese economic growth in check. It should be noted that a non-didactic approach is also important for NGOs when working in China; while the role of a U.S. NGO may be to precipitate policy or attitudinal change, its mission in China should be sensitive to cultural constraints. As one working group member com-

mented, in order for U.S. environmental assistance to succeed in China, the United States must first convince the Chinese that it has a strong interest in China's continued economic growth and that economic growth does not necessarily equate to environmental degradation.

The United States should also be wary of criticizing Chinese development plans to the point that the Chinese are left with no options. One working group member commented that the United States cannot decry China's abundant use of coal, ban all United States involvement in the massive Three Gorges Dam Project, and prohibit U.S. investment and trade in civilian nuclear technology, yet still expect the Chinese to take U.S. offers of assistance on energy matters seriously.

Financing Mechanisms for Environmental Projects

According to working group members, the Chinese are frequently critical of U.S. government offers of assistance because the United States lacks the funding mechanisms to back up its promises. American businesses with environmental technologies hoping to invest in rapidly expanding Chinese markets express similar discontent: they feel as though they are at a disadvantage to Japanese and European competitors who receive more financial assistance from their governments to invest in China. The impact of this lack of financial assistance on Chinese environmental problems is large; U.S. businesses possess the environmental technology and financial capability to significantly improve China's environment, but are deterred by a lack of financing and insufficient government attention.

The solution to this problem, however, is not necessarily increased U.S. federal funding for investment in, or transfer of, environmental technologies to China. Indeed, such a scenario is unrealistic. Instead, working group members suggested a number of approaches to address this issue:

• Establish agreed upon and accepted international environmental guidelines and minimum specifications for projects funded by OECD countries, development agencies or banks. These guidelines would not only halt large, environmentally unsound projects, but would also provide a level playing field for international businesses proposing projects in developing countries;

• Provide high level governmental support for environmental projects and business ventures in China to show the Chinese that these projects are considered a priority by the United States government;

• Explore the possibilities for multilateral or trilateral joint commercialization projects. For example, a project could capitalize on U.S. technological innovation, Taiwanese or Japanese financing, and Chinese labor to create a demonstration project in China; and,

• Develop a 'green' bank within the Export-Import Bank specifically to help finance environmental projects in developing countries, including China.[2]

Multilateral Cooperation

Working group discussion placed a great deal of emphasis on bilateral approaches and solutions to China's energy problems, but also stressed the importance of multilateral cooperation on energy issues. Multilateral fora and conventions were seen as appropriate venues for discussion of the regional and global impacts of China's increased energy consumption. One mechanism for encouraging international cooperation can be seen through the example of trilateral joint commercialization described above. Multilateral fora were also considered to be a non-threatening, positive way to engage the Chinese on environmental issues and to display international support for sustainable development principles.

Many working group members supported the idea of a multilateral forum to address energy and environmental issues throughout all of Asia. As proposed, this forum would include government representatives from interested countries, non-governmental organizations, and private business representatives. Specialized working groups could operate under the forum and focus on specific areas of interest. Suggested umbrella organizations for such a forum included the World Bank, the Global Environmental Facility, and a combination of multilateral development banks and private foundations.

A Focus on Local Problems with Secondary Global Impacts

While the Chinese are clearly concerned about the environment, it is equally evident that they are much more concerned about domestic environmental problems (such as urban air pollution and water shortages) than global ones (climate change). This prioritization of environmental issues presents a conundrum for the United States, which places its priority on the global impacts of China's environmental problems, most notably CO_2 emissions and global warming. Working group members agreed, however, that ignoring local problems at the expense of global ones would be a lasting mistake for the United States; the U.S. government and NGOs should therefore concentrate on local environmental problems which have secondary global impacts.

For example, the Chinese will be much more receptive to assistance on reducing urban levels of suspended particulates after studies demonstrate the connection between these pollutants and high rates of urban lung cancer. Once the connection is made, assistance — and investment in the technology to reduce emissions — will be more openly accepted by the Chinese. The secondary impact of such emissions reduc-

tions would be ancillary reductions in sulfur and CO_2 emissions, thereby reducing greenhouse gases and the prevalence of acid rain. Such an approach was viewed as critical when engaging the Chinese: linking domestic health concerns to economic impacts was thought to be a practical alternative method for reducing greenhouse gas emissions.

Close Examination of U.S. and Chinese Domestic Impediments to Cooperation on Environmental Issues

Recognizing that the U.S. government is unwilling to devote substantial financial resources — and political capital — to support extensive environmental projects or initiatives in China, working group discussion often analyzed ways of addressing non-economic impediments to U.S.-PRC cooperation. Examples of these impediments include a lack of market pricing mechanisms in the Chinese energy sector and the absence of international contract standards for natural gas exploration. One suggestion was to create two bilateral groups, each composed of members from public agencies, private industry and NGOs, to specifically address these impediments. The first of these groups would focus on the structural reforms necessary to make private sector investment in China more viable for U.S. companies and to reverse the trend of decreased international investment in China's energy sector. The second group would focus on impediments in the United States to increased cooperation with the Chinese on energy and environmental issues. This group, as envisioned by some working group members, would discuss strategies for encouraging more vocal public and Congressional support for cooperation on environmental issues and attempt to tackle other related topics such as trade in civilian nuclear technology and Export-Import Bank restrictions on loans to China. The group would also explore the means by which efforts on Chinese environmental issues could facilitate dialogue between the Clinton Administration and Congress on China policy. At a low cost, these groups could help establish trust in U.S.-PRC relations, and address the issue most important to U.S. investment in the Chinese energy market: legal and financial reforms.[3]

Discussion on this topic also centered on the impediments U.S. companies face when looking to invest in Chinese energy markets. Some notable impediments included:

- Policy and enforcement inconsistencies among provinces create high transaction costs for firms doing business in more than one Chinese province; and,
- The lack of transparency in the Chinese governmental and business structure makes it difficult for U.S. firms to determine the appropriate individual to speak with during negotiations.

III. Key Chinese Energy Issues

In addition to the themes listed above, working group members identified key Chinese energy issues and offered a variety of approaches to assist the Chinese in developing a sustainable energy network. Discussion also explored Chinese energy alternatives and the environmental impacts of China's reliance on coal as an energy source [For background information on Chinese energy production and its environmental impacts, please see the working group summaries located on pages 40-66 in this volume].

Working group discussion on energy issues centered on a singular debate: policy reforms versus technological fixes to Chinese energy problems. While both approaches were deemed necessary for sustainable energy growth in China, disagreement focused on which approach the United States should prioritize when working with the Chinese. In the opinion of one working group member, policy will be the driver of environmental change in China and not technology; the Chinese need to make political, legal and institutional changes before technology can have an impact on their energy needs. Other working group members agreed, citing weak environmental enforcement, artificial pricing of environmental goods, and a lack of environmental awareness among Chinese citizens as problems that must be addressed before technology can help lower Chinese energy-related emissions. Other working group members, however, felt that China's first priorities should be technological changes, including limiting current energy-related emissions and exploring alternative energy sources to coal combustion.

Technological Fixes

Technological fixes were seen by many as the best way to assist the Chinese with their energy development. Coal currently accounts for approximately 75% of Chinese energy production, leading to high levels of urban air pollution, acid rain, and transportation bottlenecks due to the rail transport of coal from the north to the economically booming south. Because of the abundance of coal in China, most working group members concurred that the Chinese will continue to rely on coal for the majority of its energy production over the next fifty years. With this in mind, many believed that the United States could best assist China through transfers of coal technology, such as coal scrubbers, more efficient boilers, or developing technologies such as integrated gasification combined cycle technology (IGCC) power plants. These technologies would help reduce carbon and sulfur dioxide emissions, would increase supply-side energy efficiency and would conform to China's continued reliance on coal.

Other working group members remarked that the United States should place emphasis on alternative energy sources and technologies — especially those for which U.S. companies could create a market in China.

Natural gas was thought to be the best alternative energy source, although the extent of China's natural gas resources are largely unknown and often far from areas of high demand. Still, natural gas presents a cleaner and more efficient fuel for China and is an area in which U.S. companies have expertise; U.S. industry is among the world's leaders in natural gas exploration and the construction of natural gas pipelines.

Fuel cells, wind power, IGCC, and small hydropower projects were all seen as new technologies that could have wide applications for Chinese energy production. These new technologies all have the benefit of low emissions, high rates of efficiency, and high potential as future markets for U.S. firms. They could also serve as a model for Chinese energy efficiency efforts or as the basis for joint commercialization projects.

Technology transfer projects, however, encompass concerns over a lack of trained Chinese personnel to properly maintain and run new equipment, intellectual property rights (IPR) issues, and a lack of U.S. government incentives for private firms to trade and invest capital in energy related activities in China. Joint commercialization projects were suggested as the best way to overcome these concerns while still assisting sustainable Chinese energy growth and obtaining profits for United States companies. Financing mechanisms, such as those described earlier in this paper, were also seen as critical to promoting technology transfers. Multilateral joint commercialization projects were seen as another alternative. Such an agreement, in conjunction with demonstration projects and proper training for Chinese personnel, could open markets for U.S. technologies while also enhancing China's environmental protection efforts. If implemented in a rural Chinese area, it would have the additional benefit of showing the Chinese that the United States is concerned with the development of all of China and not just the booming southeast.

Biomass, hydropower, and nuclear energy were also regarded as areas in which U.S. expertise and technology could assist the Chinese. Although it now seems probable that President Clinton will make the necessary certifications to approve civilian nuclear trade with China, during Working Group sessions U.S. companies were still restricted from trade in this area. United States cooperation on the hydroelectric power project which will have the largest impact on Chinese electricity generation, the Three Gorges Dam, is also currently restricted. Biomass is the main source of fuel in the Chinese countryside, and assistance in increasing its efficiency would greatly improve its current use.

Policy Reforms

While technological fixes are clearly necessary to assisting the Chinese in their energy development — and while the Chinese are more willing to implement and accept new technologies than new policies — some working group members argued that policy changes were a critical first step in meeting future Chinese energy development goals. Discussion focused on two issues: proper pricing of environmental goods, and demand-side energy efficiency measures.

China's environment is important to the United States not only because of China's increasing greenhouse gas emissions and its growing role as a major player in the global environment, but also because Chinese energy and development choices have the potential to directly impact U.S. interests.

Without market pricing of environmental goods (including electricity and water), many working group members could not foresee any significant efficiency increases in Chinese energy use. Pricing mechanisms were viewed as the key to increasing transmission efficiency, lowering energy use, and creating a shift away from inefficient coal boilers. Many believed such indirect market mechanisms would create an incentive for the use of new technologies and allow these new technologies to be effective.

Demand-side efficiency and education were also considered important Chinese policy measures. More efficient consumer use of electricity would greatly decrease demand, especially as China begins a shift towards heavy industrial production. Education on energy issues is a crucial factor in the implementation of end-use efficiency policies and can raise awareness of the impacts of inefficient energy use and production.

IV. Conclusion

China's environment is important to the United States not only because of China's increasing greenhouse gas emissions and its growing role as a major player in the global environment, but also because Chinese energy and development choices have the potential to directly impact U.S. interests. A stable, economically healthy China increases the likelihood of a stable Asia and is therefore in the best interest of the United States. Such stability and continued economic growth, however, will only be accomplished if done in an environmentally sustainable manner. Without assistance, the Chinese will be unable to meet this goal: China needs support and advanced technology from developed countries to achieve its economic, development and environmental objectives. Multilateral cooperation and a focus on domestic Chinese environmental issues with secondary global impacts will demonstrate to the Chinese the international concern about their environmental problems while also addressing

Chinese environmental priorities. Continued bilateral engagement and cooperation with China on environmental issues will facilitate the transfer of American environmental technologies to China and will further support the work of environmental NGOs establishing partnerships and programs in the PRC.

The meetings of the Working Group on Environment in U.S.-China Relations identified these key themes while also exploring Chinese energy sector choices. Taking into consideration that businesses are best equipped to promote and create environmental change in the Chinese energy sector, Working Group members believed that support for U.S. businesses and technologies should be a priority for the U.S. government. The United States government is currently unwilling to significantly increase its financial commitments to support environmental protection measures or technology transfers to China. It can, however, open doors for those who can — namely private firms. In doing so, the United States will help bring environmental remediation technologies and alternative fuel sources to the Chinese while opening markets for U.S. firms and products.

At the same time, the U.S. government and NGOs should support and assist China in developing policy changes in the energy sector, especially through multilateral mechanisms and bilateral fora on the environment. Working in tandem with private businesses, NGOs and foundations offer the best hope for encouraging Chinese sustainable development.

Through continued engagement and explicit support for environmental projects, the United States can provide a framework within which businesses, NGOs and foundations can successfully promote Chinese environmental improvements. Such cooperation is vital if the United States aims to effectively assist the Chinese in their economic and energy development. Only under such a scenario can the United States hope to have a positive influence on future Chinese energy choices and on a Chinese development pattern that is environmentally sensitive for China and the world.

Endnotes

[1] It should be noted that U.S. interest in China's greenhouse gas emissions is largely a result of developed countries' energy production and contributions to global climate change. If the United States harbors any hope of successfully reversing global climate change patterns, it must reduce its own emissions in addition to assisting China in the development of a sustainable energy sector.

[2] The Export-Import Bank has recently established a $50 million window for energy efficiency and renewable energy loans to China, although China's State Planning Commission (SPC) has yet to identify a corresponding Chinese bank.

[3] The SPC agreed in May, 1997 to the creation of a U.S.-China Oil and Gas Forum. The forum held its first organizational meeting in Beijing during October, 1997 in conjunction with the convening of the World Petroleum Congress.

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Speakers from the meetings of the Working Group on Environment in U.S.-China Relations, November 1996-July 1997

Marcia Aronoff
Environmental Defense Fund
William Chandler
Battelle Memorial Institute, Advanced International Studies Unit
Jerome Alan Cohen
Council on Foreign Relations
Louis Donato
General Motors
Richard Louis Edmonds
The China Quarterly, University of London
Barbara Finamore
Natural Resources Defense Council
Abraham Haspel
Department of Energy
Todd Johnson
The World Bank
Eva Lerner-Lam
The Palisades Consulting Group, Inc.
Kenneth Lieberthal
University of Michigan
Jonathan Margolis
Bureau of Oceans and International Environmental and Scientific Affairs, Department of State
Will Martin
National Oceanic and Atmospheric Administration
Hu Min
Peking University
Julia Philpott
International Institute for Energy Conservation
Karen R. Polenske
Massachusetts Institute of Technology
Robert Price
Department of Energy
Lester Ross
Paul, Weiss, Rifkind, Wharton & Garrison
John Sammis
Department of State, Policy Planning Office
Miranda Schreurs
University of Maryland
William Spodak
Strategic Consulting Alliance
Robert Sutter
Congressional Research Service
Barry Trembath
The World Bank

Working Group Co-Chairs

Elizabeth Economy
Council on Foreign Relations
P.J. Simmons
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Summary of Working Group Discussions on Energy Issues in China

Beginning in November 1996, the Woodrow Wilson Center's Working Group on Environment in U.S.-China Relations launched a series of monthly meetings on energy issues in China. The monthly meetings will continue through 1998, focusing on a variety of issues, including water scarcity, agriculture and biodiversity.

Background on Chinese Energy Production

• Coal accounts for approximately 75% of Chinese energy production, oil accounts for approximately 19%, hydroelectricity and natural gas 3% each, with nuclear energy contributing slightly over 1%. As currently planned, this breakdown should remain the same over the next 20 years;

• Biomass is the main source of fuel in the Chinese countryside, but its current use can be improved greatly by increasing efficiency;

• Based on an assumed 10% GDP growth rate, China's energy demand will grow at least 15,000 Megawatts per year until 2010; this is roughly equal to adding a Tennessee Valley Authority every two years;

• Chinese energy consumption in the year 2010 could be as much as 50-100% higher than current U.S. energy levels;

• Significant natural gas fields exist in Chinese provinces such as Sichuan. In order for natural gas to become a viable fuel in China, however, the Chinese need to overcome problems with gas storage and supply, and with the cultural perception that natural gas should only be used as a feed stock;

• The transportation of coal from the mines of the north to the centers of demand in the south have caused rail transportation bottlenecks and increased locomotive emissions;

• At the end of 1995, China's total installed capacity of hydroelectric power was 220 gigawatts (GW) per year, generating over 1000 kilowatt (KW) hours of energy;

• Between 1995 and 2000, newly commissioned electric capacities are expected to be between 17-18 GW per year;

• By 2000, hydroelectric power will probably account for 23% of China's generating capacity and 15% of its annual electricity generation. This percentage should remain static until 2003, when the Three Gorges Project begins power generation;

• Installed electricity generation capacity in China was 215 GW in 1995; it is planned to be 300 GW by 2010 and 533 GW by 2020;

• Nuclear energy currently accounts for 1.3% of the total Chinese energy output. This amount is expected to rise to 3.6% by 2010.

The Environmental Impacts of China's Reliance on Coal

From the perspective of the United States government, China's greenhouse gas emissions are the most serious concern of the PRC's reliance on coal for energy production. While the United States is the leading producer of greenhouse gases worldwide, the Chinese currently rank second and their emissions are increasing. The Chinese, however, are more concerned with domestic environmental problems and, consequently, the domestic impacts of pollution due to their coal energy production. These impacts include:

• Highly unhealthy air pollution due to coal burning for energy production, household and street vendor use. 500 major cities in China do not meet World Health Organization (WHO) air quality standards, and Beijing, Shenyang and Xian are three of the top ten most polluted cities in the world. Urban coal use accounts for 75% of the total output of pollutants in China. It produces 14.14 million tons of soot, 18.25 million tons of sulfur dioxide, and 11.63 million tons of industrial dust per year;

• Acid rain due to the high sulfur content of a majority of China's coal. Acid rain is problematic south of the Yangtze river, in the regions east of the Qinghai-Tibetan Plateau, and in the Sichuan Basin.

Main Barriers the Chinese Face in Addressing Environmental Issues

Even with the increasing attention the Chinese central government is giving to environmental issues, the Chinese face a number of domestic barriers in addressing environmental issues:

• The central government has little direct influence over township and village enterprises and has difficulty enforcing local implementation of environmental policies;

• The ingenuity of Chinese businesses in circumventing new environmental legislation and the willingness of government officials to allow them to do so if it will increase profitability;

• A dearth of good, reliable data on environmental pollution and other environmental factors;

• A hesitance to accept foreign assistance on energy issues because the Chinese do not see how it will benefit them commercially;

• The tendency of the Chinese central government to emphasize technological fixes and large projects rather than policy changes.

Impediments to U.S.-PRC Cooperation on Energy Issues

Working group discussion on impediments to U.S.-PRC cooperation on energy issues has run the gamut from political considerations to legal problems encountered by U.S. businesses investing in China. Examples of the major impediments hindering cooperation are:

• The Chinese still equate sustainable development with slow growth and feel that the United States is touting sustainable development as a means to keep their economic growth in check;

• The current political climate in China — especially after the death of Deng Xiaoping — makes it difficult for high level Chinese bureaucrats to institute the mechanisms under which a shift to sustainable development could take place;

• Inconsistency between provinces creates high transaction costs for firms doing business in more than one Chinese province;

• U.S. firms feel that European and Asian firms get more export assistance from their governments;

• The lack of transparency in Chinese governmental and business structure makes it difficult for U.S. firms to determine the consumer and the appropriate person to speak with during negotiations;

• When U.S.-PRC bilateral relations are tense, decisions are made at the upper levels of the Chinese government to stop deals for U.S. firms, or to make them go very slowly.

Areas for U.S.-PRC Cooperation on Energy Issues

A main focus of working group discussion has been on areas in which the U.S. and China share a common interest. Discussion has tended to focus on areas in which the United States can assist the Chinese, capitalizing on U.S. expertise or advanced technology in a certain field. There has been an ongoing debate among working group members about the best approach to assisting the Chinese: some members believe that technology transfer would encourage the Chinese to make accompanying policy changes, while others believe that new technology would be ineffective if policy reforms were not emphasized first. A summary of the main areas for cooperation on both sides of this debate follows:

• Help the Chinese increase their energy efficiency and support end-use efficiency, which holds immense potential for energy savings and conservation;

• Assist the Chinese in restructuring their utilities and decentralizing control to local utilities;

• Provide expertise and equipment so that the Chinese can refurbish and renew their coal fired power plants.

• Assist the Chinese in developing natural gas exploration and in building a modern gas system— technically, economically and politically;

• Assist the Chinese in the development of databases on water, land use and other environmental issues;

• Help the Chinese switch to non-coal electricity for households to significantly reduce coal use;

• Provide technical and policy assistance to the Chinese in implementing indirect market mechanisms in the energy sector;

• Encourage a policy framework that decouples utilities' profits from sales and lets them keep part of any savings achieved.

Engagement Strategies

While there has been a general consensus in working group discussions on the areas in which the United States can best assist the Chinese on energy issues, working group members have offered numerous ideas on *how* the United States should approach the Chinese on these issues. Members have debated whether the United States should take a bilateral or multilateral approach; whether the U.S. government, NGOs or private business should take the lead on Chinese environmental issues; and how to incorporate increased trade into environmental assistance. A list of working group suggestions for engagement strategies follows:

• Create two groups as part of the Sustainable Development Forum, both composed of members from public agencies, private industry and NGOs, to specifically address impediments to U.S.-PRC cooperation on energy issues. The first of these groups would focus on the structural reforms necessary to make private sector investment in China viable for U.S. companies. The second group would focus on impediments in the United States to increased cooperation with the Chinese on energy and environmental issues. The benefits of groups such as these is that they are low cost, will help establish trust in U.S.-PRC relations and will address the issue most important to U.S. investment in the Chinese energy market: legal and financial reforms;

• Create a multilateral group to address energy and environmental issues throughout all of Asia which would include governmental, private business, and NGO representatives from Europe, Asia and North America to discuss technology transfer, policy changes, and energy efficiency strategies. The World Bank and the Global Environmental Facility were mentioned as possible umbrella organizations for such a group;

• Develop sister-city or U.S. state-Chinese province partnerships in which cities/states/provinces would collaborate to share technologies, policies, and energy efficiency strategies. Japan and China have similar arrangements which have been successful and the U.S.-China Environment Fund is starting a program which would link U.S. and Chinese high schools;

• Provide the Chinese with environmental information and data, allow them to analyze the data themselves, show high level governmental support for progress on the issue being researched, and set deadlines by which goals and objectives to address the issue should be met;

• Encourage joint commercialization projects to build partnerships between U.S. and PRC industry through the research, development and manufacturing phases;

• Establish contact between the U.S. government and new Chinese government agencies, such as the newly created Ministry of Natural Gas;

• Provide advice to Chinese think tanks that write and develop Chinese legislation;

• Reconsider lifting U.S. export controls on nuclear technology to China;

• Encourage the Chinese to conform to international contract standards for natural gas exploration;

• Encourage the development of alternative energy sources, such as fuel cells, wind and solar power through demonstration projects, especially in rural areas;

• Provide high level governmental support for U.S. business ventures in China;

• Provide high level government access for U.S. businesses in China. U.S. business has the mechanisms to create change in China, but lacks the access that the U.S. government can provide;

• Use mechanisms such as the Montreal Protocol Fund to engage the Chinese on climate change issues;

• Be cognizant that there is a whole class of rising 40 year old bureaucrats in China who have an entirely different way of thinking than the 60 year old bureaucrats who are currently in power. The U.S. needs to be aware of the differences in thinking between the two groups and devise innovative ways to satisfy them both while still promoting U.S. objectives;

• Develop domestic constituencies that have common goals with those in China. These constituencies could combine forces for mutual benefit.

The Environment in China: An Overview

November 26, 1996

Energy

Coal accounts for 75% of Chinese energy production, oil accounts for 19%, hydroelectricity and natural gas account for 3% each, and nuclear energy represents a very small amount of China's energy production. Biomass, solar and wind power are also contributors to China's energy production, with biomass being the main source of fuel in the countryside. However, biomass and solar systems receive limited funding from the government and currently play a limited role in China's energy system.

Coal is expected to remain China's main energy source due to its vast abundance and the resilience of Chinese authorities to energy alternatives. Domestic oil reserves are low and imports are seen as a domestic threat while natural gas exploration has been historically shunned as too expensive. Hydroelectric power has very high capital costs and long payback periods, as does nuclear power.

Vertically integrated systems of business in China have made domestic oil exploration unprofitable, causing Chinese businesses to move away from the industry. China's oil self-sufficiency is also a possible economic and security problem for the United States.

Any large increase in Chinese nuclear power creates a global environmental concern which should be of high priority to the United States. However, nuclear power is often not economically feasible and the main concern of the Chinese is to get the best return for their investment in energy related fields.

Coal is also problematic for transportation by bottlenecking rail lines throughout the country. Most coal is concentrated in the North while a majority of the Chinese population lives in the South and East. Technical fixes for the negative externalities of coal use are also seen as capital intensive.

There are four possible opportunities for cooperation between the United States and China on energy issues:

- Helping China increase its energy efficiency;
- Helping China restructure its utilities and decentralizing control to local utilities;
- Refurbishing and renewing China's coal fired power plants; and,
- Helping develop natural gas exploration.

Key Environmental Issues and Chinese Institutions

Almost all government agencies and large state owned enterprises in China now have an environmental bureau or department. The key environmental agencies include:

- The National Environmental Protection Agency (NEPA);
- The State Planning Commission (SPC);
- The State Science and Technology Commission (SSTC); and,
- The China Council for International Cooperation on Environment and Development (CCICED).

On any given environmental problem, several ancillary agencies also become involved and should not be ignored in international negotiations with the Chinese.

While NEPA is a well meaning agency, it ranks low in the bureaucratic hierarchy and often is ignored. The SPC is aggressive but not terribly proactive, although some departments are more environmentally inclined than others. The SSTC has many well-educated, articulate, and relatively cosmopolitan officials (especially at the junior level); however, its reputation abroad is much better than its reputation and influence domestically.

Chinese environmental agencies do not have much clout in the Chinese bureaucracy and it is extremely important to know the institutional structure of the organization or person you are approaching.

Chinese NGOs have been focusing on issues such as environmental education and recycling, and have had some initial success with these programs. Perhaps more noticeable is that the Chinese media has latched onto environmental issues recently and there is much more coverage of international environmental conventions, such as the Montreal Protocol, and an increase in environmental investigative reporting.

The main barriers that the Chinese face in addressing environmental issues are:

- Weak local implementation of environmental policies;
- The ingenuity of Chinese business in getting around new legislation; and,
- A lack of good, reliable data.

In order to address these problems, the Chinese government needs to give more power to regulatory agencies and create stronger regulations.

The Chinese are mostly concerned with domestic environmental issues such as water and clean coal technology. Global environmental issues are very much secondary but, for political reasons, of utmost importance among global issues is climate change.

A main area for cooperation regarding the environment should be helping the Chinese improve their statistics. This could take the form of assisting NEPA

in developing databases on water or land use. It is also important to listen to Chinese interests and concerns rather than focus U.S. cooperation efforts solely on the international problems of greatest concern to the U.S.

Legal Framework

Since 1979, a great effort has been made to create a legal system in China from scratch. While significant progress has been made in terms of creating foreign treaties and agreements, the creation of legal institutions has been slow.

Legal problems for China include the enforcement of environmental regulations and policies, and tax collection. Although China is seen as a mostly totalitarian system, it more closely resembles a system of local baronies in which provinces try to avoid central government rule as much as possible. Difficulties in tax collection limit funds which could be used for environmental protection.

Environmental problems are not very prominent in Chinese legal issues, especially in terms of foreign investment. This has hurt foreign investment in China because many U.S. companies are afraid to enter a country in which enforcement of regulations appears to be lax yet they may be held liable should an accident occur.

New Chinese environmental laws and regulations have recently come into effect and over 300 environmental standards are currently in place. Many of these standards are modeled after international environmental standards. China is also preparing to cooperate with ISO 14000 and has implemented an Agenda 21 program. In addition, the legislative process in China has become more open and progressive, even to the point of providing a degree of public participation in the environmental impact assessment process.

Despite changes in the legal system, environmental enforcement is still the most significant legal problem in China.

Items of possible cooperation between the United States and China on this topic are:

- Biodiversity and fisheries protection;
- Greater participation by NGOs in the legal process;
- Cooperative efforts between the EPA, BLM, Forest Service and their counterpart Chinese agencies;
- Cooperation at the customs level to help smooth relations;
- U.S. bank supervisory agency assistance in helping clear up NEPA's problems with Chinese banks; and,
- Assistance by the United States Energy Department or NGOs to help make energy conservation law in China a reality.

U.S. Business Perspective

A key factor towards the success of U.S. business in China is the need to be patient and understand Chinese culture and thinking. Several large obstacles for U.S. businesses in China are: 1) laws and regulations are enforced differently from region to region or company to company; and, 2) political instability can be problematic. To succeed in China, U.S. business needs the continued support of the United States government. Assistance can come in the form of endorsing improved strategies and learning from our collective experiences, collaborating with industry to develop systems approaches to environmental issues, and decoupling issues like human rights, trade and international property rights (IPR) from environmental issues.

U.S. business can also promote environmental issues in China, such as broad base educational systems on the environment which include education at the kindergarten level, essay contests for school children, technological training programs for Chinese professionals, and promoting Chinese research.

Environmental Priorities in China for the United States

- It is important for the United States to exercise leadership on environmental issues in the Asian arena. The United States is not currently a major environmental force in China — Japan is #1 and Germany #2.
- Trade issues and the trade imbalance with China must be the key concern for the United States. U.S. investment in China's environment, mainly through technology transfer programs, could help reduce the trade imbalance.
- Environmental issues may take the place of human rights in terms of importance in relations between the United States and China.
- Biodiversity is an area of considerable importance to the United States and a prime candidate for U.S.-PRC cooperation. China has over 700 nature preserves and this type of preservation should be supported by the United States.
- Fisheries are an area of high importance due to the global impact of over-fishing in the region.
- Transportation should be seen as an area of environmental concern and one in which there can be cooperation between the United States and China.
- Localism in China may be more of a virtue than a vice in relation to the environment. The central authorities are giving 'go slow' signals while local leaders may be more receptive to change, help and ideas. The United States needs to build on localism while keeping the central agencies informed.
- NGOs have a unique and valuable role to play on environmental issues; NGOs have the benefit of being able to tread into areas in which the U.S. government (USG) would be seen as forcing an agenda, and they can provide reliable data for China that will not be seen

as having a hidden governmental agenda. NGOs can also more forcefully address an especially weak area, such as environmental enforcement. On issues in which the USG would be seen by the Chinese as promoting national interests, NGOs should take the lead.

Environmental Priorities for the PRC

• The most important goal of China's leadership is the country's survival. If the environment gets in the way of any of China's economic or development goals, the Chinese will become uninterested in it. Therefore, a connection must be made between Chinese economic survival and the environment.

• The United States needs to show the Chinese that there will not only be a national benefit due to environmental changes but also a benefit on a private or individual level. This will gain support at a base level of the Chinese population for new policies.

• China has its own national Agenda 21 and provinces have developed their own individual Agenda 21s. However, China is not funding Agenda 21 programs and it is improbable that they will internally do so. China also seems to be moving away from Agenda 21 and focusing instead on a 'green' plan in its 9th National Plan. This 'green' plan is backed by domestic planning and bilateral loans and has the support of the SPC. China, though, does not have adequate funding to promote this plan and will be reliant on external funding to help solve its environmental problems.

Chinese Energy Production

February 5, 1997

Energy

Background on Chinese Energy Production

Energy demand in China has doubled since 1979, yet China's energy consumption has grown only about half as fast as its economy during this period. This remarkable energy efficiency achievement must continue if China is to avoid economic hardships due to energy shortages and excessive pollution levels in the future.

China's low energy consumption figures can be attributed mainly to rationalized energy prices and a power plant retrofit program instituted after 1979. It is imperative for China to continue their energy efficiency efforts for them to keep energy use at manageable levels; without high priority attention to how energy investments are made in China, they will fail to meet their energy goals.

Based on an assumed 10% GDP growth rate, the best case scenario for China's growth in energy demand is 15,000 megawatts per year until 2010, which is roughly equal to a Tennessee Valley Authority every two years. At this rate of growth, China would reach current U.S. energy consumption levels by the year 2010. If China is unable to meet their energy efficiency standards — and it is increasingly looking as though they will not — energy consumption in the year 2010 could be as much as 50-100% higher than current U.S. energy levels. This could create serious environmental and energy management problems for the Chinese. Thus, energy efficiency should be seen as a high priority for United States assistance.

The bulk of China's energy production comes from coal (75%), with hydroelectricity, oil, natural gas, and biomass all contributing to the overall picture. It is important to note, however, that China's reliance on coal is more a function of policy decisions in the central government than the abundance of coal in China. This is exemplified by the fact that the United States has twice as much coal as China and Russia has four times as much, but both are much less reliant on coal as an energy source than China.

China is currently experiencing a multitude of problems due to its coal use, including greenhouse gas emissions, air pollution due to the dirty nature of China's coal, acid rain due to the high sulfur content of their coal, and transportation difficulties. Much of China's air pollution, however, does not come from industrial boilers but from household and street vendor coal use. The best opportunities for U.S.-PRC cooperation in this area are through increased trade in coal technology and assistance on reform in the coal sector. However, this type of reform will only be effective if the coal industry in China is privatized.

Of the 75% of energy production that comes from coal, 1/3 is for electricity, 1/3 for boilers and the final third is used for home heating and cooking. These are very different uses of coal than in the United States. Significant progress could be made if the U.S. could simply help the Chinese switch to non-coal electricity for households. The U.S. should also assist the Chinese in getting energy to users in a more efficient manner.

Chinese Energy Alternatives

Alternative energy sources in China include oil, natural gas, hydroelectric power, nuclear power, biomass, wind and solar power. Domestic oil reserves in China are low and oil exploration does not seem to be a priority of the central government. Increased oil im-

ports could lead to increases in the global price of oil and create security concerns for the United States due to a strengthened partnership between China and OPEC countries.

There is very little natural gas exploration in China, but significant gas fields do exist in provinces such as Sichuan. In order for natural gas to become a viable fuel in China, the Chinese need to overcome problems with gas storage and supply, and with the cultural perception that natural gas should only be used as a feed stock. Natural gas is an area in which the United States has a strong competitive advantage: the United States has a great deal of experience with natural gas, especially in storage and supply issues.

Biomass energy has perhaps the best potential of any energy source for rural China, and its current use can be improved greatly by increasing efficiency. However, as with wind and solar power, biomass energy suffers from a lack of infrastructure, demand and expertise on the part of the Chinese.

Increased importation of oil in China will not significantly affect oil prices. The main concern for the United States should be the strengthened partnership between China and OPEC countries that oil imports may create.

Hydroelectric power in China is abundant, underdeveloped, costly and often located in remote areas far from load centers. Large hydroelectric projects also carry environmental and social costs.

Hydroelectricity accounts for 3% of the total primary energy use in China. The Three Gorges Dam will add approximately 18 GW of power — roughly equal to one year's worth of power plant expansion in China. W. Alton Jones is currently undertaking a study to look at the costs of hydroelectric transmission and distribution.

China's growth in the nuclear field is highly dependent on foreign technology. While U.S. firms are restricted in nuclear trade with China due to a Congressional ban, both France and Russia are currently negotiating with the Chinese for the sale of reactors.

Energy efficiency in China has been assisted not only by the price structure, but also by a shift from heavy industry to light industry, and then to agriculture. An increased importance on heavy industries, such as automobile manufacturing, may hurt energy conservation efforts.

The U.S. Business Perspective on Chinese Energy Issues

China presents a challenge to U.S. firms because transactions lack transparency, making it difficult for them to determine the consumer and the appropriate person to speak with during negotiations. Inconsistency between provinces also means that transaction costs are high for firms doing business in more than one Chinese province. In addition, U.S. firms feel that these difficulties are exacerbated because European and Asian firms get more export assistance from their governments.

U.S. firms say that what they desire most is a level playing field, and increased attention to technical support and issues of supply and demand by the United States government.

There is an unfair perception by U.S. firms that our government does not provide assistance for them in China. The U.S. government not only provides financial support for U.S. firms but also contacts for new business ventures. On the other hand, it is the type of help that the U.S. government provides for businesses in China that is seen as the problem. In order for there to be tangible assistance for U.S. firms, there needs to be more high level involvement.

The main problem facing U.S. firms in China is overall U.S.-PRC bilateral relations. These relations have a definite impact on U.S. firms doing business in China. There are decisions made in the upper levels of the Chinese government to stop deals for U.S. firms, or make them go very slowly, when bilateral relations are tense.

In Poland, a shift to a market economy equated to imports of gas and oil because consumers prefer cleaner burning fuels. China could shift to natural gas under a market economy, and there is also a potential market for biomass fuels.

Funding Environmental Projects in China

- Philanthropic agencies may be the best funding sources for environmental projects in China.
- It is unnecessary for the United States to provide funding for the Chinese on environmental matters; the Chinese are one of the largest holders of United States bonds and reportedly have $110-120 billion invested worldwide. They should pay for their own environmental improvements.
- The United States is not spending anywhere near the amount that the Chinese government is spending on environmental projects, which is approximately $5 billion. One should not underestimate the financial contribution of the PRC to their own environment. The United States mainly contributes ideas and technologies to China's environment, not money.
- It is unreasonable to ask China to fund environmental programs themselves because they simply do not have the money. If the U.S. attempts to force China to fund these programs themselves, or to adopt a U.S. environmental agenda, they will simply walk away. The costs of this are too large for the United States to ignore.
- The resources for a move to sustainable development in China has to come from the private sector. The U.S. needs to figure out where U.S. public and private goals mesh, and then put an emphasis on these areas. Business has the mechanisms to make change in China, but

lacks the access that government can provide. The window of opportunity for this type of change, however, is closing. U.S. businesses are getting frustrated with the Chinese and thinking of moving to other markets. Money is beginning to go elsewhere and will not return to the Chinese market. To accomplish U.S. environmental goals in China we need a huge amount of capitol, and time is quickly running out.

Options for U.S.-PRC Engagement Strategies

• The U.S. has an interest in China because of its sustainable development goals and China's burgeoning markets. However, the U.S. must also convince Congress and the general public to view reduced CO_2 emissions in China as a direct U.S. benefit.

• The Japanese and the Europeans want to be increasingly involved in China, but the Chinese often prefer to deal with the United States. The involvement of the United States in China is largely driven by U.S. firms and economics.

• While the United States has a fairly substantial bilateral trade deficit with China, the focus of U.S.-PRC relations should be human rights concerns and not trade. Issues such as clean drinking water for children would gain the support of both Congress and the general public.

• The Administration and Congress are going to need to work out their differences for there to be any real progress on U.S. relations with the Chinese. The U.S. has a tendency to be drawn into national security issues, but it needs to be cognizant of other issues of national interest as well, such as economics. The U.S. government must take the lead on these issues and begin to act in a consistent manner.

• One needs to distinguish between levels of policy and political uncertainty when discussing U.S. government relations with China. A great deal of uncertainty in the Chinese market will not be eliminated by improved bilateral relations.

• Both the Chinese and Congress look at environmental issues as fluff. This is due to a lack of funding for environmental projects and a seeming lack of importance placed on them by the United States. Agencies like the SPC, which actually makes decisions, do not regard environmental issues highly.

Energy Policy Options for U.S. Decision Makers

February 26, 1997

While the initial focus of this meeting was to provide ideas on specific projects and initiatives which could be undertaken in China, most participants felt that, because the United States does not currently have the financial resources to support such projects or initiatives, this was not the best way to engage the Chinese. Much of the discussion focused on the idea of creating two groups, both composed of members from public agencies, private industry and NGOs, to specifically address impediments to U.S.-PRC cooperation on energy issues. The involvement of private industry was seen as especially important to this process since most of the funding for clean energy technologies will come from the private sector.

The first of these groups would focus on the structural reforms necessary to make private sector investment in China viable for U.S. companies and to reverse the trend of decreased international investment in China's energy sector. The goal of this group would be to provide a forum for U.S. companies and the Chinese to discuss specific impediments, brainstorm about solutions to these impediments, and discover the means by which the U.S. government could provide technical and legal assistance to the Chinese to institute these reforms.

The second group would focus on impediments in the United States to increased cooperation with the Chinese on energy and environmental issues. This group could benefit from a Chinese perspective on the difficulties of doing business with U.S. companies and could also make suggestions on how to best convince Congress of the benefits of improved bilateral cooperation with the Chinese.

The benefit of groups such as these is that they are low cost, will help establish trust in U.S.-PRC relations and will address the issue most imperative to U.S. investment in the Chinese energy market: legal and financial reforms.

Discussion also focused on whether it is best to approach high level officials regarding energy reforms or to concentrate on second tier bureaucrats who actually write the briefing papers for higher level officials. While many participants felt that only high level officials have the political power to make any significant changes, others believed that the lower level bureaucrats would be more receptive to ideas about environmental technologies and energy reform.

Another area of discussion concentrated on the prospects of joint research and development (R&D) and joint commercialization. While many supported joint R&D, most participants felt that joint commercialization presented better investment opportunities for U.S.

industry. Some participants mentioned fears over intellectual property rights violations and believed that joint commercialization with Chinese partners was a more secure investment. There was agreement on the belief that the key to working with the Chinese on both joint R&D and joint commercialization is building lasting partnerships that continue through the research, development, and manufacturing phases.

The following recommendations were also made for the consideration of the full working group:

Technologies

• Implement demonstration projects and joint R&D for biogas turbines and coal bed methane projects.
• Use fuel cell technology in both the stationary power and transportation sectors.
• Fuel cell technology is currently available for mid-sized stationary power needs and can be provided for a lower cost than many hotels and hospitals currently pay for electricity.
• A good opportunity for fuel cell application in transportation may be in locomotives. The Ministry of Railways is currently exploring electrification of its locomotives. Fuel cells may provide a more cost effective and environmentally benign alternative to electrification and could provide good opportunities for joint commercialization.

Areas for Reform

• Encourage the Chinese to conform to international contract standards for natural gas exploration. The Chinese have done this in the past with oil exploration and a similar effort would make investment in this area much more attractive to U.S. businesses.
• Help the Chinese create market pricing mechanisms for their energy sector.
• Provide assistance to the Chinese in reforming their state enterprises.

Engaging the Chinese

• Discuss our shared vision about China's development and how energy efficiency is a key element of this vision.
• Present environmental and energy issues from the perspective of China's economic development interests.
• Establish contact with new Chinese government agencies, such as the newly created Ministry of Natural Gas.
• Tie specific, large scale proposals to policy discussions in order to generate high level Chinese interest.
• Provide advice to Chinese think tanks that write and develop legislation.
• Use the current political climate in China to set the groundrules for improved bilateral relations and progress on environmental reforms.

The Context for U.S.-PRC Cooperation in the Energy Sector

March 5, 1997

Chinese Domestic Impediments and Ideas for U.S.-PRC Cooperation on Energy Issues

Chinese Domestic Impediments

There are two key Chinese impediments to U.S.-PRC cooperation on energy projects:

• The Chinese still equate sustainable development with slow growth and feel that the United States is pushing sustainable development as a means to keep their economic growth in check; and,
• The current political climate in China — especially after the death of Deng Xiaoping — makes it difficult for high level Chinese bureaucrats to institute the mechanisms under which a shift to sustainable development could take place.

For U.S. environmental assistance to succeed, the United States must convince the Chinese that it has a strong interest in China's continued economic growth, and that economic growth does not necessarily equate to increased environmental degradation. The United States will have to demonstrate to the Chinese convincingly that increased growth and pollution can be decoupled without sacrificing any of their economic goals.

Ideas for U.S.-PRC Cooperation on Energy Issues

• A multilateral group to address energy and environmental issues throughout all of Asia. As proposed, this group would include: governmental representatives from Asian countries, the United States, the European Union, and other interested countries; non-governmental organizations (NGOs); and private business representatives. This group would create a more neutral forum in which ideas from different sectors and countries could be shared. The group would discuss issues such as technology transfer, policy changes to supplement technological fixes, and energy efficiency strategies. The group could have specialized working groups, such as those that exist under the Asia-Pacific Economic Cooperation (APEC), which would report

back to the main group. Suggested umbrella organizations for such a group included: 1) The World Bank; 2) the Global Environmental Facility; 3) the Sustainable Development Forum with China; and, 4) a combination of multilateral development banks and private foundations.

• Sister-city or U.S. state-Chinese province partnerships in which cities/states/provinces would collaborate to share technologies, policies, energy efficiency strategies, and other environmental solutions. This might help to avoid possible political problems associated with Chinese central government involvement while creating enduring bilateral relations at the local level. Many U.S. mayors are interested in such projects.

Possible Proposals or Initiatives

• The only way that the Chinese will match their energy efficiency goals is through pricing reforms in the energy sector. The United States should therefore provide technical and policy assistance to the Chinese in implementing indirect market mechanisms in the energy sector.

• In other parts of the world, countries have been able to swap debt for environmental improvements. While China does not have this type of international debt, the core idea of such a system may have applications in China.

• Demonstration projects for energy efficient technologies in rural areas of China are a good way to show the Chinese that the United States is interested in the development of their entire country and not just the more economically developed Southeastern region.

• Policy changes, in energy efficiency for example, are our best strategy since they can have a substantial effect but have relatively low implementation costs.

Engagement and Diplomatic Strategies

• The United States should approach the Chinese with a list of their environmental accomplishments and praise them for their progress on environmental issues. Future bilateral environmental agreements should focus on expanding upon China's existing successes. This suggestion is rooted in the fear that the Chinese will take any offer of help from the United States as condescending.

• The United States should engage the Chinese on a trilateral basis with a mutual ally, such as Japan or South Korea, to help normalize U.S.-China relations and to share environmentally sound technologies.

• The United States has been extremely successful in raising environmental consciousness throughout the world. We should take this type of 'salesman' approach to China and convince them of the importance of their environmental problems.

• The United States should offer specific lessons from its own mistakes and technological advances.

• Broad issues likely to be supported by the Chinese, such as environmental education, should be the focus of near-term bilateral engagement.

• Persistence will be key to any engagement strategy.

The Chinese Perspective

• The Chinese are most concerned with results, and are willing to work with both governmental and non-governmental partners that have the funding and mechanisms to deliver.

• The Chinese understand why the United States has a commercial interest in assisting them on energy issues, but they do not see how U.S. assistance will benefit them commercially. This is an important barrier to any U.S. efforts.

• The Chinese believe that the United States has thus far been unable to back up its proposals with adequate funding.

• The Chinese put a greater emphasis on technological fixes than policy changes, as is evidenced by their selections for Agenda 21 projects.

• Chinese state agencies are sometimes uncomfortable working with U.S. NGOs and the United States should be aware of the impact that NGO involvement may have on the success of a project.

The U.S. Domestic Context

Congressional Context

The current Congressional view of China is not a favorable one. While Congress has been influenced by increased Chinese lobbying and input, the U.S. Administration's determination to improve U.S.-China relations, and support of the Administration's China policy from the private business sector and NGOs, U.S. China policy remains an extremely partisan issue for the following reasons:

• The U.S. media is still taking a very anti-Chinese stance. The impact of the media's coverage of the Hong Kong transfer and general Chinese issues on U.S. public opinion should not be underestimated.

• It is unclear how much of an impact "Donorgate" will have on overall U.S.-China relations and, specifically, on Vice President Gore's upcoming visit to China. Those in the Democratic Party who do not support Gore may see this as the perfect opportunity to attack him, using the Administration's China policy as its main weapon.

• Those on the far Right, who also disagree with the Administration's China policy, may use "Donorgate" as an opportunity to voice more opposition to improved ties with the Chinese.

The anti-Gore Democrats and the far Right may gather enough power to affect significant change in the Administration's China policy, in light of the extensive media attention they have generated thus far. The immediate question is how close Gore will want to be associated with the Chinese.

Donorgate

Over 30 members of Congress will be traveling to China over the spring recess, and Congressional codelegates will be traveling with the Vice President during his visit to China in March. One of the Congressional delegations during the spring recess will be led by Congressman Newt Gingrich.

While the Donorgate scandal may not have stopped members of Congress from planning visits to China this spring, it has made them very sensitive about their visits. Concerns have been voiced over the payment of dinners and hotel rooms, and members of Congress are sure to be highly aware of these issues during their stay in China.

Some participants believed that because half of Congress does not have any opinion on China, the impact of Donorgate should not be overestimated. Donorgate, however, does not seem to have affected the Chinese, who may not realize the possible importance of this issue.

General Comments

The environment may soon become the fourth main foreign policy issue with China, joining trade, human rights and security. However, it may take an environmental crisis in China for such a development to occur.

Environmental issues should generally be seen as a positive way to engage the Chinese. WTO negotiations also might be a means of helping the Chinese adopt such measures as energy pricing reform. The upcoming conference on climate change in Kyoto can also be an impetus to raise environmental concerns. The Chinese, however, are significantly less receptive to managing global environmental problems, such as climate change, than domestic issues.

Transportation Options and Trends in China

April 2, 1997

Chinese Transportation Options and Trends

Transportation Design and Planning

China currently has a five-year plan to develop an approximately 35,000 kilometer national trunk highway system, which will connect much of south and northeast China with the northwestern cities of Dahuangshan and Ürümqi. While the five-year time frame for the plan is somewhat unrealistic — as is the 3.2 trillion yuan set aside for transportation in the 9th five year plan — the plan does give an indication of where the Chinese plan to spend transportation funds in the near future.

Since China's publicly funded transportation infrastructure cannot possibly match the speed of its private sector driven industrial growth, China is currently experiencing a transportation bottleneck: the main Chinese transportation goal is simply to increase their passenger and freight mobility. The challenge for the Chinese is to optimize their transportation while not falling into an American-style system — an outcome that is feared by both the Chinese and the United States.

When analyzing transportation issues, it is important to understand that they are integrated systems, as opposed to separate factors, which must be properly balanced. Items to be considered when optimizing a transport system include:

- Identifying the objective ("cost function");
- Establishing the criteria ("constraint equations");
- Identifying the factors that can be adjusted ("parameters");
- Solving the problem ("minimize the cost"); and,
- Understanding that the system is not steady-state and will change over time.

During the development of their transportation system, China should consider the following factors...:

- Demand for mobility;
- Supply of transport infrastructure;
- Design of transport infrastructure;
- Efficiency of transport systems operations design and management; and,
- Integration of land use and transport infrastructure development.

...and constraints:

- Energy;
- Air quality, noise, and other environmental impacts;
- Land area; and,
- Investment capital.

To address immediate transport system concerns, the Chinese should consider the following factors:

- Infrastructure investment
  - WHAT: Roads, rails, waterways, ports, and airports.
  - WHO: Ministry of Finance, Ministry of Communications, World Bank, Asian Development Bank, investment banks, and development consortia.
  - HOW: Demand, supply design, and operations.

- Research
  - WHAT: Research institutes and collaborative research projects.
  - WHO: Universities, state ministries, and businesses.
  - HOW: Joint research initiatives and academic interaction.

In the long-term, the following factors are of high importance:

- Integrated land use and transport infrastructure planning, design, and implementation;
- Multimodal approach to supply; and,
- Education and training.

Potential destabilizing factors for China's transportation system planning include:

- Institutional segregation of transport and land use decision makers;
- Reliance on internal combustion engine technology. The Chinese are very concerned about this technology but must achieve their end goal of increased mobility;
- Western highway interchange design. This must be different than the model currently used in the United States if it is to meet Chinese transportation, land use and economic demands; and,
- Foreign equity positions in transport infrastructure projects. An important consideration since transportation choices often have a significant impact on land use.

Possibilities for U.S.-China cooperation on transportation include:

- The United States can become a professional and intellectual partner for China. The Chinese have already studied U.S. highway regulations and standards: partnerships with the Chinese will allow them to learn from our transportation missteps and help them develop a multimodal system;
- Efforts should be made to maintain the necessary levels of both U.S. and Chinese awareness of the transportation needs and the impacts of Chinese transport system development.

An example of how transportation system choices can impact land use, the environment, and investment capital can be seen through the design of interchanges on Chinese highways. In 1976, Gordon Wu, a Hong Kong entrepreneur, was able to secure the right-of-way to build a privately owned turnpike between Guangzhou and Hong Kong. Mr. Wu determined that he could get the best return on his investment by maximizing the retail space at the 15 turnpike interchange sites he was given, leading him to design an interchange that optimized land use (by placing a retail mall underneath the interchange) and incorporated public transportation accessibility. Innovative ideas such as this one are crucial to the development of an environmentally-sensitive transport system in China, and would be a main benefit of joint U.S.-China research on transportation issues.

Sustainable Transport

Sustainable transportation must be analyzed as a system, rather than just singular factors such as fuels or emissions. Transport efficiency can be reached through integrated transport planning (ITP), which consists of five factors:

- Economic incentives to moderate demand;
- Management of existing infrastructure;
- Public transport emphasis;
- Fuel and vehicle efficiency standards; and,
- Land use and urban design.

The International Institute for Energy Conservation (IIEC) is currently developing a sustainable transport program for Xiamen, China. Xiamen was chosen for its size, transportation needs and concerns, and the stated willingness of local bureaucrats to utilize an ITP approach for their city's growing transport needs. As with many Chinese cities, Xiamen's top three transport problems are: 1) air pollution; 2) traffic congestion; and 3) energy conservation. While none of these problems are currently of a critical nature in Xiamen — as opposed to the situations in other Chinese cities — Xiamen's transport related problems have the potential to become like Mexico City or Bangkok's. CO_2 emissions, it should be noted, are not on the list of Xiamen's current transport-related problems, even though these emissions are becoming increasingly important.

In conjunction with the U.S. Environmental Protection Agency, IIEC held a series of workshops on an integrated approach to mobile source emissions reduc-

tions in Xiamen. These sessions identified unmanaged vehicle growth as the major transport problem in Xiamen, resulting in increased air pollution, traffic congestion and excessive energy consumption. Suggested potential measures to overcome these problems included:

- Making public transport a priority;
- Improving pedestrian engineering and urban design;
- Using cleaner, more energy-efficient fuels;
- Establishing and enforcing vehicle emissions standards; and,
- Initiating a data collection program for full cost analysis.

The Chinese are interested in the following technologies to assist them in implementing these measures:

- Emissions inspection and ambient air quality monitoring and display equipment;
- Advanced communications technology to facilitate public transport and to manage demand for travel;
- Alternative fuels, vehicle conversion kits, and infrastructure technology;
- Intelligent Transport Systems (ITS) applications for vehicle fleet and monitoring; and,
- Geographic Information Systems (GIS) applications for land use planning and economic analysis.

Solving Chinese Traffic Congestion Problems

- Low-tech solutions, such as traffic lights at intersections and better traffic management, can help solve urban traffic congestion. New roads are not always the best solution;
- Traffic management and other low-tech solutions suffer from a lack of interagency, or even intercity, discourse on traffic congestion problems;
- Designating certain roads as pedestrian- or bicycle-only could help ease traffic congestion problems;
- The success of a transport system is heavily reliant on how you interconnect modes of transport and integrate them into a system.

Technological versus Institutional Reform

- While technological improvements can help temper many of China's transport problems, without institutional and policy changes, technology will simply be overrun. As was the case in the United States, the Chinese are using the rubber, oil, and asphalt industries to boost their economy — technology simply cannot overcome this institutional bias towards the automobile industry;
- Technology cannot solve land use problems. A basic policy framework is the best strategy to address China's transport issues;
- Fuel cells have the potential to help reduce Chinese transport energy efficiency and mobile source air pollution concerns.

Railways and Air Transport

- Rail is still the backbone of China's transport, and the Ministry of Railways has a great deal of money which it is using to make impressive improvements to China's rail system. Passenger rail cars in China are better than many currently found in Europe;
- The Ministry of Railways is placing a high priority on improving coal rail transport, but perhaps the most efficient way to improve coal transport would be to wash the coal prior to transportation. Unfortunately, pre-washing coal is problematic because water sources are generally not located near coal mines;
- Air transport in China is largely unregulated and very complicated. Foreign investment is highly regulated and airports can be opened at the discretion of local authorities.

Automobile Industry Perspective

- United States auto manufacturers doing business in China realize that there are bigger transport issues than personal mobility. Their perspective recognizes the entire transport system infrastructure and they are not focused singly on the internal combustion engine;
- The number of personal automobiles in China will not dramatically increase unless there is a dramatic increase in personal income and infrastructure development;
- Environmental issues must be addressed in a systematic fashion. Many factors beyond cars and trucks are largely responsible for current conditions;
- The use of certain technologies, such as catalytic converters, does not currently make sense in China because the Chinese still use leaded gasoline.

Financing Transport Systems in China

- Multilateral bank financing of road building in China has decreased recently. The World Bank is now holding China to more stringent technical road construction standards and is forcing them to be more responsible in their transport planning. The Asian Development Bank has decided not to spend any more money on Chinese roads until at least the year 2000;
- While China may adopt an automobile tax similar to that used in the United States, like the United States it will most likely not be used to fund the transport sector. The Chinese will probably follow the example of the United States and use this money to help them balance their budget;
- While foreign investment in air transport is discouraged, significant direct foreign investment is being

made in the automobile and road building industries; the Chinese should be concerned about the potential domestic impact of foreign interests in these industries;

• Foreign direct investment, in the automotive industry for example, can be the fastest way to bring environmental and safety improvements to China's transport system.

U.S.-PRC Cooperation on Transport Systems

• The United States should focus on local pollution and energy efficiency problems that have secondary global impacts in order to reach its goal of reducing greenhouse gas emissions;

• Multilateral cooperation on transport systems is imperative because no single country has the perfect system or correct transport answer;

• Working with the Chinese on developing appropriate pricing systems for their toll roads may help institute a user pays principle, increase carpooling, and reduce overall automobile use.

The Chinese Political Economy and Central-Local Government Dynamics
Urban, Township and Village Air Pollution

May 7, 1997

The Chinese Political Economy and Central-Local Government Dynamics

The Chinese Governmental Structure

The Chinese governmental structure is multi-layered, with functionally defined hierarchies. At the top of this structure is the central government in Beijing. The next level down is occupied by the provinces, followed by cities and then the counties. Townships are on a level below counties, followed by villages. Everything in this system is bound by level: Beijing never directly connects with the counties, and vice versa.

Every unit in this organizational hierarchy is assigned a bureaucratic rank. A basic rule is that units of the same rank cannot issue binding orders to each other. This can be very important as, for example, ministries at the Center have the same bureaucratic rank as do provincial governors. A ministry, therefore, cannot issue a binding order to a province, (the premier, vice premiers, and commissions at the Center all out-rank provinces and thus can issue binding orders to them).

The relationship between territorial and functional levels of the government is also highly important: when analyzing the Chinese governmental structure, and how laws and regulations are enforced within the structure, it is imperative to understand the relationship between *tiao* (inter-level relations) and *kuai* (intra-level relations). This relationship will often have a significant impact on the unit of the government that has the most influence and power over a specific regulation.

Due to the structured level system, binding orders can only come from a higher ranking bureaucratic unit. For example, a Ministry cannot issue a binding order to a province, and a county cannot issue a binding order to a city. Against this bureaucratic background, a basic reform deal has been struck in which each territorial level (Center, province, city, county, township) gives the level directly below it some flexibility, with the proviso that this flexibility is used effectively to increase economic output and thus maintain social and political stability. Because this is not codified in law or in the constitution, the result is ongoing bargaining over the extent and limits of this level-by-level flexibility.

Because political relationships between levels are negotiated in this system, the central government can only achieve policy enforcement when the following conditions are met:

• All of the top central party leaders agree on the policy;
• The top leaders consider the policy a priority; and,
• The results of the policy are measurable.

Chinese Enterprises

Cities, counties, townships and villages, and sometimes even provinces can have enterprises in China. These enterprises generally are not run by the private sector but by the government at the level in which they operate. To use the township level as an example, the township essentially acts like a territorial corporation overseeing the actions of a township enterprise. The township selects the leaders of the enterprise, manages its finances, and has control over many personnel decisions within the enterprise. While the daily management of business is done by the enterprise itself, the township serves as the "corporate" headquarters. The township leaders are consequently rewarded for the success of an enterprise, and therefore have a stake in ensuring that, for example, environmental concerns do

not hinder an enterprise's profitability. Due to the strong relationship between an enterprise and its local government, enterprises generally compete only with other enterprises outside of their township, village or city.

The Impact of the Chinese Governmental Structure on Environmental Enforcement

Each unit in the environmental regulatory hierarchy is subordinate to the territorial government at its own level, rather than to the environmental bureaucracy at the next higher territorial level. But, as indicated above, most territorial governments have officials that have, effectively, become entrepreneurs. As a consequence, on a systemic basis, the entrepreneurs who are government officials control the regulators.

For example, a township government controls its local Environmental Protection Bureau (EPB). The township EPB thus is not under the effective control of the EPB at the county level above it. This has created a circular system of environmental enforcement at the township and village levels which not infrequently produces a pattern such as the following:

- The EPB issues a fine against a polluting enterprise;
- The fine is paid by the enterprise to the township government; and,
- The township government provides a tax break to the polluting enterprise to offset the assessed fine.

This system renders the EPB powerless while encouraging enterprises to maximize profitability and employment at the expense of the environment.

The Potential for Progress on Environmental Issues

Not only is the political system in China negotiated, but the economy is as well. All facets of the government are enmeshed with economic goals: making money is a legitimate — and often the most important — goal. Due to this, environmental problems are often ignored or not given a high priority. For example, while agricultural development has gone up in recent years, it is still in reality given relatively low priority in the competition for funds because it does not have high economic potential.

In order for environmental progress to be made in China, new regulations must:

- Be made profitable for counties;
- Include funding mechanisms to cover front end costs of implementation;
- Sharply limit downside risks;
- Have the support of key officials and have a strategy for neutralizing skeptics; and,
- Ensure that they are given to the proper persons and agencies to implement.

Additional Comments

- The most effective way to engage the Chinese on environmental issues is to: 1) provide them with environmental information and data; 2) allow them to analyze the data themselves; 3) create an epistemic community of scientists to work on the issue, if necessary; 4) show high level governmental support for progress on the issue; and, 5) set deadlines by which goals and objectives to address the issue should be met.
- Some of the most serious environmental problems in China are at the local level. In these situations, creating a closed, small-scale, economic system in which environmental costs can be assessed is the best way to address environmental degradation.
- The tendency for the central government to spin off state-owned enterprises (SOEs) may have economic benefits, but it works against environmental concerns; the enterprises are under less governmental control and are more apt to abuse the environment for economic profit.
- It is more beneficial to shut down an SOE than to provide money for it to be cleaned up. This money would only prop up an SOE that is a drain on the economy and, more than likely, a bad polluter.
- The approaches of enforcing environmental regulations through rules and regulations (the 'stick' approach) and market incentives (the 'carrot' approach) must be used together to be effective in China.
- There will be no solution to Chinese environmental problems without a national policy on the environment. However, there must be an effort — and incentives at the lower levels of government — to enforce environmental regulations.

Urban, Township and Village Air Pollution
Main Factors Contributing to Urban Air Pollution

- Coal use in urban areas produces 14.14 million tons of soot, 18.25 million tons of sulfur dioxide, and 11.63 million tons of industrial dust per year. This is approximately 75% of the total output of these pollutants in China.
- Automobile ownership has expanded from 710,000 automobiles in 1991 to 1,500,000 in 1995.
- The number of urban citizens has risen from 19.4% of the total population in 1980 to 28.9% in 1995.

The Results of These Factors

- Beijing, Shenyang and Xian are three of the top ten most polluted cities in the world.
- 500 major cities in China do not meet World Health Organization (WHO) air quality standards.
- Photochemical smog exists in Beijing, Shanghai, Lanzhou and Chengdu.

• Acid rain is problematic south of the Yangtze River, in the regions east of the Qinghai-Tibetan Plateau, and in the Sichuan Basin.

Efforts to Improve Urban Air Quality

Total suspended particulate (TSP) levels seem to be falling in Chinese cities, but this is mainly due to higher stacks, central heating, and the movement of coal plants to rural areas. Governmental efforts include the:

• National 9th Five Year Plan which has an environmental protection component and long term targets for the year 2010;

• 4th National Conference on Environmental Protection;

• Plan for major pollutants and emissions controls during the 9th Five-Year Plan period;

• China Trans-Century Green plan;

• New law on control of atmospheric pollution; and,

• 1 July 1997 regulation enforcing unleaded fuel use in Beijing.

A new air quality program is underway and will include weekly public announcements regarding air quality levels in urban areas.

Township and Village Air Pollution

Environmental issues in China should be examined as one part of a linked chain along with technology, energy and health. This Technology-Energy-Environment-Health chain exists at the township and village enterprise (TVE), household, and industry levels. In addition, it is important to consider Chinese environmental issues by region because environmental and economic concerns vary throughout China. Economic analyses can also be utilized to combine quantitative and qualitative methods and determine the impacts of pollution from TVEs on health.

Discussion with the Chinese Citizen Involvement in Environmental Protection Delegation from the People's Republic of China

May 7, 1997

During this special session, the working group was visited by the Chinese Citizen Involvement in Environmental Protection Delegation. The nine member delegation, comprised of representatives from Chinese academic institutions, non-governmental and quasi non-governmental organizations, and government agencies, spoke with the working group for approximately two hours on a variety of environmental topics. The following is a summary of the major themes and observations made by the delegation members.

Citizen Involvement in Environmental Protection and Environmental Awareness

Citizen Involvement in Enforcing and Developing Environmental Legislation

• While scientists and environmental experts are definitely involved and consulted by the government when developing environmental legislation, the opinions of citizens are rarely taken into consideration.

• The government relies on tips from the general public to target polluting companies and to ensure that closed-down companies do not re-open.

Citizen Involvement at the Local Level

• At the provincial level, public participation encompasses the consideration of public opinion in the implementation of NEPA policies and in monitoring pollution from industries.

• In the city of Dalian, Liaoning Province, there is a 24 hour phone hotline to receive complaints about the environment from citizens and also a radio talk show devoted to airing environmental complaints. Both the hotline and the radio show receive a high number of calls.

Environmental Awareness

Environmental awareness in China is rapidly rising due to a number of factors:

• As the income level of Chinese city dwellers rises, they are paying more attention to quality of life and environmental issues;

• Environmental problems impact the daily lives of Chinese: people want to breathe clean air and have clean and reliable sources of water;

• Campaigns through newspapers and NGOs have helped raise awareness of environmental issues;

• Environmental education programs have been especially helpful;

• Media coverage on the environment and international programs has been useful in raising awareness of global problems; and,

• Central government campaigns have been very important in creating awareness, especially in rural areas.

• There are large discrepancies regarding environmental awareness between urban and rural areas. In cities, economic improvements create a greater desire for quality of life improvements. In rural areas, people are poor and are most concerned with improving the livelihoods of their families; environmental concerns are not a top priority.

• Environmental awareness is also correlated to pollution levels: when pollution directly affects the daily lives of Chinese, awareness about these issues rise accordingly.

• NEPA is working in poor rural areas to help develop sustainable development policies which will ensure both environmental protection and economic development.

• Demonstrations and protests about environmental problems in China have occurred and have had some positive results. But, because the government generally frowns upon them, they are not given much publicity. As the environment gets worse, however, the incidence of demonstrations and protests will probably rise.

How Environmental Laws and Policies are Formed

• Many environmental laws and policies in China are formed with the advice of scientists, scholars, and even NGOs, who are given preliminary versions of these documents to review.

• NEPA is active in promotional activities on the environment, and provides the State Council with environmental reports and findings. These actions often bring environmental problems to the attention of the State Council.

How Environmental Laws and Policies are Enforced

• The State Council only gets involved in very serious environmental problems that are politically difficult to ignore. Less critical problems have a more vague process for being addressed. The role of NGOs in this arena is weak: there is no set process for their voices to be heard.

• China is taking pollution issues very seriously and has already closed down 62,000 polluting industries. The central government has recently targeted small-scale pulp factories for their high levels of pollution.

• The effectiveness of laws has recently been measured by a three year project entitled, "Chinese Environmental Central Work." The data for this project has been collected but a report has not yet been issued.

• In the past, environmental impact assessments were only done on projects. However, assessments are now taking a more strategic approach and are being implemented at the policy level. Just recently, the amended water pollution act added a mechanism by which public opinion could be included in policy decisions through systematic questionnaires.

• Lawmakers have recently drafted an amendment to the criminal law which would add environmental destruction as a punishable crime. This law still must be deliberated upon and passed by the National People's Congress.

Chinese Environmental NGOs

There are two types of NGOs in China:

• Non-governmental organizations (NGOs) which are based on the American model and are completely independent of the government. NGOs in China are fairly new and are mainly trying to gain an understanding of the policies NEPA is making.

• Quasi non-governmental organizations (QUANGOs). QUANGOs have existed for a much longer period of time in China and have been influential and instrumental in developing Chinese environmental policy. They receive some funding from the government and are regularly consulted on environmental matters. These groups are generally not grassroots-based but have been formed at the governmental level.

The Chinese Society for Environmental Sciences

The Chinese Society for Environmental Sciences (CSES) is a classic example of how a QUANGO is formed in China. CSES was established in 1979 just as environmental awareness was emerging in China. This new environmental movement was led by scientists and scholars who banded together to create CSES. CSES was opened by members within the State Council and still receives some government funding. One of CSES's first accomplishments was to call for the creation of a government agency to address environmental issues. This effort eventually led to the creation of NEPA. CSES is now consulted on environmental laws and has convinced the government to sponsor numerous environmental conferences.

An Example of Environmental Enforcement: Pulp Factories

The Initial Problem

• In general, the government has taken the approach of closing down all industries which fall under a specific manufacturing level, as opposed to focusing on specific companies that are very bad polluters. For example, the government recently shut down all pulp factories with an annual production of less than 17,000 pounds. It was determined that technological solutions

to the pollution problems of these companies were not economically feasible, so the government simply closed them.

• This decision was made by the State Council in July 1996 and was enforced through government channels, mainly at the provincial level.

• The pulp factory issue was acted upon by the central government due to the significance of the impact these industries were having on the environment. The issue came to the attention of the central party through the personal experiences of provincial leaders.

• Some factories are consolidating to avoid the new regulations while others are re-opening after their initial shut-down. The government is relying on citizens to report factories which are illegally being re-opened.

Secondary Impacts as a Result of the Solution

• A secondary impact of these factories being closed is that there is now no use for rice crop wastes. Many Chinese farmers would appreciate U.S. technological assistance and training on how to best utilize these wastes. However, the best solution to this problem may be methodological and not technological: by simply using these crop wastes as organic fertilizer, these farmers could both vastly improve their soils and reduce water contamination due to chemical fertilizers.

• China is already experiencing the downstream impacts of high fertilizer use. China is working hard on eco-agriculture and has implemented successful models, but economic return from eco-agriculture is not very high.

• The problem with the methodological solution is that Chinese farms are usually very small and farmers are conscious of their costs. Chemical fertilizers are cheap, easy to use and have high short-term returns.

Discussion with Qu Geping

May 19, 1997

During this special session, the working group was visited by Professor Qu Geping, Chairman, Committee on Environmental Protection and Natural Resources Conservation, National People's Congress, and former Administrator, National Environmental Protection Agency (NEPA). Professor Qu answered questions on a variety of topics regarding environmental issues in China and U.S.-China relations. The following is a summary of Professor Qu's remarks.

The Committee on Environmental Protection and Natural Resources Conservation

Since its establishment in 1993, the Committee on Environmental Protection and Natural Resources Conservation (Committee) of the National People's Congress (NPC) has focused on two major tasks: 1) creating and reforming environmental legislation; and 2) enforcing new and existing legislation. In the past four years, the Committee has passed or amended laws in four areas: air, water, noise and solid waste. A key challenge to the Committee has been to evaluate how environmental laws will work under the new economy. To learn more about this process, the Committee is examining the experiences and lawmaking procedures of the United States and other developed countries.

To address enforcement issues, the Committee undertook an extensive review process — the largest of its kind ever performed by the NPC. This survey looked at the implementation of environmental legislation at the provincial level and also examined rural areas to assess implementation among the poor. In addition, the Committee helped set up hotlines in cities for people to call and talk about environmental problems. This effort raised environmental awareness among both citizens and lawmakers.

The Committee also initiated a plan entitled the Transcentury Chinese Environmental Tour. This plan uses the media to expose polluters and has successfully brought attention to the serious environmental problems of the Huai River. The plan has also raised general public awareness of environmental issues and even encouraged government officials to take notice of environmental problems.

In the past four years, the Committee has done a great deal to establish a democratic and legislative process in China, and has been effective in raising public awareness about environmental issues.

The Impact of Public Opinion

Through the Transcentury Chinese Environmental Tour, the government has incorporated public opinion at the provincial and city level into the decision-making process. Strong opinion at the local level can also push the central government to take action on environmental issues.

The Possibility of an Energy Efficiency Law

While the Committee and NEPA have been working on the development of an energy efficiency law, this goal has not yet been reached. The energy effi-

ciency law is necessary to promote economic growth, but it is somewhat unpopular because it will force the closure of a number of factories.

Management of Water Resources

There are areas of China that are facing severe water scarcity. The Yellow River, for example, is completely dry at its lower reaches during certain months of the year. This problem is more one of management than of drought; the Committee is looking to revise the current water law to incorporate water management policies. The Chinese water problem is due mostly to distribution: water resources in China rank sixth in the world. New water diversion projects are underway and the Chinese are studying the watershed management plans of the Thames River in England and the Tennessee Valley.

Watershed management can also solve trans-provincial pollution problems. NEPA has worked on this problem by forcing provinces with high levels of water-born pollution to treat water flowing downstream at the provincial border.

The greatest problem facing watershed management plans in China is simply changing people's view of water as a resource. At present, if water is available it is simply used: both Chinese citizens and government officials are lacking an overall perspective on how water as a whole should be managed.

The New Law on Public Announcement of Pollution Levels

The decision to announce environmental pollution data to the public was made approximately two months ago by the State Environmental Protection Commission of the State Council. If implemented, this decision will go a long way towards raising environmental awareness and helping curb environmental degradation. It is currently unclear how this information will be distributed; implementation will be difficult because many cities do not want to make pollution data public. However, since this decision was made by the State Council, they are required to abide by it.

The Cost of Environmental Pollution

The following comments were given in response to a question about the validity of World Bank figures which estimate the cost of environmental pollution in China to be approximately 6% of GDP:

The World Bank knows China very well, and if they state that the cost of environmental pollution in China is 6% of annual GDP, this figure should be trusted. Many Chinese policies, including pricing policies, are first proposed by the World Bank and then accepted by the central government. While some Chinese Ministries do not accept the World Bank's figures, they are generally very reliable.

U.S.-China Cooperation on Energy Issues

Perhaps the most important area in which China can benefit from U.S. assistance on environmental issues is coal technology. The Chinese need more innovative coal burning technology to increase efficiency and decrease emissions. While the United States has more advanced coal technology, the two countries need to move away from dialogue and towards action and collaboration.

In response to Professor Qu's comments, a working group member offered the following observation:

In two weeks, the Department of Energy will be hosting the first meeting under the new Environmental Forum between the United States and China. The two countries already have agreements on coal combustion, but lack similar efforts on natural gas development. The best technology for natural gas exploration and development is not owned by the U.S. government but by U.S. companies who feel that the exploration regime in China is unattractive. The U.S. government has little leverage to convince these companies to invest in China: the appropriate technology will only be transferred if the prospects for these companies are made more attractive.

The problem with natural gas exploration in China is that reserves are low. Some natural gas beds have recently been discovered in Shanxi and the government is building a pipeline that will bring natural gas from this province to Beijing in approximately two months. However, there is not much gas in these reserves and their overall impact on energy use will be very low.

Chinese Activities on Climate Change Issues

Climate change is a very important issue to the Chinese government. However, for China and other developing countries to make significant progress on climate change issues, developed countries will need to provide the necessary funding and technologies.

Chinese companies have been asked by the government to reduce their SO_2 and CO_2 emissions, and these companies will be forced to abide by this request or face closure when China joins the WTO. China has also recently passed a coal law and an air pollution law to regulate CO_2 emissions. Small scale power plans have been closed due to their inefficiency in relation to emissions levels and screening and washing of coal has been encouraged in the new laws.

In general, China is doing more than any other developing country to reduce greenhouse gas emissions. The key to any true progress, however, is financing assistance from developed countries and facilitating the transfer of new technologies.

Bilateral Relations on the Environment: Successes and Failures from the U.S. and Abroad

June 4, 1997

European Union-PRC Bilateral Relations on the Environment

The European Union's Efforts in China

The European Union (EU) lacks extensive bilateral relations with China on environmental matters: member states have traditionally initiated their own agreements with China, and the EU as a whole is just beginning to undertake independent efforts with the Chinese. The current consensus in the EU is that it has much to learn from Japan and the United States regarding bilateral relations with the Chinese.

Despite European intentions to build an environmental profile comparable to those of the United States and Japan, the EU generally feels that its geographical distance from China gives it less of a natural connection with China. The Europeans, however, recognize the potential of China's markets and are increasingly interested in improving relations with the Chinese and establishing new trade in a variety of areas.

The goal of most European Community (EC) projects in China is technology sales and spin-offs for European companies. The Europeans tend to place a greater emphasis on projects that will have a sizable impact on trade with China, or that will contribute to EU dominance of a sector of the market or geographical region. This emphasis on trade has created an interesting dichotomy for the Europeans: the EC is, in essence, competing with its own member states for business in China, causing many member states to be hesitant in their support of EC efforts.

The EC has targeted three issue areas for projects on the environment in China:

• The Brown Environment (urban pollution). Many European countries have experience with this issue and see it as an area in which they can provide specialized knowledge and technology;

• Energy Efficiency and Clean Technology. By the year 2020, Europe will receive 70% of its energy from foreign sources. European interest in China on energy efficiency is seen largely as a way for the Europeans to reduce future emissions and to create potential cost savings for themselves;

• Soil Conservation and Poverty Alleviation. This has been given less importance but some new projects are focusing on this area.

The EC has several Directorate Generals (DGs) involved in environmental affairs:

• DGI — External Affairs
• DGIII — Industrial
• DGXI — Environment
• DGXVI — Energy

Both DGI and DGXI began working on environmental matters in China in 1985. Yet it is only in the last two years that the two Directorate Generals began coordinating their efforts in China. DGXVI began working in China at an earlier date and still maintains separate plans and objectives. DGXI holds meetings every six months on the Chinese environment and all member states — with the exception of Greece — have attended these meetings, demonstrating the interest of member states in environmental efforts in China.

Efforts of EU Member States in China

Most member states have their own relations regarding the environment with China:

• **Germany** is the largest EU player on environmental issues in China, focusing mainly on water pollution, the brown environment, carbon dioxide, coal technology and energy efficiency. The Germans have concentrated on the central and coastal regions of China (specifically in Shandong, Tianjin, and Beijing). Germany has provided a significant amount of funding for afforestation projects and modest sums for biodiversity efforts in Hainan and Yunnan provinces. The Germans are also planning projects to address global environmental problems, including ozone layer protection, carbon dioxide reduction, and energy efficiency, with the ultimate objective of sparking technology sales. The German finance company, DEG, provides financial assistance to promote German technology in China.

• The **United Kingdom** is a smaller player in China that deals mostly in brown environment, water, energy efficiency and transportation projects. Over 45% of British projects in China are environmental in nature and many of these are operated in conjunction with the World Bank. The UK has chosen to focus on projects in Shanghai, Jiangsu, Tianjin, Beijing, and Guangdong.

• **France's** activities on the environment in China are relatively small and focus mainly on research training and the environmental applications of biotechnology.

• **Italy** would like to become more involved in Chinese markets and environmental assistance but, so far, has

limited its efforts in China.

• **The Netherlands** offers training in clean production efforts in China.

• **Belgium** is involved in university training projects in Liaoning.

• **Denmark, Spain,** and **Sweden** are all increasing their efforts in China.

EC-PRC Bilateral Relations on the Environment

In its efforts to establish bilateral relations on the environment with China, the EC has dealt mainly with the State Science and Technology Commission (SSTC). Despite efforts by the Europeans to include the National Environmental Protection Agency (NEPA) in discussions of environmental matters, the SSTC has generally kept NEPA out of negotiations with the EC. In 1995, the EC and China created the EC-China Environmental Management Cooperation Program which has provided over 13 million ecu [the currency of the EU] for technical training in environmental fields. In addition, the Administrative Center for China's Agenda 21 (ACCA21) has partnerships with France and Norway. Germany will soon be involved in a similar partnership. The China International Training Center for Sustainable Development also works closely with ACCA21 and will be a major player in EC training projects.

Another successful EC program in Asia is the Regional Institute of Environmental Technology (RIET). RIET is an EC-Singapore partnership that was established in 1993 to facilitate the transfer of environmental technology to Asia. RIET will soon be launching the "Asia Eco-Best" program to further promote EC environmental technology throughout Asia. This program will be partially supported with EU funding for the next 5 years.

The EC has initiated three main projects on the environment in China:

• The first project started was the EC-China Environmental Management Cooperation Programme to improve expertise and training in industry and to find outlets for European technology. Most training is to be done in Beijing.

• In Southern Yunnan, the EC has established a project to study soil erosion and poverty alleviation. The EC has approved a pilot phase for this project and has awarded one million ecu in initial funding. The project has developed suggestions for watershed management, water management and social forestry projects.

• The EU is launching the Liaoning Environmental Integrated Project, which will focus on: 1) the development of urban environmental planning and management; 2) the promotion of environmental awareness, cleaner production, waste recycling, and energy efficiency; 3) Liao River basin pollution control; and, 4) support for economic and social restructuring in five municipalities. The EU is currently talking with the World Bank and U.S. based international banks in the hope that they will help finance this project.

Japan-PRC Bilateral Relations on the Environment

Among non-communist countries, Japan is the oldest aid donor to China and was the first to re-establish relations with the Chinese after the Tiananmen Square demonstrations. Despite a recent suspension of aid due to protests over nuclear testing, China is once again a main recipient of Japanese development aid, with environmental aid becoming an increasingly important component of Japan's assistance package.

Beginning in the 1960's with oil and offshore drilling development, energy sector development has comprised of over 70% of Japanese aid to China. Environmental aid to China, though, is a new concept in Japan: prior to 1987, Japan did not offer non-concessional environmental loans to China. However, through the efforts of the Ministry of Foreign Affairs (MoFA) and the Ministry of International Trade and Industry (MITI), environmental aid has become one of the three pillars of Japanese development assistance.

Japanese interest in environmental aid to China is a result of four factors:

• The power of the Chinese economy and a desire to create a market for Japanese technologies;

• Concerns about transboundary environmental issues such as acid rain and global climate change;

• An attempt by Japan to improve its international role on environment and development issues, and to improve its bilateral relations with China; and,

• Japanese concern about its own energy security and dependence on foreign energy sources. Efforts to assist China with energy development can be seen as a way for Japan to address their own energy concerns.

Development aid from Japan is controlled by the Ministry of Foreign Affairs (MoFA), the Ministry of International Trade and Industry (MITI), the Ministry of Finance (MFA), and the Economic Planning Agency. The Environment Agency has no jurisdiction over development aid. Since the late 1980s, there have been numerous institutional changes in Japan in order to control the adverse environmental impacts of development assistance. The MoFA has published environmental guidelines for development projects, and an Official Development Assistance Charter, which includes environmental protection as one of its principle goals, was formulated in 1993.

In addition to environmental programs that go through traditional aid channels, MITI established a Green Aid program. China is a main recipient of Green

Aid, which is designed to promote the spread of alternative energy sources and energy efficiency. Green Aid programs also provide training on environmental technologies and aim to create policy dialogues on energy and environment issues. Under this program, MITI created the Center for Energy and Environmental Technology in Beijing in 1996.

The Green Aid program has focused on a variety of areas, including:

- Air pollution surveys;
- Wastewater treatment and reutilization;
- Energy efficiency in iron works and coal boilers;
- Emissions reductions to meet Agenda 21 requirements; and,
- Desulfurization projects which capitalize on Japanese technology in this area.

In addition to Green Aid, the Environment Agency is working on acid rain and greenhouse gas monitoring with China and has promoted local level projects such as the partnering of cities. Japanese NGOs are also showing growing interest in working with Chinese counterparts on environmental issues.

Additional Comments on Bilateral Environmental Relations with China

Incentives for Technology Transfer to China

- The Japanese offer favorable loan packages as technology transfer incentives. A high priority is placed on demonstration projects, and sites are often visited by official and non-official delegations.
- Japan works with its industrial counterparts to assess the proper technological solution to their problems. The Japanese are heavily involved in the initial project assessment phase.
- In the European Union, member states offer soft loans as an incentive to technology transfer. The lack of incentives offered at the EC level is due to the fact that the EC banking system is not firmly established enough to offer economic incentives.

Japanese Demonstration Projects in China

- MITI has initiated 20 demonstration projects in China. Ten of these projects are for cleaner coal burning, energy efficiency and desulfurization. These projects allow many companies — and especially those with desulfurization technology — to be involved in Chinese technology development and to keep staff on site to train Chinese technicians. The Japanese have taken a very long term view of the Chinese market: they are willing to fund stand-alone projects with no patent exchange in order to introduce Japanese technology to China. Many of these technologies are re-engineered to be less costly for Chinese markets.
- Demonstration projects in China are currently suffering because the Chinese central government terminated funding grants to local governments in 1994. Financing difficulties at the local level have caused many of these projects to be delayed.
- With an eye towards the future, the Japanese view these projects as a way to learn more about Chinese manufacturing capacity, bureaucracy, and the Chinese labor force.

General comments

- Japan is the only G-7 country that has no formal environmental assessment process; thus, development aid has generally not been subject to environmental criteria. Most environmental assessments of development projects have taken the form of end-of-pipe adjustments.
- While Indonesia has recently become the largest recipient of Japanese development aid, China still receives a large portion of Japanese aid and the two recipients often switch places between the first and second slot. Japan's interest in Indonesia is based largely on its strong petroleum industry.
- There are a lack of environmental regimes in Asia to deal with transboundary issues such as fisheries and marine pollution. Some progress is being made with acid rain, but little attention is given to transboundary water issues.
- Even though China has turned down all Joint Implementation/Activities Implemented Jointly (JI/AIJ) projects and funding for political reasons, the Japanese have funded $30 million in Chinese iron works pilot projects as a test to learn about the JI process and the means by which it can turn Green Aid projects into JI projects.
- Japanese capacity building in China exists in the form of energy projects. Some of this capacity building is accomplished through open programs such as export credits, while other capacity building is achieved through directed programs such as Green Aid, which receives its funding from domestic energy taxes.
- The driver of environmental change in China will be policy and not technology. The Chinese need to make political, legal and institutional changes before technology can have an impact. The first step taken by the Chinese needs to be education: progress on environmental issues will be achieved only after basic needs are met and the general public becomes knowledgeable about environmental issues.
- A mechanism to encourage environmental change should be standardized environmental criteria which export credit agencies can follow. These standards would help create an incentive for developing coun-

tries to make costly improvements that benefit the environment.

• NGOs can play an important role by simply being the vehicle that brings different governments, agencies, and interest groups together. The ability of NGOs to act as catalysts for policy change should not be underestimated.

U.S. Bilateral Relations on the Environment

While the State Department has recently made progress in establishing bilateral relations on the environment with a number of developing countries, these relations have brought certain issues to the fore. Key issues of concern include: 1) selecting which countries to engage on environmental issues; 2) determining how environmental concerns should be incorporated into general bilateral relations; and, 3) balancing the need for development and environmental aid to these countries while still encouraging them to abide by international environmental guidelines and agreements.

In selecting which countries to engage on environmental issues, the State Department has focused its diplomatic environmental efforts on pivotal players in the global environment: this category includes countries whose actions will have a major impact on global fisheries, global climate change or ozone depletion. Countries such as China, India, Russia and Brazil are included in this category. In an effort to engage these countries on environmental issues, the State Department has developed common agendas on the environment. However, there is an inherent strain within these fora: it is often unclear to both the United States and the country involved whether the U.S. goal is to assist the country in their development, or to try and steer them towards adhering to international conventions on the environment and taking a more sustainable approach to their development.

Environmental issues also tend to become linked with overall bilateral relations. This has recently occurred through the Gore commissions (Gore and Chernomyrdin, for example). In a majority of these commissions, an environmental subcommittee is created underneath the umbrella of the bilateral forum. A result of this connection is that progress on environmental issues is often seen within the context of furthering other bilateral goals.

The common agenda framework is not only limited to developing countries, but has been pursued with the Japanese and European Union, as well. These fora place an emphasis on taking a multilateral approach to global environmental concerns. The Japanese MoFA and the State Department chair the U.S.-Japan common agenda, which meets regularly to discuss how the United States and Japan can work jointly to solve environmental problems. The United States has a similar common agenda with the EU through DGXI. While much of the focus of this group has been on differences between the environmental priorities of the United States and the European Union, it has recently begun to look at how the two countries can coordinate their efforts on the environment to help solve environmental degradation in the Newly Independent States, Central Europe (especially Poland, Hungary and the Czech Republic), and Asia.

The most important lesson learned from past bilateral efforts on the environment is that these interactions often create a dynamic in which the U.S. raises concerns about global issues yet sometimes lacks the money to fund development projects to solve domestic environmental concerns in the country with which it is engaged. This situation will remain the same during bilateral relations on the environment with China. The main difference between China and other countries, however, is that China will soon become the major player on global environmental issues and it is in the best interest of the United States to work with the Chinese and to ensure that they fill this role in a responsible manner.

Hydroelectricity and Nuclear Energy in China

Summary of Working Group Discussion on Energy Issues

July 2, 1997

Hydroelectricity in China

Background on China's Hydroelectric Power

The total installed capacity of China's hydroelectric power, as of the end of 1995, was 220 gigawatts (GW) per year, generating over 1000 kilowatt (KW) hours of energy. Between 1995 and 2000, newly commissioned hydroelectric capacities are expected to be between 17-18 GW per year. By 2000, hydroelectric power will probably account for 23% of China's generating capacity and 15% of its annual electricity generation. This percentage should remain static until 2003, when the Three Gorges Project begins power generation.

Of China's four major power networks, the Central China Power Network receives the highest percentage (31%) of its electricity generation from hydroelectricity, while the East and North China Power Networks have a relatively low share of hydroelectric power generation. The Northeast Power Network has a slightly higher mix of hydro power than the aforementioned East and North Power Networks, but this amount is decreasing.

Fifty percent of Chinese hydroelectric power resources are in the Yangtze River basin. The second largest resources are in Tibet, but these are very remote from load centers and are unlikely to be significantly developed in the medium term. The next largest resources are in Yunnan province, accounting for 10 percent of energy potential, most of which is in the Lancang catchment (Chinese name for the Mekong River). The Yellow (Huanghe) and Pearl (Zhujiang) each account for about six percent of resources. In the former case, the projects are largely developed for irrigation and flood control, with power considered a secondary benefit. In the latter case, projects are developed for power but multi-purpose benefits are still very substantial.

There are about twenty large hydro projects currently underway in China. When completed, these projects will add approximately 8,000 megawatts (MW) of electricity to China's total electrical generation.

Impediments to Hydroelectric Development in China

The main impediment to China's hydroelectric development is a lack of funds. This problem has two root causes: 1) the Three Gorges Project is using the majority of central government allocated hydroelectric development funds; and 2) the Chinese prefer to use domestic funds to pay for local costs and foreign funds to pay for foreign costs in their development projects. Approximately 70% of civil costs for Chinese hydro projects are local costs, creating a situation in which a lack of domestic funds can halt a project.

Funding shortages should be partially remedied soon when recently constructed hydro projects begin to turn a profit, which can then be fed into new hydro development. Additionally, provinces have begun sharing the costs of a project based on the percentage of power they will receive from it. However, this model has achieved only limited success because inland provinces — which have the highest potential for hydro development — do not have the money to pay for their share of development. At the same time, they are hesitant to let other provinces develop their water resources because they feel ownership over the energy which it will produce. Currently, there is no royalty model which would provide compensation to inland provinces for use of their water resource by a coastal province.

Social and Environmental Concerns of Hydro Projects

From a World Bank perspective, China's recent hydroelectric power development has been very successful; China's resettlement policies are the best in the world. These resettlement policies were developed in the 1980s, and were probably about 2 to 3 years ahead of the development of remarkably similar policies by the World Bank. The 'development based' policies have been designed by the Chinese in such a manner that resettlement planning and implementation must provide a source of future income for all resettlers as well as improved housing and infrastructure.

On environmental issues, the Chinese were also slightly ahead of the World Bank in the early 1980s and the rigor of their environmental work has continued to improve since then. Recent EIAs of dam and multi-purpose projects have been very thorough and are generally of similar standards to those prepared in developed countries.

Chinese Resettlement Policies

• Chinese resettlement policies have been successful and have incorporated a participatory process. The initial conceptual resettlement plan is usually developed by a regional design institute, based on the remaining land resources after inundation. This plan is designed mainly to establish resettlement feasibility and likely costs. The completed plan is followed by an

intensive compensation negotiation process involving provinces, counties, and townships and villages, all of which are intent on obtaining the maximum benefit from the project. Compensation for infrastructure, generally at replacement cost for considerably improved facilities, is usually handled by the province or county managing infrastructure construction. Compensation for land is given to the village and compensation for assets is given directly to individuals. Both the village and the individuals have the ability to decide how they want to spend their money. In principle, village funds are shared among individuals, but in practice a variety of income generation projects emerge ranging from individually managed enterprises or land plots to enterprises owned by the entire village or township. Each resettlement project is subject to appraisal by township and counties as to its likely financial viability and sustainability.

• The World Bank has served as a positive model for Chinese resettlement policies, yet it has never influenced the amount of money spent on resettlement for a project. At the time of the Shuikou project in 1997, the resettlement budget amounted to $2000 per head. With growing economic development, and therefore increased compensation, budgets have gradually increased. The Three Gorges resettlement budget amounts to about $5000 per head and will undoubtedly increase during implementation.

• Individuals affected as a result of resettlement are incorporated into the decision making processes, and any dissatisfaction by individuals with their packages is resolved through a conflict resolution process provided by law.

• The type of corruption that one would expect to find with resettlement policies, especially in regard to funding distribution, does not seem to be occurring.

Additional Comments on Hydroelectric Power

• Transmission costs can be substantial for hydroelectric projects, adding up to 15% to the cost of a project. For the Three Gorges Project, transmission costs will equal approximately $7 million. These transmission costs can make smaller hydro projects unfeasible; transmission costs for nuclear and coal projects generally amount to approximately 5% of the total project costs.

• Transmission losses in China are fairly low, averaging about 12% throughout the entire country. For the Three Gorges Project, transmission losses will be approximately 2%, which is very low for new hydro projects.

• A good example of how money from existing dams can be used to finance new projects can be seen through the Ertan dam project. Ertan is owned by a limited liability company (LLC), which pays dividends to its shareholders from its profits. These dividends, and the profit from Ertan, can be reinvested in new dam projects.

• All indicators suggest that the Three Gorges Project will be completed on time or with a year delay at most. The first stage diversion, due to occur towards the end of 1997, will occur on time.

Nuclear Power in China

China's Current and Future Nuclear Plans

There are three key factors that require China to expand its nuclear generating capacity: 1) the large geographic distances between energy resource deposits and the centers of energy demand; 2) the expanding electric energy needs of China's fast growing economy and population; and, 3) the environmental and human health costs that come from continued heavy reliance on coal. China's current energy mix presents major problems:

• Seventy-seven percent of China's coal comes from the interior of the country or the north, tying up rail transportation throughout the country;

• Hydroelectricity is mainly concentrated in the western half of the country, far from areas of high energy demand;

• China is the sixth largest producer of oil in the world, but is a net oil importer. By 2010, China will import 2 million barrels of oil a day, which is equal to the daily oil output of Kuwait;

• China's natural gas potential is unknown, but even if significant resources are found, expensive pipelines and distribution systems will need to be created; and,

• Biomass is the main source of energy for 90-100 million Chinese.

For these reasons, nuclear energy is a viable alternative for electric generation in China.

Installed electric generation capacity in China was 215 GW in 1995; it is planned to be 300 GW by 2010 and 553 GW by 2020. At least 17 GW of new capacity must be added each year to meet these goals. In comparison, the United States has an installed generating capacity of 706 GW and added only 5.7 GW in 1995, some of which was equipment to replace old generating units.

Nuclear energy currently accounts for 1.3% of the total Chinese annual energy output. This amount is expected to rise to 3.6% by 2010. China's nuclear capacity will increase to 20 MW per year by 2010, 50 MW by 2020, and 150 MW by 2050.

There are three nuclear plants currently operating in China, with eight more plants under construction. Of the three existing plans, one is a 300 MW plant located in Qinshan (south of Shanghai) and completed in 1991. The other two are French designed 906 MW plants completed in 1993 and 1994 and located in Daya

Bay. Hong Kong receives 70% of its electricity from these two plants.

The Chinese are currently constructing eight new nuclear plants:

• Two 600 MW plants of Chinese design will be located in Qinshan;
• Two Canadian Candu 740 MW plants will also be built at Qinshan;
• Two 985 MW plants of French design are being constructed in Lingao, near the Daya Bay plants; and,
• Two 1000 MW Russian VVER plants will be built at Lianyungang in Jiangsu province, north of Shanghai.

In order for the Chinese to reach their 2010 nuclear goals, they will need to add 11.2 new GW of nuclear energy at an approximate cost of $1 billion per GW. Current Chinese nuclear plants range in size from 600 MW to 1000 MW. In comparison, the United States generates approximately 100 GW of power from 109 nuclear plants. The United States has no current plans for new nuclear plants.

Nuclear Safety

The United States and China have been cooperating on nuclear safety and regulatory matters since 1981. But with nuclear plants coming from France, Canada and Russia, it is to these countries that China now turns for assistance. There are three major nuclear concerns regarding China's program:

• A large variety of nuclear plant designs creates management difficulties. The Chinese need to standardize their plant designs, and are likely to choose a French design. U.S. plant designs are the safest, but U.S. manufacturers are currently restricted from selling nuclear technology to China;
• The disposal of nuclear waste. Nuclear waste in China, however, is relatively minimal, equaling only 20 tons per reactor each year; and,
• Nonproliferation concerns have been the main factor in restricting U.S. nuclear trade with China. The Chinese developed a nuclear bomb in 1964 and signed the Non-Proliferation Treaty (NPT) in 1992. However, the Chinese have supplied Iran and Pakistan with nuclear technology.

One of the major problems facing the implementation of nonproliferation commitments by China is the lack of an adequate export control regime. The Chinese are currently developing such a regime which will go a long way towards assuring the United States government that they will be able to enforce their nuclear non-proliferation obligations.

Prospects for Civilian Nuclear Trade with China

In 1985, President Ronald Reagan signed and Congress approved a joint resolution with the Chinese to open trade in nuclear technology. However, Congress attached non-proliferation conditions to this resolution. This clause stated that before United States trade restrictions could be lifted, the President must certify to Congress that China is not assisting other nations to acquire nuclear weapons. After 1989, additional conditions were added, including an enhanced prohibition on nuclear cooperation and a requirement that the President assure Congress that China is progressing on political reforms.

In order to open trade in civilian nuclear technology with China, the President must: 1) issue four certifications; 2) write a report to Congress; and 3) either issue a statement on China's progress on political reforms or issue a National Interest Waiver for this provision. Congress would have thirty session days to oppose the President's decision, but the President could veto a legislative attempt to maintain restrictions.

The Chinese are currently making progress with their export controls and there is hope that President Clinton will be able to make the certifications that will open nuclear trade with China during Jiang Zemin's visit to the United States later this year.

Summary of Working Group Discussion on Energy Issues

A Government Perspective

There are four general points that stand out from working group discussion:

• **Commitment to Chinese Economic Growth.** This is an issue of credibility with China. The United States needs to assist the Chinese on environmental issues and not attack them: the United States should support Chinese economic development and prove that environmental protection can only be achieved through economic growth. Increased governmental funding and support for environmental investment in China would help accomplish this goal.
• **Coherence of Policy.** This is more of an issue of credibility within the United States. The Clinton Administration needs to clearly articulate an overall U.S. policy towards China: the lack of such of a policy not only impacts government agencies working with their Chinese counterparts, but also U.S. private industry attempting to do business in China. The United States also must stop criticizing every Chinese energy source and instead work with the Chinese to create a credible alternative energy framework which meets their energy needs and economic goals. With a concerted effort in this direction, the United States may very well have an impact on Chinese energy development in the 10th Five Year Plan.

• **Levels of Engagement.** The United States may want to look at new levels of engagement, such as state-province and city-to-city relationships, and multilateral or trilateral engagement. The National Governor's Association or National Conference of Mayors could help develop state-province or city-to-city relationships, and the relationship between the Sigur Center for Asian Studies, the Center for Area Studies of Keio University and the China Institute of Contemporary Relations could provide a strong example of a successful trilateral relationship.

• **Roles of Players.** While the Federal government, NGOs, universities and private business each has a distinct role to play in U.S.-China relations, synergies can clearly be achieved by working together. If this does not occur, we face a dilution of efforts. An example of the usefulness of a coordinated effort can be seen through the accomplishments of the U.S.-Chongqing Task Force on Energy / Environmental Technology Cooperation.

An NGO Perspective

When working with China, it is important for the United States to know exactly what it wants out of the relationship but be prepared to engage on a level that the Chinese feel is important to them; this holds true for NGOs as well. The role of the NGO in China is somewhat unclear. One purpose of NGOs is to initiate and facilitate change, yet this is a new approach for the Chinese culture. It is therefore important for NGOs to proceed cautiously in China, and to work with — not against — the Chinese.

An important way that government, private businesses, and NGOs can work together is to stimulate G-7 interest in environmentally sustainable investment in China. Harmonized standards for bilateral loan guarantees, insurance and investment agencies will facilitate appropriate investment and technology transfer, and will both help China's economic growth and protect its environment.

Domestically, NGOs need to accept that Congress often has conflicting agendas and will constantly change its course in terms of its policies on U.S.-China relations. NGOs need to ensure that their perspective is heard, and be clear about what they hope to gain from engagement with China.

NGOs can also help facilitate communication between different levels of engagement, both domestically and abroad.

A Business Perspective

The United States government should communicate to the Chinese the many benefits of environmentally sensitive growth. The United States needs to recognize that economic growth is a necessary condition for environmental protection when dealing with China. U.S. NGOs, private businesses and government agencies should also assume that there will not be a significant change in U.S. governmental financial support for environment or development projects in China, and should base their strategies on this assumption.

Another important area in which the United States can assist the Chinese is with lead gasoline phaseout and petroleum clean-up. United States policy and technical experience in these areas would be extremely valuable to the Chinese.

An additional approach would be support for energy service companies (ESCOs) that promote energy savings and conservation through private enterprise rather than the central government. These ESCOs have been both financially and environmentally successful.

Science and technology is another key area for U.S.-China cooperation: science and technology opened the door to U.S.-China relations and should still be an important player in developing mutually beneficial relationships.

The United States should address global concerns such as climate change by focusing on local environmental issues, such as energy conservation, epidemiological studies and alternative energy sources, that will have secondary impacts on the global environment. Energy conservation and air pollution reductions can also be sought by relating these issues to China's domestic public health care expenditures.